P. E. SOCIETY'S MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE GANESHKHIND PUNE

DEPARTMENT OF ENGLISH

FYBA REVISED (NEP)

Subject -1/2/3

MINOR FORMS OF LITERATURE

(w. e. f 2024-2025)

Semester: I
Credits: 4
Lectures: 60
Subject code:

Objectives:

1. To introduce students to different texts of minor forms of literature.
2. To encourage students to analyse and appreciate literary text.
3. To help students study the multicultural sensibilities depicted through literary texts.
4. To encourage students to develop their linguistic competency.
5. To boost their understanding and imaginative ideas through practical component
6. To engage students in group activities for sharing, expressing, and developing ideas

Outcomes:

At the end of the course students will be able to
CO 1: understand different forms of minor literature
CO 2: analyse and appreciate literary texts
CO 3: develop their sensibility about many social and humanitarian issues.
CO 4: learn and use new words while paraphrasing and summarizing
CO 5: critically evaluate the text with the help of classroom activities like group discussion etc
CO 6: share and develop their literary knowledge

Unit I – Short Stories **15 Clock Hours**

1. The Verger – W. Somerset Maugham
2. The Homecoming – Rabindranath Tagore
3. The Last Leaf – O. Henry

Unit II – One Act Plays **15 Clock Hours**

1. The Proposal – Anton Chekhov
2. The Monkey's Paw – W.W. Jacobs

Unit III – Essays **15 Clock Hours**

1. The Pleasures of Ignorance – Robert Lynd
2. All About a Dog – A.G. Gardiner
3. Freedom of the Press – Shashi Tharoor

Unit IV - Practical Component **15 Clock Hours**

1. Group activity – Think-pair-share
2. Individual projects based on the literary component
3. Presentations and discussions on themes, central idea, character analysis etc.
4. Group discussion aligned to emerging ideas from the literature component

References:

- Panorama – Values and Skills through Literature. Board of Editors: Orient Blackswan
- Initiations – Minor Literary Forms and Basics of Phonology. Board of Editors: Orient Blackswan
- Pearls of Wisdom – An Anthology of Prose and Poetry. Board of Editors: Orient Blackswan
- A Glossary of Literary Terms. Cencage Learning India Pvt Ltd

P. E. SOCIETY'S MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE GANESHKHIND PUNE
First Year (BA/BCOM/BSC/BCS/BCA/BBA/BIOTECH)
Open Elective (OE-1)
(As per the Revised NEP 2020)
Title of the Paper: English for Advertising
(w.e.f. 2024-25)
(Faculty: Humanities and Interdisciplinary)

Semester-I
Credits-02
Subject Code-
Lectures-30 Clock Hours
Objectives:

1. To enhance students' ability to craft compelling and persuasive written content for advertising

2. To foster creativity and innovation in advertisement writing

3. To build technical and writing skills for various advertising platforms

Course Outcomes:

CO1: The learners will have developed proficiency in persuasive writing for advertising.

CO2: Students will be able to demonstrate creative thinking and innovative approaches in advertising.

CO3: The leaners will be able to write for different advertising platforms while applying their analytical skills to understand the market and audience.

Unit 1: Advertising and English language **15 Hours**

- Introduction to Advertising
- History and Evolution of Advertising
- Types of Advertising
- Importance and Role of English in Advertising
- Guidelines for Writing Advertisements in English

Unit 2: Writing for Advertising **15 Hours**

- Newspaper Advertisements
- Television Advertisements
- Radio Advertisements
- Internet Advertisements

References:

1. *Aspirations: English for Career*. Board of Editors. Orient BlackSwan
2. Schwab, Victor O. *How to write a good advertisement: A Short Course in Copywriting*. Martino Publishing, 2015.
3. Hilliard, Robert L. *Writing for Television, Radio and New Media*. Cengage Learning, 2011.

4. McMahan, Harry Wayne. *The Television Commercial: How to Create and Produce Effective TV Advertising.* Scholar's Choice, 2015.

Chron. *Types of TV Commercials.* March 8.2021. https://smallbusiness.chron.com/types-tv-commercials-57852.html

Progressive Education Society's
Modern College of Arts, Science & Commerce, Ganeshkhind, Pune-16
Academic Year 2024-2025
Department of English

SEC-I (24ENG11405)

English for Office Correspondence

Semester-I
No. of Credits: 02
No. of Hours: 30 Clock Hours
Objectives:

1. To develop proficiency in internal communication in organizations.
2. To enhance skills in external communication such as press releases, conferences etc.
3. To master digital communication tools like email and social networking for engaging external stakeholders and the public.

Course Outcomes:

The learners will have:

CO1: 1. Mastered the drafting of internal communication documents, including memoranda, notices, circulars, and meeting agendas and minutes.

2. Developed skills in crafting external communication materials, such as press releases, press conferences, public notices, magazines, and brochures.

3. Acquired proficiency in utilizing digital communication tools like emails and social networking platforms for effective external communication.

Unit 1 Internal Communication in an Organization 15 hours

- Memoranda
- Notices, Circulars and Orders
- Agenda and Minutes of a Meeting

Unit 2 External Communication 15 hours

- Press Releases, Press Conferences and Public Notices
- Magazines and Brochures
- E-mails and Social Networking

REFERENCES

Sinha, K.K., Business Communication. Taxmann Publications Pvt. Ltd. New Delhi, March 2012.

Horizons: English in Multivalent Contexts, Board of Editors, Orient BlackSwan Publications.

P. E. SOCIETY'S MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE GANESHKHIND PUNE
First Year (BA/BCOM/BSC/BCS/BCA/BBA/BIOTECH)
Ability Enhancement Course (AEC)
(As per the Revised NEP 2020)
Title of the Paper: Communicative Competence in English
(w.e.f. 2024-25)
(Faculty: Humanities and Interdisciplinary)

Sem: I **No. of Credits: 2**

Preamble:

The aim of education is to enhance the ability of learners to acquire knowledge and skills. This course is designed to enhance the linguistic ability or competence of the learners. As per the National Education Policy 2020, students are going to study language skills in this paper. They will learn sub-skills of reading and listening in the first unit. In the second unit, writing skills are introduced. Students will study basics of writing and various forms of writing in this unit.

Course Outcome:

At the end of this course, students will be able to
CO1 read and understand texts in English,
CO2 listen and respond to communication in English,
CO3 speak English in different situations,
CO4 deliver speech in public,
CO5 write letters, memos, notices, agendas and minuets in English,

SYLLABUS

Unit One: Reading and Listening Skills **15 hrs**

A) Reading Skills
- i. Skimming and scanning
- ii. Reading comprehension
- iii. Loud Reading
- iv. Reading and making notes

B) Listening Skills
- i. Active and passive listening
- ii. Listening comprehension
- iii. Listening and responding
- iv. Listening and taking notes

Unit Two: Writing Skills **15 hrs**

A) Writing skills
- i. Paragraph writing
- ii. Expansion of ideas

iii. Summarising and Paraphrasing
iv.

B) Forms of Writing

i. Letter writing
ii. Writing notice, agenda and minutes
iii. Email writing
iv. Writing for Digital Platforms

P.E SOCIETY'S MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE GANESHKHIND PUNE
DEPARTMENT OF ENGLISH
FYBA REVISED (NEP)
Subject – 1/2/3
MAJOR FORMS OF LITERATURE
(w. e. f 2024-2025)

Semester: II
Credits: 4
Lectures: 60
Subject code:

Objectives:

1. To introduce students to the major forms of literature.
2. To encourage them to appreciate and analyse texts according to different genres and periods of literature.
3. To help students enhance their understanding towards different socio, economic and linguistic aspects**.**
4. To explain the literary elements of the major forms of literature
5. To introduce students to the literary devices to evaluate the text

Outcomes:

At the end of the course students will be able to
CO 1: identify different forms and styles of literature.
CO 2: analyse the texts of the major forms of literature.
CO 3: relate many socio, economic and linguistic aspects with the text
CO 4: examine the literary elements of the major forms of literature
CO 5: understand the use of literary devices in the literary text

Unit I – Drama **15 hours**

1. The Importance of Being Earnest – Oscar Wilde

Unit II – Fiction **15 hours**

2. Of Mice and Men – John Steinbeck

Unit III – Poetry **15 hours**

1. Sonnet 116: Let me not to the marriage of true minds – William Shakespeare
2. Telephone Conversation – Wole Soyinka

Unit IV – Practical Component **15 hours**

1. Introducing the literary devices **–** irony, personification, conflict, motif, point of view, satire, metaphor, simile, alliteration, hyperbole, oxymoron.
2. Role play exercises
3. Assignments based on the titles of drama, fiction and poetry

References:

- Elkunchwar, Mahesh. Old Stone Mansion. Ed. Shanta Gokhale. Seagull Books: New Delhi, 1989
- Hemingway, Ernest. The Old Man and the Sea. Penguin: New Delhi, 1994
- Ashok, Padmaja. A Companion To Literary Forms. Orient Blackswan: Hyderabad, 2015
- Abrams, M.H. A Glossary of Literary Terms. Cengage Learning: New Delhi, 2015

P. E. SOCIETY'S MODERN COLLEGE OF ARTS, SCIENCE AND COMMERCE GANESHKHIND PUNE
First Year (BA/BCOM/BSC/BCS/BCA/BBA/BIOTECH)
Open Elective (OE-2)
(As per the Revised NEP 2020)
Title of the Paper: Technical Writing
(w.e.f. 2024-25)
(Faculty: Humanities and Interdisciplinary)

Semester-II
Credits-02
Subject Code-
Lectures-30 Clock Hours

Objectives

1. To Demonstrate rhetorical knowledge to create effective technical writing documents for end users.
2. Apply and adapt flexible writing process strategies to produce clear, high-quality deliverables in a multitude of technical writing genres.
3. To Write clearly, correctly, and concisely.

Outcomes

1. Students learn the fundamentals of Technical Writing.
2. Students learn Applications of Technical Writing.
3. Students learn to write clearly, correctly, and concisely.

Unit 1 – Fundamentals of Technical Writing **10 Hours**

1. Technical Writing Fundamentals
2. Instruction Manual: Getting Started

Unit 2 – Applications of Technical Writing **20 Hours**

1. Instruction Manual: Finalizing the Document
2. Writing a Technical Description

References:

1. Handbook of Technical Writing - Kieran Morgan -

The Insider's Guide to Technical Writing – Krista Van Laan – XML Press

Progressive Education Society's
Modern College of Arts, Science & Commerce, Ganeshkhind, Pune-16
Academic Year 2024-2025
Department of English

SEC-II (ENG12405)

EMPLOYABILITY SKILLS

Semester-II
No. of Credits: 02
No. of Hours: 30 Clock Hours
Objectives:

1. To teach students effective writing and communication skills for specific job needs.
2. To equip students with the skills required to analyze the components and strategies of successful job applications, résumés, and curriculum vitae.
3. To develop communication skills through discussions, mock interviews, and presentations.

Course Outcomes:

The learners will have:

CO1: Crafted polished job materials demonstrating their proficiency in written communication for employability.

CO2: Acquired effective communication skills in employment scenarios such as discussions, interviews and presentations, showing professionalism

CO3: Evaluated the effectiveness of their written and oral communication for employability, identifying and implementing strategies to enhance their communication skills.

Unit 1 –Writing Skills for Employability **15 hours**

- Drafting a Job Application
- Drafting a Résumé
- Drafting a Curriculum Vitae

Unit 2 - Communication Skills for Employability **15 hours**

- Group Discussion
- Interview Skills
- Presentation Skills

REFERENCES

Horizons: English in Multivalent Contexts, Board of Editors, Orient BlackSwan Publications.

Enelow, Wendy S., and Louise M. Kursmark. Modernize Your Resume. JIST Works, 2019.

Whitmore, Lisa M. How to Write an Irresistible Cover Letter. Wiley, 2016.

Yate, Martin John. Knock 'em Dead Cover Letters: Cover Letters and Strategies to Get the Job You Want. Adams Media, 2016.

Carnegie, Dale. The Quick and Easy Way to Effective Speaking. Pocket Books, 1990.

Leat, Mike. Effective Presentation: How to Create and Deliver a Winning Presentation. Kogan Page, 2008.

Mehta, Sanjay, and Sangeeta Shankaran Sumesh. Résumé Building and CV Writing for Indian Professionals: A Comprehensive Guide. Sage Publications, 2018.

Rao, Gayatri. The Perfect Resume for Job Seekers in India: A Comprehensive Guide. Platinum Press, 2019.

First Year (BA/BCOM/BSC/BCS/BCA/BBA/BIOTECH)

Ability Enhancement Course (AEC)

(As per the Revised NEP 2020)

Title of the Paper: Mastering English for Professional Purposes

(w.e.f. 2024-25)

(Faculty: Humanities and Interdisciplinary)

Sem: II **No. of Credits: 2**

Preamble:

The aim of education is to enhance the ability of learners to acquire knowledge and skills. This course is designed to master the linguistic ability of the learners. As per the National Education Policy 2020, students are going to study language advanced language skills in this paper. They will learn sub-skills of speaking in the first unit. In the second unit, professional English skills are introduced. Students will study how to speak in professional context.

Course Outcome:

At the end of this course, students will be able to
CO1 learn correct English sounds.
CO2 develop fluency and clarity of speech.
CO3 speak English in different situations.
CO4 understand to use Phonetics to improve their pronunciation.

Unit One: Speaking Skills **15 hrs**

i. Introducing Yourself and Others
ii. Asking for directions and information
iii. Seeking permission, Giving and Declining Permission
iv. Requesting and Demanding
v. Offering Suggestions
vi. Agreeing, Partly Agreeing and Disagreeing

Unit Two: Professional English **15 hrs**

i. Use of English in Professional Context
ii. Negotiating Skills
iii. Interview Skills
iv. Telephonic Conversation in English
v. English for Virtual Meeting
vi. English for Marketing

Progressive Education Society's

Modern College of Arts, Science and Commerce

(Autonomous)

Ganeshkhind, Pune

www.moderncollegegk.org

F. Y. B. A. Geography Syllabus under Revised NEP

Autonomous Program

(Semester & Choice Based Credit System)

(To be implemented from the Academic Year 2024-25)

Title of the Course: Bachelor of Arts (B.A.) – Geography

Preamble for the syllabus:

Modern College of Arts, Science and Commerce, Ganeshkhind Pune (Autonomous) has decided to change the syllabi of undergraduate courses from June 2022. Considering the dynamic and interdisciplinary nature of the subject, Board of Studies in Geography at Modern College Ganeshkhind has prepared the syllabus of FYBA Geography. UGC model curriculum is followed while framing the syllabus.

Preamble: Students of FYBA will be learning about Physical Geography in general and Geomorphology in specific. The intension is to make students understand the basic concepts in Geomorphology like earth's origin and shape, formation of continents and oceans, theories related to origin of continents and oceans, interior of the earth, erosion and weathering, landforms created by river and sea waves etc.

In Human Geography, students understand the needs of human societies, their formations, development, culture, economy, politics, occupations, trade and commerce etc. within the context of their environment. The interrelationships between societies are studied from local to global and especial study of population, settlements, agriculture etc.

Objectives:

1. To make students understand the basic concepts in Geomorphology.
2. To make students learn theory of continental drift, interior of the earth, rocks etc.
3. To make students know the various landforms created by denudational agents like river and sea waves.

Course Outcome:

Upon successful completion of this course, students will be able to

1. Understand the basic concepts in Geomorphology.
2. Memorize theory of continental drift, interior structure of the earth, rocks etc.
3. Identify landforms created by denudational agents like river and sea waves.

Course Structure

F.Y.B.A. GEOGRAPHY

Semester	Paper code	Paper	Name of the Course	Credits
1		CC 1	Elements of Geomorphology	3
1		SEC 1	Travel and Tourism	2
2		CC 2	Human Geography	3

S.Y.B.A. GEOGRAPHY

Semester	Paper code	Paper	Name of the Course	Credits
3	DSC 5	Major	Oceanography	2
	IKS 1	IKS	Geography of Ancient India	2
	DSC 6	Major	Practical Geography - I	4
	Minor 2	Minor	Population Geography (No Grant)	4
	VSEC 3	Major	Computer Geography	2
	CC	Major	FP 1	2

Semester	Paper code	Paper	Name of the Course	Credits
4	DSC 7	Major	Climatology	4
	DSC 8	Major	Practical Geography - II	4
	Minor 3	Minor	Economic Geography (No Grant)	4
	VSEC 4	Major	Urban Planning	2
	CC	CC	CEP 1	2

Equivalence of Previous Syllabus along with new syllabus

Sr No		Old Course	New Course
1	Paper 1	Physical Geography	Elements of Geomorphology
2	Paper 2	Human Geography	Human Geography

Syllabus FYBA (Revised NEP Autonomous)

FYBA SEMESTER 1

ELEMENTS OF GEOMORPHOLOGY

Total Lectures: 60 Total Credits: 4

Sr. No	Topic	Sub Topic	Teaching Hours
1	Introduction to Geomorphology	• Introduction to Physical Geography • Definition, nature, scope of Geomorphology • Branches and importance of Geomorphology	8
2	Interior of the earth	• Interior of the earth • Wegener's Continental Drift Theory • Meaning, definition, and types of rocks	12
3	Weathering	• Meaning & concept • Physical weathering • Chemical weathering • Biological weathering	10
4	Agents of Erosion and Associated Landforms	• Meaning and agents of erosion • Fluvial landforms • Coastal landforms	20
5	Field Visit	• Visit to any natural features- mountain, river, valley, plateau, forest, beach etc.	10

References:

1. Dayal P. (1996) Textbook of Geomorphology, Shukla Book Depot, Patna
2. Kale V.S. and Gupta A. (2015) Introduction to Geomorphology, University Press, PVT Kolkata
3. Kale V.S. and Gupta A. (2001) Elements of Geomorphology, Oxford University Press
4. Singh Savindra (2000) Physical Geography, Prayag Pushtak Bhavan, University Road, Allahabad
5. Pawar Yogesh and Pawar Nikhil (2016) Elements of Geomorphology, Nirali Prakashan, Pune
6. Ahirrao W. Alizad S. and Dhapte C. (1996) Morphology and Landscape, Nirali Prakashan, Pune
7. Mrs. Padey P. N. (2002) Elements of Physical Geography, Nirali Prakashan, Pune

Syllabus FYBA (Revised NEP Autonomous)

FYBA SEMESTER 2

HUMAN GEOGRAPHY

Total Credits: 4 **Total Lectures: 60**

Sr. No	Topic	Subtopics	Teaching Hours
1	Introduction to Human Geography	1. Definition of Human Geography 2. Nature, scope, and significance of Human Geography 3. Branches of Human Geography	7
2	Population	1. Factors influencing population distribution. 2. Demographic Transition Theory 3. Composition of world and Indian population (Gender and Literacy)	15
3	Settlement	1. Types and patterns of settlements – rural and urban 2. Problems and prospects of urbanization 3. Urbanization in India	14
4	Agriculture	1. Types of agriculture 2. Factors affecting agricultural activity. 3. Problems and solutions of Indian agriculture 4. Recent trends in agriculture	14
5	Field Visit	1. Field visit to any industry, settlement, dam, market, agriculture, slum, institute, dairy etc.	10

References:

1. Chandna R.C. (2010) Population Geography, Kalyani Publisher
2. Hassan M.I. (2005) Population Geography, Rawat Publications, Jaipur
3. Daniel P.A. and Hopkinson M.F. (1989) The Geography of Settlement, Oliver and Boyd, London
4. Musmade Arjun, sonawane Amit and Jyotiram More (2015), Population and Settlement Geography Diamond Publication, Pune
5. Kaushik S.D. (2010) Manavi Bhugol, Rastogi Publication, Meerut
6. Maurya S.D. (2012) Manavi Bhugol, Sharada Pustak Bhawan, Allahabad
7. Hussain M. (1994) Human Geography
8. Perpillou A.V. (1986) Human Geography, Longman, London
9. Ghosh B.N. Fundamentals of Population Geography
10. Money D.S. Human Geography.

Syllabus FYBA (Revised NEP Autonomous)

FYBA SEC 1

TRAVEL & TOURISM

Total Lectures:30 **Credits: 2**

OBJECTIVES:

1. To understand the basic concepts of travel & tourism.
2. To aware the students about significance of tourism.
3. To understand the applications of tourism.
4. To know the employment generation opportunities in the field of tourism.
5. To understand the impact of tourism on physical and man –made environment.

Chapter No.	Chapter Name and Learning Points	Lectures
1	**INTRODUCTION TO TRAVEL & TOURISM** 1. Definition of Travel & Tourism 2. Nature and scope 3. The Tourism industry 4. Tourism: An invisible export 5. India's share in world Tourism 6. Economic multiplier effect 7. International Tourism in India	**6**
2	**TYPES OF TOURISM** 1. Definition of international, domestic, regional & local tourism 2. Purpose of tourism 3. Travel motivators 4. Social & cultural, geo, sports, adventure, agro, heritage, religious, health, business, space, night tourism.	**6**
3	**TOURISM TRANSPORT & ACCOMODATION** 1. Types of accommodations: private hostels, motels, inn etc. 2. Govt. accommodations: tourist homes, guest house, rest house, 3. Youth hostels, tents, caravans, private home accommodations, private lodges, co –operative lodges, accommodation sanstha's etc. 4. Rail yatri bhavan, house boats, dharmashalas & temples etc.	**6**

4	**TOURISM OPERATIONS** 1. Tourism operating procedures, travel agents, types & functions of travel agencies. 2. Tour operators, types and functions of tour operator. 3. Package tours 4. Tourism planning: local, regional, national, international level 5. Passport, VISA, ticket booking, travel insurance, taxes paid by travellers etc. **6.** Emigrations & immigrations, health issues, discipline & behaviour	**6**
5	**APPLIED TOURISM** 1. Short/ Long tour in Maharashtra/ India. 2. Study tour report writing. **3.** Visit to travel/ tour company or presentation.	**6**

References:

1. Sunetra Roday, Archana Biwal, Vandana Joshi (2009) : Tourism Operations & Management
2. A. K. Bhatia (2000) : Tourism Development - Principles & Practices
3. Pran Nath Seth, Sushma Seth Bhat (2000) : An Introduction to Travel & Tourism
4. Robinson H. (1996) : A Geography of Tourism
5. Singh S. N. (1985) : Geography of Tourism & Recreation
6. Bhagwat A. V. Medha Joshi : Geography of Tourism

प्रोग्रेसिव एजुकेशन सोसाइटी,पुणे
मॉडर्न कॉलेज कला, विज्ञान और वाणिज्य
गणेशाखिंड ,पुणे **411 0 16 (** स्वायत्त**)**

कला शाखा
हिंदी पाठ्यक्रम **NEP-2024-25**

क्र.	पाठ्यविषय	क्रेडिट
F.Y.B.A SEM 1	सामान्य हिन्दी 24HIN 11201	4 cr
F.Y.B.A SEM 2	साहित्य विविधा 24HIN 12201	4 cr

बी . ए. प्रथम वर्ष -कला **NEP**

वर्ष **2024- 2025**

हिंदी

प्रथम सत्र (SEM 1)

पाठ्यचर्या: सामान्य हिंदी

Choice Based Credit System

(विकल्प आधारित श्रेयांक पद्धत)

कर्मांक -4 (4 credit)

उद्देश्य:

1. छात्रों को हिंदी के प्रतिनिधि कहानी करो एवं कवियों से परिचित कराना।
2. छात्रों को हिंदी कहानी एवं नई कविता की विशेषताओं से परिचित करना।
3. छात्रों को इंटरनेट की सामान्य जानकारी देना।
4. छात्रों को संवाद कौशल की जानकारी देना।

इकाई	पाठ्यविषय	तसिकाएं
इकाई 1	कहानी साहित्य : 1. हार की जीत: सुदर्शन 2. नैहर छूटा जाए:मालती जोशी 3. पहली चुक: श्रीलाल शुक्ल 4. अकेली: मन्नू भंडारी 5. चीफ़ की दावत: भीष्म साहनी उक्त रचानाओं का कथ्यगत एवं शिल्पगतअध्ययन	20
इकाई 2	काव्य साहित्य: 1. 'कूड़ा बीनते बच्चे' : अनामिका 2. देश कागज़ पर बना नक्शा नहीं होता: सर्वेश्वरदयाल सक्सेना 3. संयुक्त परिवार: राजेश जोशी 4. हॉकी खेलती लड़कियां: कात्यायनी 5. नाच: अज्ञेय उक्त रचानाओं का कथ्यगत एवं शिल्पगतअध्ययन	20
इकाई 3	साहित्येत्तर पाठ्यक्रम: अनुवाद निबंध विज्ञापन सूत्र संचालन	20

पूर्णांक : 100

अंतरिक मूल्यांकन : 40 अंक , सत्रांत परीक्षा: 60 अंक

संदर्भ ग्रंथ :

1.हिंदी साहित्य और भाषा- संपादक हिंदी अध्ययन मंडल सावित्रीबाई फुले पुणे विश्वविद्यालय पुणे, राजकमल प्रकाशन नई दिल्ली।
2. गद्य परिमल: संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, जगतभरती प्रकशन, इलाहाबाद।
3. कथा विहार:संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, स्वर्ण जयंती प्रकाशन, दिल्ली।
4..युगंधारा (कविता संग्रह)- नागार्जुन
6. प्रयोजनमूलक हिंदी के विविध रूप- डॉक्टर राजेंद्र मिश्रा ,राकेश शर्मा, तक्षशिला प्रकाशन , नई दिल्ली।
7. प्रयोजनमूलक हिंदी अधुनातन आयाम- डॉ. अंबादास देशमुख, शैलजा प्रकाशन, कानपुर।

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बी . ए. प्रथम वर्ष -कला **NEP**

वर्ष **2024- 2025**

हिंदी

द्वितीय सत्र (SEM 2)

पाठ्यचर्या: साहित्य विविधा

Choice Based Credit System

(विकल्प आधारित श्रेयांक पद्धत)

कर्मांक -4 (4 credit)

उद्देश्य:

5. छात्रों को हिंदी के प्रतिनिधि साहित्य विधाओं एवं साहित्यकारों से परिचित कराना।
6. छात्रों को हिंदी कहानी एवं नई कविता की विशेषताओं से परिचित करना।
7. छात्रों को इंटरनेट की सामान्य जानकारी देना।
8. छात्रों को संवाद कौशल की जानकारी देना।

इकाई	पाठ्यविषय	तसिकाएं
इकाई 1	गद्य विधा: परिचय, इतिहास एकांकी प्रतिशोध - डॉ. रामकुमार वर्मा व्यंग्य- अकबरी लोटा :अन्नपूर्णानन्द। रेखाचित्र - सुभान खॉ :रामवृक्ष बेनीपुरी निबंध - व्यापारे वसते लक्ष्मी यात्रा वर्णन - एक बूंद सहसा उछली- अज्ञेय	20
इकाई 2	काव्य साहित्य: दो हाथियों की लड़ाई : उदयप्रकाश किताबें झाॉकती है : गुलज़ार उतनी दूर मत ब्याहना बाबा : निर्मला पुतुल तब तुम क्या करोगे? : ओमप्रकाश वाल्मीकि चुनौती : उषा यादव उक्त रचानाओं का कथ्यगत एवं शिल्पगतअध्ययन	20
इकाई 3	साहित्येत्तर पाठ्यक्रम: संवाद कौशल समूह चर्चा इंटरनेट की सामान्य जानकारी, स्ववृत्त-लेखन, सूचना लेखन वाक्य शुद्धिकरण (संज्ञा, सर्वनाम, विशेषण, क्रिया के	20

	संबंध में)	

पूर्णांक : 100
अंतरिक मूल्यांकन : 40 अंक , सत्रांत परीक्षा: 60 अंक

संदर्भ ग्रंथ **:**

1. साहित्य विविधा: संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, पुणे
2. प्रयोजनमूलक हिंदी के विविध रूप- डॉक्टर राजेंद्र मिश्रा ,राकेश शर्मा, तक्षशिला प्रकाशन , नई दिल्ली।
3. प्रयोजनमूलक हिंदी अधुनातन आयाम- डॉ. अंबादास देशमुख, शैलजा प्रकाशन, कानपुर।
4. हिंदी साहित्य का इतिहास: रामचंद्र शुक्ल
5. गद्य परिमल: संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, जगतभरती प्रकशन, इलाहाबाद।
6. कथा विहार:संपा. हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्वविद्यालय, स्वर्ण जयंती प्रकाशन, दिल्ली।

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Progressive Education Society's

Modern College of Arts, Science and Commerce (Autonomous)

Ganeshkhind, Pune 411016

www.moderncollegegk.org

(CBCS pattern to be implemented from 2024-2025)

As Per New Education Policy

Faculty of Humanities

FYBA History Syllabus

Semester - I & II

FYBA History Course Structure
(Semester I & II)

I	History Subject 1 **Concepts in Indian History** (4 Credits) Subject Code: **24HIS11101**	**OE** **Idea of India** (2 Credits) Subject Code: **24HIS11303**
II	History Subject 2 **Makers of Modern Maharashtra 1818-1947** (4 Credits **)** Subject Code: **24HIS12101**	**OE** **History** of **Science and Technology in the world** (2 Credits) Subject Code: **24HIS12303**

Modern College of Arts Science Commerce Ganeshkhind Pune 16 Autonomous
As per New Education Policy -
Faculty of Humanities
Syllabus in History for FYBA (Credit System)
form the Academic Year 2024-2025

Semester: I
Discipline Specific Course (DSC 1) 4 Credits
Title of the Paper: DSC 3: Concept in Indian History
Subject Code: 24HIS11101

Program Objective:

- Students will be acquainted with the social system and Political Thoughts of Ancient, Medieval & Modern India through Historical concepts.
- In this paper students will get conceptual knowledge of pre- History & Proto History.
- Students will gain Knowledge in terms of development of Indian civilization.

Outcomes:

- Students will study the conceptual survey of India from Ancient to Modern.
- To make students familiar with Economic concepts, Socio-political history of Ancient, medieval& Modern India.
- To make students aware about outline of Indian history.

Pedagogy: Lectures/Visual presentation/ Role play/ Critical analysis/Assignments/ Tests/Quiz/Maps./Field visit/ Group Discussion/ Seminar /use of e-learning

Course Content

Module 1 Traditional Knowledge system through Concepts (15 Lectures)

a. Pre-History, Paleolithic, Mesolithic, Neolithic, Chalcolithic, Iron Age & Bronze Age
b. Bharatvarsh, Charvaka, Varnashram, Samskara, Saptang Theory
c. Dandniti, Stupa-Chaitya, Vihar, Tradition of Memorials –Satishila, Hero stone, Alvar-Nayanars,

Module 2 Middle Age of India (15 Lectures)

a. Medievalism, Feudalism, Bhakati Movement, Sufi Movement, Khalifa

b. Cahalisa, Din-i-Ilahi, Jizya Tax, Kingship Theories of medieval India , Vatan, Saranjam, Inam, Jahagir, Ikta, Mansabdari System

Module 3 Concepts in Indian National Movement (15 Lectures)

a. Colonial India, Colonialism, Modernity, Rule of law,
b. Indian Renaissance, Drain of Wealth, Nationalism, Satyagraha , Communalism
c. Economic Nationalism, Capitalism, Marxism, Deindustrialization, Commercialization of agriculture

Module 4 Themes in Independent India (15 Lectures)

a. Integration of Princely states, Indian Constitution , Linguistic Reorganization of States, Mixed Economy, Five Year Economic Planning,
b. Non Alignment Movement, Kashmir Conflicts,

References:

1. Tripathi, R. S. : History of Ancient India; Delhi,1960.
2. Ray Chaudhari, H.C. : Political History of Ancient India; 1938
3. Smith, V. A. : Early History of India; Oxford, 1924.
4. Ghosh, N. W. : Early History of India; Alahabad, 1938.
5. Rapson, E. J. : Ancient India; Cambridge, 1916.
6. Mujumdar R. C.: Ancient India.
7. Das, S. K. : Economic Life in Ancient India; Calcutta, 1925.
8. Chitnis, K. N. : Glimpses of Medieval Indian Ideas and Institutions; 2nd ed., Pune, 1981.
9. Chitnis, K. N. : Socio-Economic Aspects of Medieval India; Pune, 1979.
10. Hasan, Ibn : The Central Structure of the Mughal Empire; London, 1936
11. Thaper Romila : A History of India; Vol.I, Penguin, England, 1966.
12. History and Culture of the Indian People : Bharatiya Vidya Bhavan Series, Vols. I, II, III, IV.
13. Shastri, K. A. N. (ed): Compreshensive History of India; relevant Volume, Delhi
14. Gopal, S. : British Policy in India — 1857-1905; Oxford, 1965.
15. (Sarkar Sumit : Modern India—1885-1947; 1983, Macmillan India Ltd., Delhi.
16. Spear, Percival : Oxford History of Modern India; Oxford, 1965
17. Seshan Radhika, Ideas and Institutions in Medieval India

मराठी संदर्भ ग्रंथ:

1. चिटणीस कृ. ना. मध्ययुगीन भारतीय संकल्प व संस्था
2. पगडी सेतू माधवराव : सुफी संप्रदाय
3. वकील अलीम : 'सूफी संप्रदायाचे अंतरंग', प्रतिमा प्रकाशन

Modern College of Arts Science Commerce Ganeshkhind Pune 16 Autonomous
As per New Education Policy -
Faculty of Humanities
Syllabus in History for FYBA (Credit System)
Form the Academic Year 2024-2025

Semester: I
(Open Elective) 2 Credits
Title of the Paper: OE 1: Idea of India

Subject Code : 24HIS11303

Program Objective:

- Students will be acquainted with rise of Nationalism in India
- In this paper students will get clarity on the Mass movements..
- Students will gain Knowledge in terms of the development of Nation state.

Outcomes:

- The course will enable students to understand the dynamics of Nation building .
- To make students aware about our National Builders.

Pedagogy: Lectures/Visual presentation/ Role play/ Critical analysis/Assignments/ T ests/Quiz/Maps./Field visit/ Group Discussion/ Seminar /use of e-learning

Course content

Unit 1. Gandhian Idea of Nation & State (10 Lectures)

a. Philosophy
b. Mass Movement
c. Non - Violence

Unit 2. Nehruvian Idea of Nation & State (10Lectures)

a. the discovery of India
b. pragmatic idealism
c. foreign Policy & Non Alignment

Unit 3. Ambedkar's vision for Nation & State (10 Lectures)

a. Ideas of Nation and Ambedkar
b. Ambedkar's Scheme of Nation-Building
c. Idea of Social Justice

Reference :

1. Agov, D. : Moderates and Extremists in the Indian Nationalist Movement—1933-1920; Bombay, 1967.
2. Masselos, Jim-Indian, Nationalism : A History; Sterling Publishers Private Ltd., New Delhi, 110016.
3. Heimsath, C. H. : Indian Nationalism and Hindu Social Reform; Princeton, 1964.
4. Ravindra Kumar (ed.) : Essays on Gandhian Politics : The Rowlatt Satyagraha of 1919; Oxford, 1971.
5. Shrinivas, M. N. : Social Change in Modern India; California, 1966.
6. Gandhi, Mohandas K. : An Autobiography : The Story of My Experiments with Truth; Boston, 1957.
7. Gopal, S. : Jawaharlal Nehru; 3 Vols., Oxford, Delhi.
8. Sarkar, Sumit : Swadeshi Movement in Bengal, 1903- 1908; New Delhi, 1973

Modern College of Arts Science Commerce Ganeshkhind Pune 16 Autonomous
As per New Education Policy -
Faculty of Humanities
Syllabus in History for FYBA (Credit System)
Academic Year 2024-2025

Semester: II
Discipline Specific Course (DSC 1) 4 Credits
Title of the Paper: DSC 3: Makers of Modern Maharashtra 1818-1947
Subject Code: 24HIS12101

Course Objectives:
1. To acquaint the students with the history of the notable individuals and institutions of the 19th and first half of the 20th century in Maharashtra.
2. Tracing the personalities who contributed to the making of Modern Maharashtra
3. To understand the nature of political social movement in modern Maharashtra from various perspective
4. to understanding the ideas and institutions of modern Maharashtra

Course Outcomes:
1. Student will develop the ability to analyze sources for 19th and first half of the 20th century in Maharashtra.
2. Student will learn significance of Regional History and Socio- religious reformism foundation of the region.
3. It will enhance their perception of 19th Century Maharashtra.
4. Appreciate the skills of leadership and the Socio-religious System of the Maharashtra.

Pedagogy:
Lectures / Visual Presentation / Critical Analysis / Assignments / Test/ e-learning.

Unit I
Social and Religious Enlightenment : Individuals and Institutions (05 lectures)

- Paramhansa Mandali
- Prarthana Samaj
- Satyashodhak Samaj
- Arya Samaj

Unit II
Feminist Reform Thoughts and Thinkers (15 lectures)

- Gopal Hari Deshmukh
- Savitribai Phule
- Gopal Ganesh Agarkar
- Maharshee Dhondo Keshav Karave
- Mukata Salvi
- Trabai Shinde
- Pandita Ramabai
- Ramabai Ranade

Unit III

Political awareness and Nationalism **(12 lectures)**

- Sarvajanik Kaka
- Lokamanya Tilak
- Gopal Krishna Gokhale
- Mahadev Govind Ranade
- Acharya Vinoba Bhave

Unit IV

Revolutionaries **(14 lectures)**

- Vasudev Balavant Phadake
- Chapekar Brothers
- Rajguru
- Swatantraveer Sawarkar

Unit V

Fight for equality **(14 lectures)**

- Naryan Meghaji Lokhande
- Rajashree Shahu Maharaj
- V R Shinde
- Dr. B R Ambedkar

Reference Books: English

1. Ballhatchet Kenneth, Social Policy and Social Change in Western India. 1817-1830, OUP, 1961.
2. Nurullah Syed and Naik J.P. A History of Education in India (During the British Period) Macmillan and Co.Ltd. Bombay,1951.
3. Paranjpe Shrikant, Dixit Raja and Das C.R. Western India: History Society and Culture, Itihas Shikshak Mahamandal, Maharashtra, Pune-1997.
4. Ravindra Kumar, Western India in the Nineteenth Century: A Study in the Social History of Maharashtra Routledge and Kegan Paul, Toronto, 1968.

मराठी:

१. अत्रे शुभांगी, महाराष्ट्र संस्कृती, डायमंड प्रकाशन, पुणे.१८१८
२. कीर धनांजय, महात्मा ज्योतिराव फुले आमच्या समाजक्रांतीचे जनक, पॉप्युलर प्रकाशन, मुंबई.२०१२
३. कुलकर्णी शिल्पा, महाराष्ट्राचे समाज सुधारक, डायमंड प्रकाशन, पुणे.२०१२
४. कुलकर्णी पु. बा., नाना शंकरशेट यांचे चरित्र, मुंबई,१९५९
५. केतकर कुमार, कथा स्वातंत्र्याची, ग्रंथाली प्रकाशन, पुणे.१९८५
६. गरुड अण्णासाहेब, सावंत बी.बी., महाराष्ट्रातील समाज सुधारणा चळवळीचा इतिहास, कैलास पब्लिकेशन, औरंगाबाद १९८६

७. गर्गे एस. एम., गोपाळ गणेश आगरकर, नॅशनल बुक ट्रस्ट इंडिया, न्यू दिल्ली. १९९६
८.चौसाळकर अशोक, महर्षी विठ्ठल रामजी शिंदे यांचे धर्मविषयक विचार, लोकवाङमय गृह प्रकाशन मुंबई.२००९
९.चौसाळकर अशोक, महाराष्ट्रातील महर्षी विठ्ठल रामजी शिंदे, लोकवाङमय गृह प्रकाशन मुंबई २०११
१०.जावडेकर आचार्य, आधुनिक भारत, कॉन्टिनेन्टल प्रकाशन, पुणे.२०१०
११.दीक्षित राजा. एकोणिसाव्या शतकातील महाराष्ट्रातील मध्यम वर्गाचा उदय, डायमंड प्रकाशन, पुणे. २००९
१२. नरके हरी ,फडके य. दि. महात्मा फुले गौरव ग्रंथ, महाराष्ट्र राज्य संकीर्ण विभाग, मुंबई. १९९३
13. पवार जयसिंगराव, राजश्री शाहू स्मारक ग्रंथ, महाराष्ट्र इतिहास प्रबोधनी, कोल्हापूर. १९९९
१४. पाटील व्ही.बी., महाराष्ट्रातील समाजसुधारणेचा इतिहास, मेहता पब्लिशिंग हाऊस, पुणे. १९७८
१५.फाटक एन.आर., न्यायमूती महादेव गोविंद रानडे यांचे चरित्र, नीलकंठ प्रकाशन, पुणे. १९६६
१६.बगाडे उमेश, महाराष्ट्रातील प्रबोधन आणि वर्गजात प्रभुत्व, सुगावा प्रकाशन, पुणे. २००६ ,
१७.भोळे भा. ल., भारतीय राजकीय विचारवंत, सोलापूर अँड कंपनी पब्लिकेशन, नागपूर. २०१८
१८.भोळे भास्कर लक्ष्मण, महात्मा ज्योतिराव फुले वारसा आणि वसा, साकेत प्रकाशन, औरंगाबाद.२००१
१९. नलिनी पंडित, महाराष्ट्रातील राष्ट्रवादाचा विकास, मॉडनम बुक डेपो, पुणे.१९७४
२०.मोरे सदानंद., लोकमान्य ते महात्मा. राजहंस प्रकाशन. मुंबई.२००७
२१.सरदार ग. बा., अर्वाचीन मराठी गद्याची पूर्वपीठिका, मॉडर्न बुक डेपो , पुणे १९३७.
२२.सरदार ग. बा., आधुनिक महाराष्ट्राचे उपेक्षित मानकरी. सुनंदा प्रकाशन, पुणे १९४१.
२३.सरदार जी. बी., महात्मा फुले व्यक्ती आणि विचार, ग्रंथाली प्रकाशन. पुणे .
२४.सरदेसाई बी. एन., आधुनिक महाराष्ट्र, फडके प्रकाशन, कोल्हापूर.२०००.

Modern College of Arts Science Commerce Ganeshkhind Pune 16 Autonomous
As per New Education Policy -
Faculty of Humanities
Proposed Syllabus in History for FYBA (Credit System)
form the Academic Year 2024-2025
Semester II
(Open Elective) 2 Credits

Title of the Paper: History of Science & technology in the world

Subject Code: 24HIS12303

Course Objectives:

- This course is designed to create awareness about scientific enquiry.
- It aim of the course is to introduced history of Science and Technology to the Students.
- It will enable students to understand scientific innovation from Medieval to Modern period
- The students will understand the Historical development science.

Outcomes:

- It will enable the students to develop a holistic understanding of science and technology in the Western world.
- This course develops the student's view of how science and technology developed in ancient, mediaeval and modern periods.
- Students will be introduced to the achievements made in science by western scientists to enhance their thinking skills.
- Students will be introduced to the discovery of information technology in the 20th century and its impact on society and climate.

Pedagogy: Lectures/Visual presentation/ Role play/ Critical analysis/Assignments/ Tests/Quiz/Maps./Field visit/ Group Discussion/ Seminar /use of e-learning

Course content

Unit I. Concept of Science and Technology (06 Lectures)

a. What is Science & Technology
b. Definition and Scientific Method
c. Philosophy of Science

Unit II. Scientific Revolution (12 Lectures)

a. Renaissance & Science
b. Renaissance Scientist
   - Roger Bacon, Copernicus, John Kepler, Vesalius, Galileo, Newton etc.

c. Development of Printing

Unit III. Technological Innovations (12 Lectures)

a. Geographical Discoveries –
   Telescope & Quadrant, mariner's Compass & Cartography etc.
b. Industrial Revolution & Technology
c. Impact of Science and Technology

Reference Books:

1. Butterfield H, the Origins of Modern Science (1300-1800), the Macmillan Company, New York, 1959.

2. Russel B., The Impact of Science on Society, 1885.

3. Derry T. K. and Williams, T. I., A short History of Technology, OUP,1975.

4. Losee, J. A Historical Introduction to the philosophy of science, Oxford, 1980.

Progressive Education Society's

Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

F. Y. B.A

Introduction:

This is a foundation Course in Psychology. It will cover the classical theories and lay a foundation of what is to come ahead.

Programme Objectives:

1. **Introduce Psychological Concepts**
2. **Provide a foundation in Psychology**
3. **Give an orientation to the different Branches of Psychology**

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions

4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

Eligibility:

Subject List

Course Type	Sr. No.	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Total Marks
Sem I	1	All you want to know about Psychology		3	40	60	100
Sem II	2	Understanding Emotions, Motivation and Personality		3	40	60	100

F.Y.B.A Semester I

Course Code:

Subject Name: All you want to know about Psychology

Total lectures: 12 **Total Credits: 3**

Course Objectives:

Course Outcome:-

Unit	Topic	No of lectures
1	**TOPIC -1 – PSYCHOLOGY: SCIENCE AND PERSPECTIVES** 1.1- Definition, nature and goals of psychology as a science. 1.2- Perspectives–Gestalt, Psychoanalysis, Behaviourst, Cognitive 1.3- Fields – Developmental, Social, Clinical and Counseling, Educational, Industrial,Health, Criminal and Forensic, Sports and Women psychology. 1.4- Methods – Introspection, Observation, Experimental, Survey and Case study.	
2	**TOPIC -2 – BIOLOGICAL BASES OF HUMAN BEHAVIOUR** 2.1- Neuron – Structure and function. 2.2- Neurotransmitters: Serotonin, Dopamine, GABA. 2.3- Nervous system- Central Nervous System (CNS- Brain, Spinal Cord), Peripheral Nervous System (Autonomous Nervous System (ANS), Somatic Nervous System(SNS))2.4- Glandular System: Pituitary, Thyroid, Parathyroid, Adrenal, Gonads.	
3	**TOPIC -3 – SENSATION, ATTENTION AND PERCEPTION** 3.1- Sensation – Definition, nature and process 3.2- Attention – Definition, types, determinants, phenomena - Division of attention,Span of attention. 3.3- Perception – Definition, Gestalt principles and perceptual constancies. 3.4 - Perceptual illusions.	
4	**TOPIC -4- LEARNING AND MEMORY** 4.1- Learning: Definition, nature and types. 4.2- Conditioning – Classical and operant conditioning and their practical applications.4.3- Trial and error – Thorndike's experiment and laws, Insight learning- Kohler. 4.4- Memory: Definition, types - Forgetting and causes of forgetting.	

Reference Books:

F.Y.B.A Semester II

Course Code:
Subject Name: Understanding Emotions, Motivation and Personality

Total lectures: 48 **Total Credits: 4**

Prerequisites: -

Course Objectives:

Course Outcome:-

Unit	Topic	No of lectures
1	**TOPIC – 1- EMOTION** 1.1- Definition, nature and importance of emotion. 1.2- Basic emotions: Joy, Excitement, Tenderness, Sadness, Anger, Fear and Love. 1.3- Theories of emotion: James-Lange, Canon Bard, Schachter, Singer and Lazarus.1.4- EQ – Definition, nature, measurement and importance of EQ	12
2	**TOPIC – 2- MOTIVATION** 2.1- Definition and characteristics – Motivational cycle. 2.2- Types – Biological, Social, Psychological. 2.3- Theories – Arousal, Drive Reduction, Incentive, Humanistic (Maslow). 2.4- Frustration – Sources of frustration, types of conflicts.	12
3	**TOPIC -3- PERSONALITY** 3.1- Nature, definition and misconceptions. 3.2- Freud's psychoanalytical theory of personality. 3.3- Trait approaches to personality: Allport's approach, Eysenck's PEN model, Cattell's16PF, McCrae and Costa's Big-five model. 3.4- Assessment techniques – Behavioural, projective and self-report inventories	12
4	**TOPIC -4 – INTELLIGENCE AND THINKING** 4.1- Intelligence: Definition and basic concepts in measurement (CA, MA, IQ and DQ). 4.2- Theories of Intelligence 4.3- Individual Differences: Mentally Challenged and Gifted People, types and causes. 4.4- Thinking – Definition and types: Logical, problem solving and decision making, Creativethinking.	12

Reference Books:

Progressive Education Society's

Modern College of Arts, Science and Commerce,

Ganeshkhind, Pune 411016.

(Autonomous College)

F.Y.B.A Sociology

Syllabus

(NEP)

(To be implemented from the Academic Year **2023-24**)

P.E. Society's

Modern College of Arts, Science and Commerce

Ganeshkhind, Pune 16.

(Autonomous)

F. Y. B. A. Sociology (w.e.f. June 2023-24)

Code No.	Title of Paper		Credits
Semester – I			
	Sociology beyond commonsense	**Major**	**04**
	Indian Society : Issues and Challenges	**Major**	**02**
	Social Entrepreneurship	**Open Elective**	**02**
	Sociology of Human Resource	**Open Elective**	**02**
	Gender in Everyday life	**SEC/ Vocational**	**02**
	Gender and Media	**SEC/ Vocational**	**02**
	Indian Oral Tradition	**Indian Knowledge System (IKS)**	**02**
Semester – II			
	Sociology: Social Institutions and Change	**Major**	**04**
	Classical Thinkers of Sociology	**Major**	**02**
	Law and Society	**Minor**	**02**
	Introduction to Tribal Culture	**Open Elective**	**02**
	Tribal Livelihood and Challenges	**Open Elective**	**02**
	Gerontology: Concept and Dimensions	**SEC/ Vocational**	**02**
	Gerontology Care and concern	**SEC/ Vocational**	**02**
	Youth Culture and Social Values	**Value Education**	**02**

F. Y. B. A. Sociology

DSC (Major) (Credits – 4)

Semester – I

Sociology Beyond Commonsense

Objectives:

- To understand the social context of emergence of Sociology.
- To introduce basic sociological concepts and subject matter and perspective of Sociology.
- To familiarize students with new avenues in Sociology.

Outcomes:

- The students will be familiar with the basic concepts and subject matter of sociology and communicate them effectively.
- The students will be able to understand the emergence of sociology as a science.
- The students will be able to explore different career opportunities available in Sociology.
- The students will be able to understand how societies have evolved.

I. Emergence of Sociology as a Discipline (15)

a. Sociological Imagination: Beyond Commonsense
b. Emergence of Sociology - Western and Non-Western background, Enlightenment (French and industrial Revolution)
c. Definitions, Nature (Scientific and Humanist) and subject matter of Sociology.
d. Diverse fields and career opportunities in Sociology.

II. Basic Concepts in Sociology (15)

a. Society: Definitions, Characteristics and Changing Types of Society (Gathering and Hunting, Agriculture, Industrial and Neo Liberal).
b. Groups, associations and Social Networks – Concepts, definition and Characteristics

III. Culture: Definition and Types (15)

a. Culture -Definition, Characteristics, Aspects.
b. Types of Culture –Folk, Mass, Popular, Subculture, Counter Culture.
c. Ethnocentrism, Xenophobia, Multiculturalism and hybridization

IV. Inequality and Social Exclusion (15)

a. Social stratification and Social Inequality – Concept, definition and Bases (caste,class, gender, ethnicity and age)
b. Social Exclusion – Definition and Meaning

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Essential Readings:

1. Mills, C. Wright (2000). The Sociological Imagination. Oxford University Press.
2. Macoinis, J. J.,Plaummer, K.(2014). Sociology –A Global Introduction, New Delhi .Pearsons.
3. Scott, J. (2006). Sociology- Key Concepts. New York: Routledge Publication.
4. Haralambos,M., Heald, R.M. (2001). Sociology: Themes and Perspectives. New Delhi: Oxford University Press.
5. Haralambos, M., Holborn, M. (2007). Sociology: Themes and Perspectives.London: Harper Collins Publication.
6. Tischler, Whitten and Hunter, 'Introduction to Sociology', Holt, Rinehart and Winston, 1983
7. Bhasin, K. (2000). Understanding Gender? New Delhi: Kali for Women.
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13. मारुलकर, वि. (२००७). समाजशास्त्र परिचय. कोल्हापूर: फडके प्रकाशन
14. गगनग्रास, ज्यो., येवले सु. (२००३). समाजशास्त्राचा परिचय. पुणे: निराली प्रकाशन.
15. तांबे, श्रुती. लिंगभाव समजून घेताना, मुंबई: लोकवाङ्मय गृह प्रकाशन.
16. आहुजा, रा. (२००७) भारतीय समाज. जयपूर: रावत पब्लिकेशन.
17. पंडित, न. (२००१) 'जागतिकीकरण आणि महाराष्ट्र' मुंबई: लोकवाङ्मय गृह प्रकाशन.
18. सोमण मा. शं., सावळे, सं. (२०१६). समाजशास्त्रीय विचार. पुणे: डायमंड प्रकाशन.

Reference Books:

1. Giddens, A. (2009). Sociology (Sixth Edition).London: Polity Press.
2. Giddens, Anthony, Duneier Mitchell and Appelbaum Richard P. Carr Deborah. 'Essentials of Sociology', W. W. Norton and Company. New York. 2017
3. Horton and Hunt, (1976). Sociology. Tokyo:MacGraw Hill.
4. Rawat, H.K. (2007). Sociology. Jaipur:Rawat Publications.
5. Vidyabhushan and Sachdeva, (2003). Introduction to Sociology. New Delhi:KitabMahal.
6. Deshpande, S. (2006). Contemporary India, Sociological Perspectives. Penguin Pub
7. Ritzer, G. (2011). Sociological Theory', 8th Edition, Mac Grew Hill,
8. Handbook of Sociology, Oxford Publication
9. सोमण मा. शं., सावळे, सं. (२०१६). समाजशास्त्रीय विचार. पुणे: डायमंड प्रकाशन.
10. खातू, ग.(२००४). जागतिकीकरण: परिणाम आणि पर्याय. मुंबई: अक्षर प्रकाशन

DSC (Major) (Credits – 2)

Semester – I

Indian Society: Issues and Challenges

Objectives:

- To familiarize the students to various issues and problems of Indian society
- To enable students to analyze social issues using different sociological perspectives.
- To encourage students to think critically about the constructions of social issues.

Outcomes:

- Students will get familiarize with the various issues and problems of Indian society.
- Students will develop an approach to analyze social issues using different sociological perspectives.
- Students will develop an ability to think critically about the constructions of social issues.

I. Social Issues-Concept and Approaches (15)

a. Concept, definitions and characteristics and consequence of social issues
b. Approaches to social issues : structural-functional, conflict, interactionist
c. Overview of issues of Indian Society

II. Issues related to Gender, Structural, Ethnic and religious dissonance (15)

a. Caste inequality and discrimination: Definition, causes and consequences
b. Issues of religious minorities: Nature, causes and consequences
c. Violence against women: Domestic and sexual violence, human-trafficking: nature and causes.

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Essential Readings

1) Mills, C. Wright (2000). The Sociological Imagination. Oxford University Press.

2) Nelson B. (1984) Making an Issue of Child Abuse. London. Chicago Press

3) Totten S., Pedersen J. (ed) Teaching and Studying Social Issues: Programs and Approaches. USA. Information Age Pub.

4) Manis, J. (1974) Assessing the Seriousness of Social Problems. *Social Problems*, Vol. 22, No. 1, (Oct., 1974), pp. 1-15 Published by University of California Press

5) Samaddar, R. and Samaddar R. (2009) State of Justice in India: Issues of Social Justice. Sage Publication

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7) Parrillo, V. (2008) Encyclopedia of Social Problems (Two Volume Set). SAGE Publications

8) Kornblum W., Julian J. (2011) Social Problems (14th Edition) Prentice Hall

9) Heraud B. and Nursten J. (1970) Sociology and Social Work. Perspectives and Problems. Elsevier Ltd, Pergamon Press

10) AhujaRam, 1993. *Indian Social System*. Jaipur.Rawat Publications.

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12 Deb,Sibnath., 2005. *Contemporary Social Problems in India*. New Delhi,Anmol Publications.

13) Tripathi. R. N., 2011. *Indian Social Problems*, Pinnacle Technology, New Delhi

14) Prasad B.K., 2004. *Social Problems in India*, Vol. I and II, New Delhi.Anmol Publications

Pvt. Ltd.
15) Selwyn Stanley., 2004. *Social Problems in India*. New Delhi.Allied Publishers,
16) Jogan Shankar., 1992. *Social Problems and Welfare in India*. US South Asia Books.
17) Madan G. R., 2009. *Indian Social Problems*. Vol. I and II. New Delhi. Allied publishers,pp-
18) PandeyRajendra., 1994. *Social Problems in Contemporary India*. New Delhi. Ashish Publishing House
19) Purushottam G. S., 2003. *Social Problems in India*, Mumbai.Himalaya Publishing House,
20) Murthy, V and Thakur, J., 2013. 'Scheduled Caste Women: Problems and Challenges'
21) D. Swarupa Rani, Sadu Rajesh,2014. March:'Socio - Economic Status of Dalit Women-A Study In Andhra Pradesh', *Indian Streams Research Journal*, Vol 4, Issue 2, Pp 1- 6 Available athttp://www.isrj.net/UploadedData/4287.pdf
22) Ramnath Sharma ,1982 Indian Social Problems : A Sociological Perspective ,Atlantic Publisher and Distributors , New Delhi
23) Ramnath Sharma ,Bhartiya Samaj Samasyay aur Saskriti ,Atlantic Publisher and Distributors, New Delhi *Indian Streams Research Journal*, Vol 3, Issue 11, Pp 1-7 (2013). Available at http://www.isrj.net/UploadedData/3378.pdf

Reference Books

1) Dandanean Steven P., 2001. *Taking it Big: Developing Sociological Consciousness in PostmodernTimes*. New Delhi. London. Pine Edge Press.
2) GadgilMadhav and GuhaRamchandra, 1996. *Ecology and Equity*. New Delhi. Oxford University Press
3) Giddens Anthony (ed)., 2001. *Sociology: Introductory Readings*. Cambridge, Polity Press.
4) Gupta M. and Chen Martha Alter. 1996. *Health, Poverty and Development in India*. New Delhi. Sage Publications.
5) Mckinney Kathleen and Beck Frank (ed)., 2001. *Sociology through Active Learning*. New Delhi. Pine Edge Press. London.
6) Sen Amartya, 1992. *Inequality Reexamined*. Russell New York. Sage foundation,
7) Vivek P. S., 2002. *Sociological Perspectives and Indian Sociology*. Mumbai. Himalaya Publishing House.
8) Tribhuvan Robin D., 2014, Social Problems and Developmental Issues of Youth. New Delhi. Discovery Publishing House Pvt. Ltd

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1) साळुंखे सर्जेराव. भारतीय समाज आणि सामाजिक समस्या.
२) खडसे भा. कि.. भारतातील सामाजिक समस्या.
3) लोटे रा. ज. २००३. भारतीय समाज आणि सामाजिक समस्या, पिंपळापुरे प्रकाशन नागपूर
4) पाटे सुमन, १९९१. भारतीय सामाजिक समस्या विद्या प्रकाशन, नागपूर
5) ओमन टी के २००५. भारतीय समाजातील समस्या व बाद, अनुवाद- संगीता फाटक, पुणे, डायमंड प्रकाशन.
6) माने माणिक, १९९९ गुन्हेगारीशास्त्र फडके प्रकाशन, कोल्हापूर
7) खडसे भा. कि. १९९९, भारतातील सामाजिक समस्या मंगेश प्रकाशन नागपूर
8) काळदाते सुधा, गव्हाणे गोटे शुभांगी, २००५. गुन्हा आणि समाज पिंपळापुरे प्रकाशन नागपूर
9) कोंडेकर ए. वाय मारुलकर विजय २०१२. भारतातील सामाजिक समस्या फडके प्रकाशन, कोल्हापूर 10) साळुंखे सर्जेराव जत्राटदार मारुलकर २०००. समकालीन भारतातील सामाजिक समस्या नरेंद्र प्रकाशन

F. Y. B. A. Sociology

DSC (Major) (Credits – 4)

Semester - II

Social Institutions and Change

Objectives:

- To acquaint students with basic institutions of society with its newer dimensions.
- To develop critical understanding of the functioning of social institutions.
- To acquaint students with the concept and current versions of socialchange.

Outcomes:

- The students will be able to identify 'Social Institutions' and their newer forms
- The students can effectively understand the nuances of the functioning of social institutions.
- The students will be able to explain 'Social Change' and its different dimensions
- Critical understanding about the causes and consequences of social inequality.

I. Family, Kinship and Marriage **(15)**

a. Social Institution : Concept and Characteristics
b. Family and kinship : Meaning and forms
c. Marriage – meaning, forms and changing trends.(Singlehood, cohabitation, Mixed Family, Gay- Lesbian Marriages).

II. Polity and Economy **(15)**

a. Polity: Meaning Forms. (Monarchy, Democracy, Totalitarianism, Authoritarianism, Neo-liberal state)
b. Economy: Meaning, History and Models. (Capitalism, Socialism, Mixed Economy, Neo liberal)

III. Religion, Education and Media **(15)**

a. Religion: Meaning, Secularization
b. Education – Meaning, Forms (Formal, Non-formal and Role), Challenges in Higher Education
c. Media – Meaning, Types (Print, Electronic, social media and Role)

IV. Social Change **(15)**

a. Social change : Concept and Characteristics
b. Technology and role of State
c. Civil Society and Social movement

d. Modernization, Development and Globalization

***

Essential Readings:

1. Macoinis, J. J.,Plaummer, K.(2014). Sociology –A Global Introduction, New Delhi .Pearsons.
2. Scott, J. (2006). Sociology- Key Concepts. New York: Routledge Publication.
3. Haralambos,M., Heald, R.M. (2001). Sociology: Themes and Perspectives. New Delhi: Oxford University Press.
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F. Y. B. A. Sociology

DSC (Major) (Credits – 2)

Semester – II

Classical Thinkers of Sociology

Objectives:

1. To familiarize the students to the social background of emergence of sociologicalthoughts.
2. To introduce the students to the works of classical sociologists that shaped the discipline.

Outcomes:

- Students will aware of the foundation of 'Sociological Thoughts'
- How these classical thinkers shape the sociological imagination.
- Students will be able to apply this knowledge to understand our surroundings and society at large.

I. The Positivist School (15)

a. August Comte

1. Positivism
2. Law of three stages

b. Emile Durkheim

1. Theory of social facts
2. Theory of suicide

II. Other Important Schools: (15)

a. Conflict School: Karl Marx

1. Historical Materialism
2. Theory of Alienation

b. The Interpretative School: Max Weber

1. Theory of Social Action
2. Ideal Types

Essential Readings

1) Abraham, M.F. 1990. Modern Sociological Theory: An Introduction, New Delhi. Oxford University Press, Pp 72- 143.

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16) Nagla B. K., 2008. Indian Sociological Thought, Jaipur. Rawat Pub, Pp 8-28, 67-70, 93-111, 138-153, 212-225, 303-327
17) Patel Sujata, (ed) 2011. Doing Sociology in India, New Delhi. Oxford, Pp- 11-29
18) Pramanik S. K. 2001. Sociology of G. S. Ghurye, Jaipur., Rawat, Pp-19-30

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1) Das Veena, (ed), 2003. Oxford India Companion to Sociology and Social Anthropology, New Delhi. Oxford University Press,
2) Morrison Ken, 1995. Marx, Durkheim, Weber: Formation of Modern Social Thought, London. Sage,
3) Oommen and Mukherji (ed) 1986. Indian Sociology: Reflections and Introspections, Bombay. Popular Prakashan, Pp 16 – 55
4) Singh Yogendra, 1986. Indian Sociology: Social Conditioning and Emerging Concerns, New Delhi. Vistaar, Pp 1 – 31.
5) Vivek P.S., 2002. Sociological Perspectives and Indian Sociology, Mumbai. Himalaya Publishing House. 6) Speeches and Writings of Dr. B.R. Ambedkar, 1990. Education Department, Govt. of Maharashtra volume. 7., Pp-114-131, 156-185, 178-280, 370-379.

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2. सोमण, एम. एस., साबळे एस. D. 2016. समाजशास्त्रीय विचार, पुणे, डायमंड पब्लिकेशन्स
3. मोटे दादासाहेब, 2005. सोशियोलॉजिकल रिसर्च फाउंडेशन, औरंगाबाद, नक्षत्र प्रकाशन
4. वैद्य, N.S., 1987. समाजवादी, नागपूर. महाराष्ट्र विदयापीठ ग्रंथ निर्निमानंद.
5. गर्गे, एस. M. 1989. इंडियन एथनोलॉजिकल थिसॉरस, पुणे सोसायटी ऑफ सोशल सायन्सेस
7. समाजशास्त्र डॉ. बाबासाहेब आंबेडकर, पुणे. सुगावा पब्लिकेशन्स, 51-132
8. गजेंद्रगड आणि मारुलकर, 2000, समकालीन भारतीय समाजशास्त्रज्ञ, कोल्हापूर, फडके प्रकाशन, ५७-१२३, १४६-१६९, २३६-२५८, ३१६-३२२.
9. गर्गे, एस. एम. 1989. भारतीय सामान्य विज्ञान कोश, पुणे सामाजिक विज्ञान मंडळ
10. सहारे पद्माकर. 2015. भारतीय समाजशास्त्रीय दृष्टीकोन. औरंगाबाद, विद्या बुक्स

F. Y. B. A. Sociology

DSC (Minor) (Credits – 2)

Semester - II

Law and Society

I. **Basic Concepts** **(15)**

a. Law as a social fact
b. Legitimacy of law
c. Law and social institutions

II. **Law and Social Change** **(15)**

a. Law as an instrument of social change – constitution (preamble), role of nation state
b. Case Studies of law and social transformation (Gender, Social Justice, environment , Right to education, work, life)

Essential Readings:

1. Aubert V (ed.) (1969) Sociology of Law. London: Penguin.
2. Banakar R (2003) Merging Law and Sociology: Against theDichotomies in Socio-Legal Research. Berlin: Galda & Wilch
3. Banakar R (2008) The politics of legal cultures. Retfærd: The Nordic Journal of Law and Justice 123(4): 37–60.
4. Banakar R (2009) Law through sociology's looking glass: Conflict and competition in sociological studies of law. In: Denis A and Kalekin-Fishman D (eds) TheISA New Handbook in Contemporary International Sociology: Conflict, Competition, and Cooperation. London: Sage, 58–73.
5. Banakar R and Travers M (eds) (2002) An Introduction to Law and Social Theory. Oxford: Hart.
6. Baxi U (1986) Towards a Sociology of Indian Law. New Delhi: Stavahan.
7. Black D and Mileski M (1973) The Social Organisation of Law. New York: Seminar Press.
8. Moore SF (1973) Law and social change: The semiautonomous social fields as an appropriate subject of study. Law and Society Review 7: 719–746
9. Ramachandran, M. (2013). [Review of *LAW AND SOCIAL TRANSFORMATION IN INDIA*, by K. P. Malik & K. C. Raval]. *Journal of the Indian Law Institute*, *55*(3), 393–398. http://www.jstor.org/stable/43953679

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F. Y. B. A. Sociology

(SEC) (Credits – 2)

Semester – I

Gender in Everyday Life

Objective:

- To understand social construction of gender.
- To understand the manifestation of gender in everyday life.
- To understand the need of gender equality.

Outcome:

- Students will be able to analyze how concept of gender affects their social surroundings.
- Students will be able to orient towards gender equality.

I. Understanding concept of gender (15)

a. Difference between sex and gender
b. Tools of Socialization
c. Masculinity, Femininity

II. Manifestation of gender in everyday life (15)

a. Social Setting and gender
b. Market and Gender
c. Gender Identities
d. Why gender equality is important

Essential Readings:

1. Gauntlett D. . 2002. Media, Gender and Identity: An Introduction. London. Routledgepub.
2. Cynthia Carter, Linda Steiner.2003. Media and Gender: Reader. England. Open University Press.
3. Rosemarie Buikema, Iris van der Tuin. 2009. Doing Gender in Media, Art and Culture. London. Routledge
4. Seth Stephens Davidowitz, 2017. Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are, Bloomsbury Publishing.
5. The Handbook of Gender, Sex, and Media. 2011. Wiley-Blackwell
6. Kosut Mary E. 2012. Encyclopedia of Gender in Media. UK. SAGE Publications
7. MissRepresentation- A documentary directed by Jennifer Siebel Newsom
8. Understanding Gender- Kamala Bhasin/ Trans. Shruti Tambe
9. Beasley, C., 2008. Rethinking Hegemonic Masculinity in a Globalizing World. Men and Masculinities, 11(1), pp.86-103.
10. Generation M: Misogyny in Media and Culture- A documentary by SAGE

F. Y. B. A. Sociology

(SEC) (Credits – 2)

Semester – I

Gender and Media

Objectives:

- To understand contemporary trends in the field of media.
- To understand the role of media in shaping the gender identity.

Outcomes:

- How contemporary media structure works.
- Students will be able to analyze relationship between gender identities and media.

I. Post Truth Politics and Media (15)

a. Capitalists and companies, Government, Market, Audience, Political parties and their intentions.

b. The Filter Bubble, Fake News, Post Truth and Role of Psychological **Factors.**

II. Gender and Media (construction of gender) (15)

a. Representation of Feminine identities in Indian cinema, TV and Advertisements

b. Representation of masculine identities in Media.

c. Representation of Alternate sexualities in Media.

Essential Readings:

1. Gauntlett D. 2002. Media, Gender and Identity: An Introduction. London. Routledgepub.
2. Cynthia Carter, Linda Steiner.2003. Media and Gender: Reader. England. Open University Press.
3. Rosemarie Buikema, Iris van der Tuin. 2009. Doing Gender in Media, Art and Culture. London. Routledge
4. Seth Stephens Davidowitz, 2017. *Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are*, Bloomsbury Publishing.
5. The Handbook of Gender, Sex, and Media. 2011. Wiley-Blackwell
6. Kosut Mary E. 2012. Encyclopedia of Gender in Media. UK. SAGE Publications
7. Miss Representation- A documentary directed by Jennifer Siebel Newsom
8. Understanding Gender- Kamala Bhasin/ Trans. Shruti Tambe
9. Beasley, C., 2008. Rethinking Hegemonic Masculinity in a Globalizing World. Men and Masculinities, 11(1), pp.86-103.
10. Generation M: Misogyny in Media and Culture- A documentary by SAGE

F. Y. B. A. Sociology
(Open Elective) (Credits – 2)
Semester - I
Social Entrepreneurship

Objectives:

- Impart students with the fundamental knowledge of social entrepreneurship
- Managing and achieving growth of social enterprise as a career option.
- To Understand Difference between Social and Commercial Entrepreneurship

Course Outcomes

- Understand the fundamentals of social entrepreneurship
- Recognize opportunities and generate ideas of social enterprises
- To Understand Difference between Social and Commercial Entrepreneurship

I. Introduction to Social Entrepreneurship (15)

a. Definition, concept and nature of social entrepreneurship
b. Emergence of social entrepreneurship as global movement
c. Process of social entrepreneurship
d. Growth of social entrepreneurship

II. Contribution of social entrepreneurship (15)

a. Civil society
b. Government and Non-Government organizations
c. Corporate social responsibility

Essential Reading:

1. Robert A. Philips Margret Bonefiel Ritesh Sharma, Social entrepreneurship, the next big business opportunity Global Vision Publishing House, New Delhi, 2011
2. S.S.Khanka, Entrepreneurship in India, perspective and practice, Akansha publishing house, New Delhi, 2009
3. Jill Kickul and Thomas S.Lyons, Routledge, Understanding social entrepreneurship, the relentless pursuit of mission in an ever changing world, New York, 2012
4. Vasanth Desai, Entrepreneurial development, Himalaya Publishing House, 2008, web resources Bornstein, David, how to change the world: social entrepreneurs and the power of new ideas New York, Ny: oxford university press, 2004
5. Dees, j. Gregory, "the meaning of social entrepreneurship" center for the advancement, 2007. of social entrepreneurship duke universityhttp://www.caseatduke.org/documents/dees_sedef.pdf
6. Martin, roger and Osberg, sally, "social entrepreneurship: the case for definition", Stanford social innovation review. 2008
7. Sharma, S. G. (2009). Corporate Social Responsibility in India: An Overview. *The International Lawyer*, *43*(4), 1515–1533. http://www.jstor.org/stable/40708084

F. Y. B. A. Sociology
(Open Elective) (Credits – 2)
Semester – I
Sociology of Human Resource

Objectives:

- To understand how different social processes create a framework for human resource.
- To acquaint students with changing patterns of human resource.

Outcomes:

- Students will be able to analyze the relationship between social processes and human resource.
- To prepare students for the opportunities and challenges in the field of human resource.

I. Introduction to Human Resource (15)

a. Defining Human Resource
b. Social construction of work and occupation
c. Socialization and power dynamics in organization
d. International Labor framework

II. Contemporary issues and future trends (15)

a. Globalization and workforce
b. Technology and Human resource
c. Gig Economy and alternative forms of work

Essential Reading:

1. Rao, T.V.(et.al): HRD in the New Economic Environment, Tata McGraw-Hill Pub.Pvt, Ltd., New Delhi , 2003.
2. Luthans, Fed : Organisational Behaviour, Tata McGraw-Hill Co. New Delhi , 2004.
3. Stephen, P. Robins : Organisational Behaviour, Prentice-Hall of India Pvt., Ltd., 2004. John, W. NMewstrom & Davis, Ketih : Organisational Behavior (Human Behavior at Work), Tata McGraw-Hill, New Delhi , 2002.
4. Gangadhara Rao, M. & Raok VSP & Narayana, P.S: Organisational Behaviour, Konark Publishing Pvt., Ltd., New Delhi , 2003
5. Holmstrom, Mark, Industry and Inequality, Orient Longman, Hyderabad .
6. Rao, usha, N.J. Women in a Devleoping society, Ashish Pub. House, New Delhi
7. Mazumdar, Dipak & Sarkar, Sandip. (2020). Globalization, Labor Markets and Inequality in India.

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F. Y. B. A. Sociology

(Open Elective) (Credits – 2)

Semester – II

Introduction to Tribal Culture

Objectives:

- To acquaint students with tribal culture.
- To comprehend various issues and challenges faced by tribals.

Outcomes:

- Students will be able to explore tribal studies.
- Students will be able to engage with issues and challenges related to tribal communities.

I. Introduction (15)

a. Tribes: Definition, concept and features
b. Tribes of India - Geographical distribution
c. Elements of tribal culture

II. Sustaining tribal identity: Issues and challenges (15)

a. Commercialization of tribal culture
b. Changing pattern of land and lifestyle
c. Environmental degradation and tribal culture

Essential Readings

1. Vidyarthi L. P. and Rai B. K. 1985, Tribal Cultures in India. New Delhi: Concept Publishing House.
2. Bailey F.G. 'Tribe, caste and nation', OUP, Bombay, 1960.
   i. Furer-Haimendorf C.V. 'Tribes of India – the struggle for survival', OUP, N.Delhi, 1991.
3. Kapadia K.M. 'The criminal tribes of India' In Chacko Pariyaram (ed.) 'Tribal communities and social change', Sage, N.Delhi, 2005.
4. Singh K.S.(ed.) 'Tribal situation in India' Indian Inst. Of Advanced Studies, Simla, 1972.
5. Chavan Ramnath, 'Jati-Jamati'
6. Dube, S.C. ,India's Changing Villages.
7. Haimendorf, Christoph von, Tribes of India;
8. Hasnain, N., Tribes in India.
9. Raza, Moonis and A. Ahmad, An Atlas of Tribal India .
10. Sharma, Suresh, Tribal Identity and Modern World
11. Singh, K.S. , Tribal Situation in India (Indian Institute of Advanced Study)
12. Singh, K.S, Tribal Society
13. Singh, K.S. , Economies of the Tribes and Their Transformation.
14. Singh, K.S, Tribal Movements in India, Vol.I and II
15. Singh, K.S,The Scheduled Tribes .
16. Doshi S.L. : Tribal society in India
17. Bose, N.K. : Culture and Society in India.
18. Bose, N.K. : Tribes In India.

19. Sachidanand. Harijan Elites.
20. Naik, T.B. The Bhils.
21. BeteilIe, A. 'The Concept of Tribe with Special Reference to India'
22. Cohn, B.S. An Anthropologist among Historians.
23. Vidyarthy, L.P. The Tribal Culture of India.
24. Sharma, K.L. Social Stratification and Mobility.
25. Sachidanand. Harijan Elites

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F. Y. B. A. Sociology

(Open Elective) (Credits – 2)

Semester – II

Tribal Livelihood and Challenges

Objectives:

- To understand the interrelationship between nature and tribal livelihood.
- To understand the issues emerging from changing patterns of tribal livelihood

Outcomes:

- Students will be able to assess the condition of tribal livelihood.
- Students will acquaint with existing policy framework, rights and tribal movements.

I. Understanding tribal livelihood (15)

a. Traditional livelihood patterns
b. Economic changes and livelihood
c. Displacement, Migration and unemployment
d. Education and health

II. Tribal rights and policies (15)

a. Tribal movement and its impact
b. Constitutional Framework
c. Government policies for tribals

Essential Readings

1. Vidyarthi L. P. and Rai B. K. 1985, Tribal Cultures in India. New Delhi: Concept Publishing House.
2. Bailey F.G. 'Tribe, caste and nation', OUP, Bombay, 1960.
3. Furer-Haimendorf C.V. 'Tribes of India – the struggle for survival', OUP, N.Delhi, 1991.
4. Kapadia K.M. 'The criminal tribes of India' In Chacko Pariyaram (ed.) 'Tribal communities and social change', Sage, N.Delhi, 2005.
5. Kharat Shankarao, 'Bhatkya Vimukta Jamati va tyanche prashna' Sugava, Pune, 2003.
6. Singh K.S.(ed.) 'Tribal situation in India' Indian Inst. Of Advanced Studies, Simla, 1972.
7. Singh K.S. 'Tribal Movements in India (Vol. I & II), Manohar Prakashan, N.Delhi, 1982.
8. Chavan Ramnath, 'Jati-Jamati'
9. Dube, S.C. ,India's Changing Villages.
10. imendorf, Christoph von, Tribes of India;
11. Hasnain, N., Tribes in India.
12. Raza, Moonis and A. Ahmad, An Atlas of Tribal India .
13. Sharma, Suresh, Tribal Identity and Modern World .
14. Singh, K.S. , Tribal Situation in India (Indian Institute of Advanced Study)
15. Singh, K.S, Tribal Society .
16. Singh, K.S. , Economies of the Tribes and Their Transformation.
17. Singh, K.S, Tribal Movements in India, Vol.I and II .
18. Singh, K.S,The Scheduled Tribes .

19. Doshi S.L. : Tribal society in India.
20. Bose, N.K. : Culture and Society in India.
21. Bose, N.K. : Tribes In India. • Sachidanand. Harijan Elites.
22. Naik, T.B. The Bhils.
23. BeteilIe, A. 'The Concept of Tribe with Special Reference to India'
24. Cohn, B.S. An Anthropologist among Historians.
25. Vidyarthy, L.P. The Tribal Culture of India.
26. Sharma, K.L. Social Stratification and Mobility.
27. Sachidanand. Harijan Elites

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F. Y. B. A. Sociology
(Vocational) (Credits – 2)
F.Y.B.A. - Semester - II

Gerontology: Concept and Dimensions

Objective:

- To develop multidisciplinary approach to understand societal changes and aging.
- To recognize importance of policy framework to address concerns of aging.

Outcomes:

- Recognition of how gerontology can inform analysis of social policies and their applications.
- Ability to communicate effectively with aging population and professionals in the field of aging.

I. Introduction to Gerontology **(15)**

a. Definition and concept of Gerontology
b. Dimensions of aging (biological, cognitive and socio-emotional)
c. Sustainable Development goals and aging (SDG – 3)

II. Policy and aging **(15)**

a. Role of State (Policies and programs)
b. Role of NGOs
c. National Policy of Aging

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Essential Readings:

1. Hooyman, N. R., & Kiyak, H. A. (2011). *Social gerontology: A multidisciplinary perspective* (9th ed.). Upper Saddle River, NJ: Pearson.
2. Cavanaugh, John C., and Fredda Blanchard-Fields. 2017. *Adult development and aging*. 8th ed. Boston: Cengage Learning.
3. Quadagno, Jill. 2018. *Aging and the life course: An introduction to social gerontology*. 7th ed. New York: McGraw Hill.
4. Dannefer Dale & Phillipson Chris (2010): *The Sage Handbook of Social Gerontolog.*London: Sage
5. Wienclaw, Ruth. 2009. "Caring for the Elderly in America." *Research Starters*. Retrieved January 28, 2012 (http://www.ebscohost.com/academic/academic-search-premier).
6. World Health Organization. 2012. "Definition of an Older or Elderly Person." Retrieved January 28, 2012 (http://www.who.int/healthinfo/survey/ageingdefnolder/en/index.html).
7. Bazzini, D.G. and W.D. Mclntosh. 1997. "The Aging Women in Popular Film: Underrepresented, Unattractive, Unfriendly, and Unintelligent." *Sex Roles* 36:531–43.
8. Alam, Moneer, 2006, ‗Ageing in India: Socio-Economic and Health Dimensions', Academic Foundation, New Delhi.

9. Ara, S. (1996) Old age among slum dwellers. New Delhi: South Asia Publishers
10. Martha, B. H.,Jennifer, A. P., and Mark H. W. (2011). Ethics, Aging, and Societythe Critical Turn. New York. Springer.
11. Phillips, J, Ajrouch, K and Hillcoat-Nallétamby, S (2010) ―Key Concepts in Social Gerontology‖. London, Sage.
12. Shankardass, Mala Kapur and Kumar, Vinod (1996 [b]): ―A Sociological Analysis of Support Networks in Old Age in India‖ in V. Kumar (ed) Aging: Indian Perspective and Global Scenario, All India Institute of medical Sciences, New Delhi.

F. Y. B. A. Sociology
(Vocational) (Credits – 2)
Semester - II

Gerontology: Care and Concerns

Objectives:

- To develop multidisciplinary approach to understand societal changes and aging.
- To address the role of community in the process of healthy aging.

Outcomes:

- This academic background is necessary to practice in the field of aging or pursue advance studies in gerontology.
- Generating interest to work with aging population as professional or informal care-givers.

I. Healthy Aging : Knowledge, attitudes and Practices (15)

a. Sociology of aging
b. Role of Community in healthy aging

II. Aging Population : Contemporary Issues (15)

a. Aging and depression
b. Family care, Culture, Ethnicity and aging

Essential Readings:

1. Hooyman, N. R., & Kiyak, H. A. (2011). *Social gerontology: A multidisciplinary perspective* (9th ed.). Upper Saddle River, NJ: Pearson.
2. Cavanaugh, John C., and Fredda Blanchard-Fields. 2017. *Adult development and aging*. 8th ed. Boston: Cengage Learning.
3. Quadagno, Jill. 2018. *Aging and the life course: An introduction to social gerontology*. 7th ed. New York: McGraw Hill.
4. Dannefer Dale & Phillipson Chris (2010): *The Sage Handbook of Social Gerontolog.*London: Sage
5. Wienclaw, Ruth. 2009. "Caring for the Elderly in America." *Research Starters*. Retrieved January 28, 2012 (http://www.ebscohost.com/academic/academic-search-premier).
6. World Health Organization. 2012. "Definition of an Older or Elderly Person." Retrieved January 28, 2012 (http://www.who.int/healthinfo/survey/ageingdefnolder/en/index.html).
7. Bazzini, D.G. and W.D. Mclntosh. 1997. "The Aging Women in Popular Film: Underrepresented, Unattractive, Unfriendly, and Unintelligent." *Sex Roles* 36:531–43.
8. Alam, Moneer, 2006, ‗Ageing in India: Socio-Economic and Health Dimensions', Academic Foundation, New Delhi.
9. Ara, S. (1996) Old age among slum dwellers. New Delhi: South Asia Publishers
10. Martha, B. H.,Jennifer, A. P., and Mark H. W. (2011). Ethics, Aging, and Societythe Critical Turn. New York. Springer.
11. Phillips, J, Ajrouch, K and Hillcoat-Nallétamby, S (2010) ―Key Concepts in Social Gerontology‖. London, Sage.

12. Shankardass, Mala Kapur and Kumar, Vinod (1996 [b]): ―A Sociological Analysis of Support Networks in Old Age in India‖ in V. Kumar (ed) Aging: Indian Perspective and Global Scenario, All India Institute of medical Sciences, New Delhi.

F. Y. B. A. Sociology

(Indian Knowledge System) (Credits – 2)

Semester – I

Indian Oral Tradition

Objectives:

- To make students familiar with importance of oral tradition
- To understand oral tradition as valuable tool for preserving cultural and historical memory.

Outcomes:

- Students will acquaint with dynamic and diverse oral medium for to preserving and transmitting knowledge.
- To engage students with documentation of oral tradition.

I. Understanding oral tradition (15)

a. Oral Tradition: Concept and definition
b. Orality and memory
c. Forms of oral tradition

II. Oral Tradition and Social change (15)

a. Bhakti Tradition
b. Folk Tradition
c. Reformer's Tradition

1. *D. Fairchild Ruggles, Helaine Silverman Intangible Heritage Embodied, 2009 ISBN: 1441900713 Publisher: Springer*
2. Martindale, A., Shneiderman, S., & Turin, M. (2018). TIME, ORAL TRADITION, AND TECHNOLOGY. In P. TORTELL, M. TURIN, & M. YOUNG (Eds.), *Memory* (pp. 197–206). Peter Wall Institute for Advanced Studies. https://doi.org/10.2307/j.ctvbtzpfm.26
3. HANDOO, J. (1994). ORAL LITERATURE IN INDIAN TRADITION: FOLK CATEGORIES AND MODERN INDIAN SOCIETY. *Indian Literature*, *37*(5 (163)), 89–109. http://www.jstor.org/stable/44295583
4. CHOWDHURY, I. (2014). Oral Traditions and Contemporary History: Event, Memory, Experience and Representation. *Economic and Political Weekly*, *49*(30), 54–59. http://www.jstor.org/stable/24479740
5. CHOWDHURY, I. (2014). Speaking of the Past: Perspectives on Oral History. *Economic and Political Weekly*, *49*(30), 39–42. http://www.jstor.org/stable/24479737
6. KAMBLE, V. C., & RANSURE, P. V. (2008). FOLK AND FOLK-LORE CULTURE OF MAHARASHTRA. *Bulletin of the Deccan College Research Institute*, *68/69*, 191–205. http://www.jstor.org/stable/42931206
7. NEMADE, B. (1994). THE SEMANTICS OF ORALITY. *Indian Literature*, *37*(5 (163)), 79–88. http://www.jstor.org/stable/44295582
8. Patil, C. (2000). Tribal Poetry From Maharashtra. *Indian Literature*, *44*(3 (197)), 186–193. http://www.jstor.org/stable/23343206

F. Y. B. A. Sociology

(Indian Knowledge System) (Credits – 2)

Semester – II

Youth Culture and Social Values

Objectives:

- To develop mental, emotional, physical wellbeing and lifeskills.
- To develop an ability to face the contemporary challenges.

Outcome:

- Inculcation of social values, compassion and stability among youth.
- Overall development of personality of student

I. Introduction (15)

a. Youth Culture: Concept and approach
b. Social Values: Concept and definition
c. Dimensions: Historical, Social, Cultural, Economic, Political
d. Youth and Generational conflict

II. Youth and Society (15)

a. Hedonism, Consumption and youth culture
b. Influence of Media on Youth culture
c. Impact of youth culture on society
d. Issues of Youth: addiction, unemployment, sexuality, suicide, relationship issues

Essential Readings:

1. Sociological approaches to the culture of youth : Person as author : Zygulski, Kazimierz International social science journal, XXIV, 2, p. 366-373 Year of publication :1972
2. The Sociology of Youth Culture and Youth Subcultures (Rutledge Revivals): Sex and Drugs and Rock 'n' Roll? Paperback – 20 August 2014 by Michael Brake (Author)
3. Comparative Youth Culture: The Sociology of Youth Cultures and Youth Subcultures in America, Britain and Canada Paperback – 4 July 1985 by Mike Brake (Author)
4. Comparative Youth Culture: The Sociology of Youth Cultures and Youth Subcultures in America, Britain and Canada Mike Brake Rutledge, 01-Feb-2013 - Social Science - 238 pages
5. Sociology of Youth Sterling Rajendra Pandey, 1984 - College students - 187 pages
6. Youth Culture and Social Change: Making a Difference by Making a Noise January 2017 DOI:10.1057/978-1-137-52911-4 ISBN: 978-1-137-52910-7 Authors: Keith Gildart University of Wolver Hampton Anna Gough-Yates ,Sian Lincoln Bill Osgerby
7. कोलाम : सामाजिक-सांस्कृतिक मूल्ये आणि आर्थिक विकास

Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16

NEP 2020 (Autonomous)

Faculty of Commerce

Board of Studies : Accountancy and Taxation

First Year B.Com. (Semester I) NEP 2020

Applicable from AY 2024-25

SUBJECT : FUNDAMENTALS OF FINANCIAL ACCOUNTING

Course Code – 24COB11102 (Theory)

Examination Pattern : CIE 40 + ESE 60 = 100 Marks

Total Credits : 4 (Theory)

Objectives of the Course:-

1. To impart knowledge of basic accounting concepts
2. To create awareness about application of these concepts in business world
3. To impart knowledge regarding finalization of accounts of various establishments.

Course Outcome :-

1. Students will be able to know basic accounting concepts and emerging trends in accounting.
2. Students will be able to complete the accounting records as per double entry system.
3. Students will be able to understand the accounting treatment during reconstruction of partnership firms.

Unit No.	Unit Title	Contents	Purpose skill to be developed of the Course
1.	Fundamentals of Accounting and Emerging Trends in Accounting	• Meaning, definitions of accounting, Rules of Accounting. • Accounting Concepts, Conventions and Principles • Inflation Accounting • Creative Accounting • Environmental Accounting • Human Resource Accounting • Forensic Accounting.	• Knowledge about basic concepts of accounting • Knowledge about recent trends in Accounting
2.	Accounts from Incomplete Records (Single Entry System)	• Introduction of single-entry system and Double entry system • Problems on Conversion of Single Entry into Double Entry	• Knowledge about single entry systems. • Purpose and advantages of double entry system • Process of conversion of single entry into double entry system.
3.	Amalgamation of Partnership Firms	• Meaning and Introduction, Objectives, Methods of accounting, • Practical Problems	• Knowledge about amalgamations of firms. • Process of closure of old partnership firms and opening entries in the amalgamated firm.

Modern College (Autonomous) Ganeshkhind, Pune-16.

4	Conversion of Partnership Firm into Limited Company	• Meaning and introduction, Objectives, Advantages • Calculation of Purchase Consideration • Practical problems	• Process of conversion of a Partnership firm into a Limited Company. • Calculation of Purchase Consideration

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	PowerPoint Presentations	Videos available on YouTube	Library assignment on Types of accounting principles and conventions with its usage and emerging trends in accounting	Students will be able to acquire in-depth knowledge
2	15	PowerPoint Presentations	Videos available on YouTube	Group activity on conversion of single entry into double entry system	Students will be able to understand the process and importance of conversion of single entry into double entry system
3	18	PowerPoint Presentations	Videos available on YouTube	Group activity on Amalgamation of Partnership Firm	Students will be able to understand the process and importance of Amalgamation of Partnership Firm
4	15	PowerPoint Presentations	Videos available on YouTube	Group activity on Conversion of Partnership firm into a Limited Company	Students will be able to understand the process of conversion of Partnership Firm into Limited Company.

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Advanced Accounts	M.C. Shukla, T.S. Grewal, S.C. Gupta	S. Chand Publication	New Delhi.
2.	Financial Accounting for B.Com	CA (Dr.) P.C. Tulsian S.C. Gupta	S. Chand Publication	New Delhi.
3.	Introduction to Accountancy	S.R.N Pillai & Bhagavathi	S. Chand & Company Ltd	New Delhi
4.	Corporate Accounting	Raj Kumar Sah	Cengage Publications	Noida, Uttar Pradesh
5.	Advanced Accounting	S. N. Maheshwari		

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First Year B.Com. (Semester II) NEP 2020

SUBJECT: PRACTICES OF FINANCIAL ACCOUNTING

Course Code – 24COB12102 (Theory)
Examination Pattern : CIE 40 + ESE 60 = 100 Marks
Total Credits : 4 (Theory)

Objectives of the course

1. To impart knowledge of various software used in accounting
2. To impart skills regarding Computerized Accounting
3. To impart knowledge about final accounts of Non-Profit Organisations
4. To impart knowledge about valuation of intangible assets
5. To impart knowledge about accounting for leases

Course Outcome :-

1. Students will be able to understand features and advantages of Computerized Accounting
2. Students can complete final accounts of Non-Profit Organisations
3. Students will be able to know about valuation of intangible assets and accounting for leases

Unit No.	Unit Title	Contents	Purpose/ Skills to be developed
1	Final Accounts of non-profit organization.	• Meaning and Characteristics of NPO • Financial Statements of NPO • Preparation of Income and Expenditure Account, Preparation of Receipt and Payment Account and Balance Sheet of NPO (Problem)	• Understanding the accounting process of accounting of charitable trusts • Recording basic accounting transactions and prepare annual financial statements; and • Analyzing , interpreting and communicating the information contained in basic financial statements and limitation
2	Valuation of Intangibles	• Valuation of Goodwill (Problem) • Valuation of Brands • Valuation of Patents, Copyright and Trademark.	• Learning the concept of intangible assets and the methods of their valuation.
3	Royalty Accounts	• Royalty : Meaning Minimum Rent, Short Workings, recoupment of Short Working, Lapse of Short Working (Journal Entries and Ledger Accounts in the Books of Landlord and Lessee)	• Understanding the process of calculation of Royalty and its accounting treatment in the books of Lessor and Lessee.
4	Computerized Accounting (Theory)	• Meaning of computerized Accounting, features. • Difference in manual and computerized accounting. • Types of Accounting Software • Use, Advantages and disadvantages of Accounting Software.	• Students are expected to acquaint themselves with computerized accounting, its application and utility.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	18	Visit to charitable trust for collection of relevant information	Videos available on YouTube	Visit report	Students will be able to acquire in-depth knowledge
2	15	Case studies on intangible assets and its valuation	Videos available on YouTube	Report writing	Students will be able to acquire in-depth knowledge
3	15	Case studies and expert lectures on Royalty	Videos available on YouTube	NA	Students will be able to acquire in-depth knowledge
4	12	Visit to commercial organisations using accounting software	Videos available on YouTube	Report preparation on computerised accounting software	Students will be able to acquire in-depth knowledge

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Advanced Accounts	M.C. Shukla, T.S. Grewal, S.C. Gupta	S. Chand Publication	New Delhi.
2.	Financial Accounting for B.Com	CA (Dr.) P.C. Tulsian S.C. Gupta	S. Chand Publication	New Delhi.
3.	Financial Accounting	Dr. Kishor Jagtap	Tech- Max Publications,	Pune
4.	Introduction to Accountancy	S.R.N Pillai & Bhagavathi	S.Chand & Company Ltd	New Delhi
5.	Corporate Accounting	Raj Kumar Sah	Cengage Publications	Noida, Uttar Pradesh
6.	Principles of Accountancy	Principles of Accountancy	S.Chand & Company Ltd	New Delhi
7.	Advanced Accounting	S. N. Maheshwari		

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Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
NEP 2020 (Autonomous)

Faculty of Commerce
Board of Studies : Accounting and Taxation
F Y B Com (Semester I)

Subject: (SEC 1) Computerised Accounting

Course Code: 24COB11401A & 24COB12401A (Practical)

Examination Pattern : CIE 20 + ESE 30 = 50 Marks

Total Credits : 2 (Practical)

Course Objective :

The course has been designed to acquaint students with the computerized accounting practices used in the industry. Practical knowledge about accounting software will be provided to the students' along with hands-on experience in the computer laboratories. The course aims at enhancing skills and employability of students.

Course outcome:

1. Students will be able to understand Fundamentals of Tally Such as… Groups, Ledgers, Voucher Types.
2. Students will get acquainted with knowledge of Data Export/ Import & Inventory Records.
3. Students will develop knowledge about Invoicing, Bank Reconciliation & Data Backup.

Contents:

- Tally Fundamentals
- Accounts Masters – Groups, Ledgers, Voucher Types – Create, Display, Alter
- Accounting Voucher Types – Contra, Payment, Receipt, Journal, Sale, Purchase, Debit Note, Credit Note
- Data Export / Import,
- Finalization Adjustment entries
- Inventory Masters – Stock Groups, Unit of Measure, Godowns, Stock Items – Create, Display, Alter
- Invoicing – Enter Purchases / Sales / Debit Note / Credit Note in Invoice Mode – Accounting Invoice, Item Invoice, Additional expenses, Tax ledgers in Invoices
- Bank Reconciliation,
- Data Backup/Restore

Modern College (Autonomous) Ganeshkhind, Pune-16.

Methods of Instruction

- Lecture
- Guest speakers
- Written assignments
- Laboratory practical
- You Tube Video

References :

Sr. No.	Title	Details	Link
1.	Computerised Accounting	YouTube Video	https://www.youtube.com/watch?v=A1Z_uONjgbQ&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg
2.	Advantages and Disadvantages of Computerised Accounting	YouTube Video	https://www.youtube.com/watch?v=xginbhyCKxw&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=2
3.	Accounting Information System	YouTube Video	https://www.youtube.com/watch?v=Jk_oZIFrm8g&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=3
4.	Users interested in Accounting Information	YouTube Video	https://www.youtube.com/watch?v=gK93LP_38AY&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=4
5.	Accounting Softwares	YouTube Video	https://www.youtube.com/watch?v=xmxsmC3f5xg&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=14
6.	Different Versions, Functions and Meaning of Tally	YouTube Video	https://www.youtube.com/watch?v=GqeZsyUKU4Q&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=15
7.	Meaning and features of Tally Prime	YouTube Video	https://www.youtube.com/watch?v=_7rIMIj235s&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=16

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Progressive Education Society's
Modern College of Arts Science and Commerce (Autonomous)
Ganeshkhind, Pune-16
Faculty of Commerce
Board of Studies : Accountancy and Taxation
Applicable from AY 2024-25
FY..OE-3.....SEM - 2
NEP (2020)

Subject: Fundamentals of Accounting **Course Code:**COM 12301(a)
Total Credit: 02 (Theory) **Total Lecture:** 30

Objective of Course:

1. To introduce the basic concepts, Principal and terminologies of Accounting .
2. To introduce the Classification of Account, Golden Rule of Account & Double entry system.
3. To introduce Journal Entries, Ledger Posting & Trail Balance preparation.
4. To acquaint Students with the preparation of the final Account of proprietary Concern.

Course Outcome:

1. Student will develop basic concepts, Principal and terminologies of Accounting .
2. Students will get acquainted with knowledge of classification of Account, Golden Rule of Account & Double entry system.
3. Students will develop knowledge about Journal Entries, Ledger Posting & Trial Balance preparation.
4. Students will get acquainted with knowledge of final Account of proprietary Concern.

Course Content:

Sr. No.	Unit Title	Content	No. Of Lecture	Teaching Methodology
1.	**Introduction to Accountancy**	Meaning, Definition, Basic Accounting Terminologies. Accounting Concepts, Conventions and Principles. Accounting Standards.	6	Classroom lecture, Videos, PPT, Group discussion,Assignment, Tutorials.
2	**Introduction of Double Entry system**	Meaning and Definition of Double entry System. Classification of Accounts. Golden Rules of Debit	6	
3	**Journal & Ledger Account**	Meaning, Definition of Journal. Format of Journal & Recording of Journal entries. Meaning, Definition of Ledger. Format of Ledger & Posting of entries from Journal.	6	
4.	**Final Accounts of a Proprietary Concern**	Meaning, Importance of Final statements of accounts.Preparation of Trading Account, Profit and Loss Account & Balance Sheet.	12	

Modern College (Autonomous) Ganeshkhind, Pune-16.

Reference:

Sr. No.	Title of Book	Author	Publication	Place
1.	Advanced Accounts	M.C. Shukla, T. S. Grewal, S.C. Gupta	S Chand Publication	New Delhi
2	Introduction to Accountancy	S.R.N. Pillai & Bhagavathi	S Chand & Co. Ltd	New Delhi
3	Advanced Accounting	S N Maheshwari		

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Progressive Education Society's

Modern College of Arts, Science and Commerce Ganeshkhind Pune 53(Autonomous)

Faculty of Commerce

Board of Studies: Banking and Finance

First Year B. Com Sem I w.e.f 2024-25 (Under revised guidelines given by NEP)
Subject Name: Basics of Banking
Subject Code: -

Name of the Vertical: Vertical I (VI)
Credits Assigned: 4 (60 lectures)
Examination: 30 CIE + 70 ESE = Total 100

Sr. No.	Title	Units	Objectives	No. of Lectures
1	Evolution of Banking	Meaning, Definition, features andOrigin of word 'Bank' Overview of development of banking inthe world Development of Banking in IndiaTypes of Banks in India	To make the students aware about the evolution of banking.	15
2	Functions of Bank	a. Primary Functions Mobilization of deposits Loans and Advances Investments	To make the students understand about the functionsof bank	15

		b. Secondary Functions **i.** Agency services and roles played bybank **ii.** Utility Services **iii.** Distribution of Third-Party Products, Bank assurance, Mutual Funds, Debit Card, Credit Card **iv.** Non-Fund Based Credit Facilities- Letter of Credit, Bank Guarantee andDeferred Payment. **v.** Government Business – CollectingGST, Stamp Duty, Excise duty, etc. c. Remittance of money RTGS, NEFT, IMPS, SWIFT		
3	Deposit Account Opening and Operation	**a.** Meaning and Importance of KYC **b.** Need of Nomination **c.** Account opening procedure **d.** Savings account operation **e.** Term deposit account operation **f.** Closure of deposit account **g.** Death claim procedure	**1.** To ensure banking inclusionand literacy of the students **2.** To make the students awareabout the various transactions	15
4	Types of Customers	**a.** Individuals/ Business/ Professionals **b.** Single and joint account **c.** NRI/ NRE accounts **d.** Institutional bank customers Sole proprietorship concern, partnership concerns, joint stock company, Hindu undivided family, non-trading concerns	To educate the students about the various customers handled by bank.	15
		Total lectures		60

Progressive Education Society's

Modern College of Arts, Science and Commerce Ganeshkhind Pune 53(Autonomous)

Faculty of Commerce

Board of Studies: Banking and Finance

First Year B. Com Sem II w.e.f 2024-25 (Under revised guidelines given by NEP)
Subject Name: Practices of Banking

Subject Code: -

Name of the Vertical: Vertical I (VI)

Credits Assigned: 4 (60 lectures)

Examination: 30 CIE + 70 ESE = Total 100

Sr. No.	Title	Units	Objectives	No. of Lectures
1	Lending Principles	1.Primary Principles Liquidity and profitability and conflict management by bank 2. Secondary Principles Safety, Diversification of risk, marketability of security, anticipation of income, national interest 3. CIBIL 4. SARFAESI Act 2002	To make the students aware about the banking business.	15

2	Negotiable Instrument	1.Definition and features 2. Meaning, features and types of Promissory notes, bills of exchange and cheque 3.Crossing, Dishonor, Return of cheque	To make the students aware bout the various negotiable instruments used in banking operations.	15
3	Endorsement	1.Meaning, effects, and legal provisions of endorsements 2. Types of endorsements Blank, full, partial, restrictive, conditional, sans recourse, facultative	To make the student understand about endorsement used in banking transactions.	15
4	Bank Technology	1.Role of technology in banking 2. Automation in Banking ATM, Cash Depsoit Machine, Cheque Deposit Machine, Printing of Passbook, Note counting machine, Fake note detecting machine 3. E-banking Debit and credit card, Internet banking, Mobile banking apps, BHIM, UPI 4. Digital banking products 5. Risk associated 6. Secure Digital Banking	To ensure the digital inclusion of the students. To make the student aware about the safety in digital banking.	15
		TOTAL		60

First Year B. Com Sem I

Subject Name: Banking Operations

Subject Code: -

Name of the Vertical: Open Elective

Credits Assigned: 2 (30 lectures)

Examination: 25 CIE + 25 ESE = Total 50

Sr. No.	Contents	No. of Lectures
1	Introduction to Banking • Meaning and Definitions • Basic Concepts • Functions • Scheduled Commercial Banks • Classification of banks in India	10
2	Banking Operations • Opening an account and KYC Compliance • Depositing and Withdrawal of Money • Cheques and Crossing of Cheques • FD operations • Methods of Remittances • Electronic Payments • Risk in banking and Cyber Security • Closing of an account	20
	Total lectures	30

First Year B. Com Sem II

Subject Name: Digital Banking

Subject Code: -

Name of the Vertical: Open Elective

Credits Assigned: 2 (30 lectures)

Examination: 25 CIE + 25 ESE = Total 50

Sr. No.	Contents	No. of Lectures
1	Introduction to Digital Banking • Meaning and features of digital banking • Evolution and growth • Digital banking: Advantages and threats • Types of digital banks • Digital banking products • Future trends in digital banking • Role of AI in digital banking	15
2	Operations in digital banking • Operating ATM, Debit and credit card • Various electronic transactions-Internet banking, NEFT, RTGS, IMPS, SWIFT, UPI, BHIM etc. • Various mobile banking apps • Secure Digital Banking	15
	Total lectures	30

Progressive Education Society's

Modern College of Arts, Science and Commerce Ganeshkhind Pune 53(Autonomous)

Faculty of Commerce

Board of Studies: B. Com (Accounting and Finance- BAF)

First Year B. Com (Accounting and Finance (BAF) Sem II w.e.f 2024-25
(Under revised guidelines given by NEP)

Subject Name: Banking Practices

Subject Code: 24BAF12101

Name of the Vertical: Vertical I (VI)

Credits Assigned: 4 (60 lectures)

Examination: 30 CIE + 70 ESE = Total 100

Sr. No.	Title	Units	Objectives	No. of Lectures
1	Lending Principles	**1.** Primary Principles Liquidity and profitability and conflict management by bank **2.** Secondary Principles Safety, Diversification of risk, marketability of security, anticipation of income, national interest **3.** CIBIL **4.** SARFAESI Act 2002	To make the students aware about the banking business.	15

2	Negotiable Instrument	1.Definition and features 2.Meaning, features and types of Promissory notes, bills of exchange and cheque **3.** Crossing of cheque **4.** Dishonor of cheque **5.** Return of cheque	To make the students aware bout the various negotiable instruments used in banking operations.	15
3	Endorsement	**1.** Meaning, effects, and legal provisions of endorsements **2.** Types of endorsements Blank, full, partial, restrictive, conditional, sans recourse, facultative	To make the student understand about endorsement used in banking transactions.	15
4	Bank Technology	**1.** Role of technology in banking **2.** Various machines used in bank ATM, Cash Depsoit Machine, Cheque Deposit Machine, Note counting machine, Fake note detecting machine **3.** Use of technology in banking Debit and credit card, Internet banking, Mobile banking apps, BHIM, UPI **4.** Digital banks **5.** Risk in use of technology in bank **6.** Precautions in using bank technology	To ensure the digital inclusion of the students. To make the student aware about the safety in digital banking.	15
		TOTAL		**60**

PES's Modern College of Arts, Science & Commerce, Ganeshkhind, Pune 411016.

Faculty of Commerce

Board of Studies for B.Com. Accounting and Finance

[Revised NEP Syllabus from academic year 2024-2025]

Semester I : Business Mathematics : Course Code – 24BAF11103 : 4 credits

Objectives of the Program

1. To introduce the basic concepts in Finance and Business Mathematics.
2. To familiar the students with applications of Mathematics in Business.
3. To acquaint students with decision making in business using LPP

Semester I : Business Mathematics : 4 credits **Assessment structure : Internal-CIE 40 and External 60 = Total marks 100**			
	Unit Title	Contents	Purpose /skill to be developed
1.	**Interest & Annuity**	Concept of Present Value and Future Value, Simple Interest Compound Interest, Nominal and Effective Rate of Interest Meaning of Annuity, Equated Monthly Installments (EMI) by interest of Reducing Balance and Flat Interest methods Examples and Problems.	• To understand the concept of Simple interest, compound interest, effect of compounding. • To understand the concept of Annuity and its applications for EMIs and Amortization Schedule.
2.	**Shares**	Concept of Share, Face Value, Market Value, Dividend, Brokerage, Equity Shares, Preferential Shares, Bonus Shares. Concept of Mutual Funds, simple examples Examples and Problems.	• To understand the concept of shares and mutual funds. • To understand contribution of shares and mutual funds in systematic investment plans • To solve problems related to shares and mutual funds

3.	**Matrices & Determinants (upto 3 order only)**	Definition of a matrix ,Types of Matrices ,Algebra of Matrices Determinants, Adjoint of Matrix Inverse of a Matrix via Adjoint Matrix , applications in Business & Economics, Examples & Problems	• To understand the concept of matrices and determinants. • To understand applications of matrices and determinants in business and economics.
4.	**Linear Programming Problems [L.P.P.]** **(for two variables only)**	Definition & terms in the LPP Formulation of LPP Solution by Graphical method Examples & Problems	• To understand the concept of LPP and its application in business and decision making. • To understand graphical method to solve business optimization problems with two variables.

Semester II : Business Statistics : Course Code – 24BAF12103 : 4 credits

Assessment structure : Internal-CIE 40 and External 60= Total marks 100

Objectives of the Program

1. To introduce the basic concepts in Finance and Business Statistics
2. To familiar the students with applications of Statistics in Business.
3. To acquaint students with some basic concepts in Statistics.
4. To learn some elementary statistical methods for analysis of data.

	Topics		
1.	**Introduction to Statistics and Data presentation with Frequency distribution**	Definition of Statistics, Scope of Statistics in Economics, Management Science and Industry Concept of Population and Sample, Methods of Data Collection, Census & Sampling with illustration Methods of Random Sampling – SRSWR, SRSWOR, Stratified, Systematic (Description of sampling procedures only) Frequency distribution, Raw Data, Attributes and Variables Classification of data ,Frequency distribution, Cumulative frequency distribution	• Collection of data • Analyzing and interpreting data. • Knowing different method of sampling • To classify and represent data in tabular form.
2.	**Measures of Central Tendency**	Requisites of ideal measures of central tendency ,Arithmetic Mean, Median and Mode for ungrouped and grouped data. Combined mean ,Merits and demerits of measures of central tendency Examples and problems.	• To compute various measures of central tendency.
3.	**Measures of Dispersion**	Measures of Dispersion ,Concept of dispersion, Measures of dispersion ,Range, Variance, Standard deviation (SD) for grouped and ungrouped data Combined SD , Measures of relative dispersion : Coefficient of range, Coefficient of Variation Examples and problems.	• To compute various measures of dispersion.

4.	**Correlation & Regression**	Concepts & types of correlation Scatter diagram, Karl Pearson's coefficient of correlation for ungrouped data, Spearman's rank correlation coefficient. Concept of regression[theory] Examples and problems.	• To use correlation for knowing the relationship between two variables. • To understand regression for prediction

Teaching Methodology

Topic no	No of lectures	Innovative methods	Expected Outcome
Semester I			
1	15	ICT	Students will be able to apply the concept of interest and calculation of EMI
2	15	ICT	Students will be able to calculate dividend, return on shares. Students will be able to apply contribution of shares as a systematic investment plan
3	15	ICT	Students will be able to apply the theory of matrices to solve business and economic problems.
4	15	ICT	Students will be able to formulate LPP and its application in business and decision making.
Semester II			
Topic No	No of lectures	Innovative methods	Expected Outcome
1	15	ICT	Students will be able to recognize different types of data and also understand the concept of statistics, it's scope and sampling Students will be able to know the Classification of data & Frequency distribution
2 & 3	30	ICT	Students will be able to use appropriate measure of central tendency-Mean ,Mode & Median & measures of Dispersion
4	15	ICT	Students will able to predict the type of relationship between bivariate data. Students will be able predict the value of unknown from give bivariate data

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Practical Business Mathematics	S. A. Bari	New Literature Publishing Company	New Delhi
2.	Mathematics for Commerce	K. Selvakumar	Notion Press	Chennai
3.	Business Mathematics with Applications	Dinesh Khattar & S. R. Arora	S. Chand Publishing	New Delhi
4.	Business Mathematics and Statistics	N.G. Das & Dr. J.K. Das	McGraw Hill	New Delhi
5.	Fundamentals of Business Mathematics	M. K. Bhowal	Asian Books Pvt. Ltd	New Delhi
6.	Operations Research	P. K. Gupta & D. S. Hira	S. Chand Publishing	New Delhi
7.	Mathematics for Economics and Finance: Methods and Modeling	Martin Anthony and Norman Biggs	Cambridge University Press	Cambridge
8.	Financial Mathematics and Its Applications	Ahmad Nazri Wahidudin	Ventus Publishing ApS	Denmark
9.	Fundamentals of Mathematical Statistics	Gupta S. C. and Kapoor V. K.:,	Sultan Chand and Sons	23, Daryaganj, New Delhi 110002
10.	Statistical Methods	Gupta S. P.:	Sultan Chand and Sons	23, Daryaganj, New Delhi 110002
11.	Applied Statistics	Mukhopadhya Parimal	New Central Book Agency Pvt. Ltd.	Calcutta.
12.	Fundamentals of Statistics	Goon A. M., Gupta, M. K. and Dasgupta, B.	World Press	Calcutta.

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Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16

NEP 2020 (Autonomous)

Faculty of Commerce

Board of Studies : B.Com. (Accounting & Finance) (BAF)

First Year B.Com. (Accounting & Finance) (BAF)

(Semester I) NEP 2020

Applicable from AY 2024-25

SUBJECT : SEC-1 : BASICS OF INDIAN STOCK MARKET & OPERATION

Course Code – 24BAF11102 (Theory)

Examination Pattern : CIE 20 + ESE 30 = 50 Marks

Total Credits : 2 (Theory)

Objective of the Course:-

1. To impart knowledge of basic concepts of Indian Stock market.
2. To create awareness about investment and trading and several instruments available in stock market
3. To impart knowledge regarding systematic methodology about investing and trading.

Course Outcome:

1. Students will develop an understanding of basic concepts of Indian Stock market.
2. Students will get acquainted with knowledge of different styles of trading and investing.
3. Students will develop knowledge about Investment and techniques and disciplined approach towards fund growth.

Unit No.	Unit Title	Contents	Purpose skill to be developed ofthe Course
1.	Overview of Indian Stock Market	Meaning & Functions, Stock Exchange & Indices – NSE, BSE, NCDEX, Nifty, Sensex Primary market- Process of New Issue (IPO) & Participants Segments of Secondary market& Participants: Equity, Futures, Options & Swaps	• Knowledge about basicconcepts of Indian Stock market • Knowledge about Process & participants of Indian Stock market
2.	Investing & Trading in Stock Market	Investment: Meaning, Styles of Investing: Growth v/s Value v/s Momentum, Long and Medium term Popular Instruments: Equity, Index fund, Exchange traded funds, Mutual fund, Bonds, Role of fundamental analysis in investing. Trading: Meaning, Styles of trading- Swing, Scalping, HFT, Momentum, Algorithmic trading. Popular Instrument: Equity, Futures & option, bond, commodity, forex.	• Knowledge Types of investing • Different financial instruments • Process & different Styles of trading financial instruments

3.	Regulatory Framework	SEBI – Objectives, Role, Powers and functions, Steps taken for Investor Protection - Insider Trading – Due Diligence of Insiders & Insider trading. Credit Rating Agencies- Role & Functions.	• Knowledge about regulatory framework of Indian Stock market. • Knowledge about financial market reforms.

Teaching methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	10	PowerPoint Presentations	Videos available on YouTube	Live market analysis of Indices and price behavior	Students will be able to acquire in-depth knowledge
2	12	PowerPoint Presentations	Videos available on YouTube	Chart Analysis: Various indicators and their functioning	Students will be able to understand behavior and movement of instruments prices
3	8	PowerPoint Presentations	Videos available on YouTube	Building Investment Strategies based on fundamental and technical analysis	Students will be able to understand factors that govern investment decision

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Indian Financial System	Pathak, Bharati	Pearson Education	New Delhi.
2.	Capital Markets and Financial Services	Mahesh Kulkami & Dr Suhas Kulkami	Nirali Publications	Mumbai
3.	Capital Markets in India	Rajesh Chakraborthy, Sankar D.E	Sage Publications	New Delhi

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Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16

NEP 2020 (Autonomous)

Faculty of Commerce

Board of Studies : BCom Accounting and Finance (BAF)

F Y B Com (Semester II)

Subject: (SEC 2) Computerised Accounting

Course Code: 24BAF12401 (Practical)

Examination Pattern : CIE 20 + ESE 30 = 50 Marks

Total Credits : 2 (Practical)

Course Objective :

The course has been designed to acquaint students with the computerized accounting practices used in the industry. Practical knowledge about accounting software will be provided to the students' along with hands-on experience in the computer laboratories. The course aims at enhancing skills and employability of students.

Course outcome:

1. Students will be able to understand Fundamentals of Tally Such as… Groups, Ledgers, Voucher Types.
2. Students will get acquainted with knowledge of Data Export/ Import & Inventory Records.
3. Students will develop knowledge about Invoicing, Bank Reconciliation & Data Backup.

Contents:

- Tally Fundamentals
- Accounts Masters – Groups, Ledgers, Voucher Types – Create, Display, Alter
- Accounting Voucher Types – Contra, Payment, Receipt, Journal, Sale, Purchase, Debit Note, Credit Note
- Data Export / Import,
- Finalization Adjustment entries
- Inventory Masters – Stock Groups, Unit of Measure, Godowns, Stock Items – Create, Display, Alter
- Invoicing – Enter Purchases / Sales / Debit Note / Credit Note in Invoice Mode – Accounting Invoice, Item Invoice, Additional expenses, Tax ledgers in Invoices
- Bank Reconciliation,
- Data Backup/Restore

Methods of Instruction

- Lecture
- Guest speakers
- Written assignments
- Laboratory practical
- You Tube Video

References :

Sr. No.	Title	Details	Link
1.	Computerised Accounting	YouTube Video	https://www.youtube.com/watch?v=A1Z_uONjgbQ&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg
2.	Advantages and Disadvantages of Computerised Accounting	YouTube Video	https://www.youtube.com/watch?v=xgjnbhyCKxw&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=2
3.	Accounting Information System	YouTube Video	https://www.youtube.com/watch?v=Jk_oZIFrm8g&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=3
4.	Users interested in Accounting Information	YouTube Video	https://www.youtube.com/watch?v=gK93LP_38AY&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=4
5.	Accounting Softwares	YouTube Video	https://www.youtube.com/watch?v=xmxsmC3f5xg&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=14
6.	Different Versions, Functions and Meaning of Tally	YouTube Video	https://www.youtube.com/watch?v=GqeZsyUKU4Q&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=15
7.	Meaning and features of Tally Prime	YouTube Video	https://www.youtube.com/watch?v=_7rlMIj235s&list=PL3XU4dkmwc1dAIGr6F4EOv2wa6AfJjarg&index=16

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Progressive Education Society's

Modern College of Arts, Science and Commerce Ganeshkhind Pune 53(Autonomous)

Faculty of Commerce

Board of Studies: B. Com (Accounting and Finance- BAF)

First Year B. Com (Accounting and Finance- BAF) Sem I w.e.f 2024-25 (Under revised guidelines given by NEP)
Subject Name: Fundamentals of Banking
Subject Code: - 24BAF11101

Name of the Vertical: Vertical I (VI)
Credits Assigned: 4 (60 lectures)
Examination: 30 CIE + 70 ESE = Total 100

Sr. No.	Title	Units	Objectives	No. of Lectures
1	Evolution of Banking	Meaning, Definition, features andOrigin of word 'Bank' Overview of development of banking in the world Development of Banking in India Types of Banks in India	To make the students aware about the evolution of banking.	15
2	Functions of Bank	a. Primary Functions Mobilization of deposits Investments Loans and Advances	To make the students understand about the functionsof bank	15

		b. Secondary Functions **i.** Agency services and roles played bybank **ii.** General Utility Services **iii.** Distribution of Third-Party Products, Bancassurance, Mutual Funds, Issuance of Credit Card, andDebit Card **iv.** Non-Fund Based Credit Facilities- Letter of Credit, Bank Guarantee andDeferred Payment. **v.** Government Business – CollectingGST, Stamp Duty, Excise Payment, etc. c. Remittance of money IMPS. RTGS, NEFT, SWIFT		
3	Deposit Account Opening and Operation	**a.** Meaning and Importance of KYC **b.** Nomination and its importance **c.** Account opening procedure **d.** Savings account operation **e.** Fixed deposit account operation **f.** Closer of deposit account **g.** Death claim procedure	**1.** To ensure banking inclusionand literacy of the students **2.** To make the students awareabout the various transactions	15

4	Types of Customers	**a.** Single and joint account **b.** Individual bank customers Minor, married women, pardanshin women NRI **c.** Institutional bank customers Sole proprietorship concern, partnership concerns, joint stock company, Hinduundivided family, non trading concerns	To educate the students about the various customers handled by bank.	15
		Total lectures		60

Semester: I

Introduction to Office Management

Course Code: 22-COB115(b) **No. of Credits :- 04**

Objectives of the course

1. To introduce the students to the emerging changes in the modern office environment
2. To develop the conceptual , analytical , technical and managerial skills of students efficient office organization and records management
3. To develop the organizational skills of students
4. To develop Technical skills among the students for designing and developing effective means to manage records , consistency and efficiency of work flow in the administrative section of an organsation.
5. To develop employability skills among the students

Depth of the program – Fundamental Knowledge

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1	Concept of Modern Office	a. Modem Office :- Definition, Characteristics, importance and functions b. Office environment:- Meaning and Importance, factors c. Office Location :-Meaning, factors affecting Office location d. Office Layout :- Meaning, Principles affecting Office Layout	1. Conceptual Clarity on the meaning of a modern office 2. Developing understanding on the internal and external factors of an office environment 3. Developing analytical and technical skills to contribute towards planning office location and layout
2	Office Manager	a.Qualities of office manager, skills of office manager - Interpersonal skills, Presentation skills, thinking and Negotiation skills ,Duties and Responsibilities of office manager	1. Developing the necessary set of managerial skills

3	Office work	Office work :-Meaning and Characteristics, Flow of work :- Significance, Features of Ideal flow of work ,benefits of flow of work ,problems in smooth flow of work , suggestions for even flow of work	1. Analytical skills for process improvement in office work.

Teaching Methodology

Topic No.	Total Lectures	Innovative methods to be used	Film shows and AV Applications	Project	Expected Outcome
1	12	Power Point Presentation	Online Videos	Making a model of office layout in groups	Conceptual Clarity on meaning of Modern Office, internal and external factors of an office environment
2	12	Power Point Presentation			Conceptual clarity on the meaning of Scientific office management and understanding various techniques for scientific management

Semester : - II

Subject : - Office Organisation and management- II

Course Code – 22-COB125(b)

No. of credits: 4

Objectives of the course

1. To develop the technical skills of the students to keep up with the technological advancements and digitalization
2. To develop the communication skills of students and introducing them to the latest tools in communication
3. To improve writing, presentation, interpersonal skills of the students for effective formal corporate reporting.
4. To educate the students on the recent trends in communication technology and tools of office automation

Depth of the program – Fundamental Knowledge

Unit No.	Unit Title	Contents	Purpose Skills to be developed
1.	Office Organisation and Management	a. Office Organisation : Definition, Importance, Principles and Types of Organisation b. Office Management:- Definition, Functions c. Scientific Office Management :- Meaning, Aims, Techniques of Scientific Office Management and Steps for installation of Scientific Office Management	1. Conceptual clarity on the meaning ofScientific office management 2. Development of understanding in varioustechniques for scientific management

2		a. Goal Setting:- Concept, Importance of goals, SMART(Specific, Measurable, Achievable, Realistic and Time Bound) b. Time Management :-Meaning, Techniques, Principles and Significance	3. Developing Goal setting and Time management skills in all areas of life
3	Office Records Management	a. Office Records Management -Definition, Objectives, Scope of Records Management, Significance, Principles of Records management. b. Digitalization of records:- Advantages and Problems of Digitalization c. Form Design:- types of forms, Principles of form designing d. Office Manual - Definition, Contents Types , benefits and limitations	1. Introduction to concept of digitalization of records 2. Technical skills and critical analysis skills for designing of various office documents for effective records creation and maintenance
4	Office Automation	Objects of Mechanization, Advantages of Mechanization, Factors in selecting office machines, Types of modern Office Machines Recent modes of communication used in office	1. Enhancement of Technical knowledge and developing technical skills to adapt to the technical advancements 2. Critical thinking skills and technical skills to overcome the problem of choice among options

References :

List of Books Recommended :

1. **Modern Office Management – By Mills, Geoffrey**
2. **Office Management – By Dr. R.K. Chopra , Priyanka Gauri**
3. **Office Management – By R.S.N. Pillai**
4. **Office Management – By K.L.Maheshwari , R.K . Maheshwari**
5. **Modern Office Management : Principles and Techniques – By J.N.Jian , P.P.Singh**

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PES's Modern College of Arts, Science & Commerce, Ganeshkhind ,

Pune-16

Faculty of Commerce

Board of Studies in Business Practices
SEMESTER 2 (OPEN ELECTIVE 3)
BUSINESS MANAGEMENT

Teaching Hrs: 2hr / week **Credits: 2**

Examination Pattern : CIA 20 + ESE 30= 50 Marks

Course Objectives

- To introduce the concept of Business & Management
- To Acquaint students with Basic functions of Management

Course Outcome

- Students will understand basic concepts of Business and Management
- Students will understand Nature,scope and functions of Management

Course Content

Unit No.	Topics	No. of Lectures
1	Concept of Business, organisation and Management, Types of Business, Nature and scope of business,	10
2	Meaning of Management, Characteristics, Importance of Management, Levels of Management, Management as an Art,Science and Profession	10
3	Functions and process of Management- Planning, Organising, Staffing, Directing, Leadership, Communication, Motivation, Coordination and controlling	10
		30

Teaching Methodology

Classroom Lectures, Videos, PPTs, Assignments, Tutorials, Group discussion

References

1. Essentials of Management - Horold Koontz and Iteinz Weibrich - McGrawhills International
2. Management Theory & Practice - J.N.Chandan
3. Essential of Business Administration - K.Aswathapa Himalaya Publishing House
4. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi
5. Business Organization & Management - Dr. Y.K. Bhushan
6. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
7. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
8. Business organization and Management by Talloo by Tata McGraw Hill
9. Business Environment and Policy – A book on Strategic Management By Francis Cherunilam Himalaya Publishing House
10. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi
11. Business Organization & Management - Dr. Y.K. Bhushan
12. Principles of Management, By Tripathi, Reddy Tata McGraw Hill 14. Business organization and Management by Talloo by Tata McGraw Hill

Progressive Education Society's

Modern College of Arts, Science and Commerce, Ganeshkhind, Pune 16

Title of the Course: Event management (2 credit course) (Open Elective)

First year B.Com, Semester II

Objectives:

• To understand the planning and managing an event.

• To understand how to market an event, publicize it, generate interest and attract participants.

Sr.No.	Topics	Hours
1	Principles of Project/ Event Management – Understand project management, resources, activities, risk management , delegation , project selection, role of the event manager.	3
2	Understanding the facts – Conducting market research, establishing viability, capacities, costs and facilities , plans, time scales , contracts	3
3	Preparing a proposal – Clarity , SWOT analysis, estimating attendance, media coverage, advertising, budget , special considerations, success.	3
4	Crisis management plan – Crisis planning, prevention, provision, action phase, handling negative publicity, structuring the plan.	3
5	Seeking sponsors – Different types of sponsorship , definition, objectives, target market, budget, strategic development, implementation, evaluation.	3
6	Organising the event – Purpose, Venue, timing, guest list , invitations, food & drink, room dressing, equipment, guest of honour, speakers, media, photographers , podium, exhibition.	4
7	Marketing tools – Types of advertising, merchandising, give aways, competitions, promotions, website and text messaging.	3
8	Media tools – Media invitations, photo calls, press releases, TV opportunities, radio interviews.	3
9	Promotional tools – Flyers, Posters, Invitations, Website, newsletters, ezines, blogs, tweets.	3
10	Evaluation- Budget, cost of event, return on investment, media coverage, attendance, feedback.	2

References: 1. Event Management : A blooming industry and an eventful career, Har Anand Publication, Devesh Kishore & Ganga Sagar singh

2.The Art of Successful Event Management , APH Publishing Corporation, Leelamma Devasia & V.V. Devasia

3. Start your own event planning business 3/E: Your step by step guide to success, Perseus Books Group, Cheryl Kimball, Entrepreneur Press.

Paper Title: SEC: Theory of Consumer and Producers Behaviour
Credits: 02
Subject Code:
Lectures: 30 Clock Hours

Unit 1: Consumer Behaviour

1.1 Utility analysis- Cardinal Approach- Law of Diminishing and Equi-marginal utility

1.2 Ordinal Approach - Indifference Curve Analysis- Income, Price, and Substitution effects

1.3 Consumer Surplus

1.4 Case Studies with field work based on real life examples

Unit 2: Demand and Supply Analysis

2.1 Demand, Market Demand, and its determinants

2.2 Supply and its determinants

2.3 Elasticities of demand and supply – Price, Income and Cross Elasticity

2.4 Law of Demand and Supply

2.5 Derivation of demand curve from Diminishing Marginal Utility and Indifference Curve analysis

2.6 Case Studies with field work based on real life examples

Unit 3: Production Function

3.1 Short run production function- Law of variable proportion

3.2 Long run production function -Law of Returns to scale

3.3 Producer's Equilibrium

3.4 Internal and external economies of scale

3.5 Case Studies with field work based on real life examples

Paper Title: SEC: Theory of Price
Credits: 02
Subject Code:
Lectures: 30 Clock Hours

Unit 1: Perfect Competition and Monopoly

1.1 Perfect Competition - Features, short run and long run price determination
1.2 Monopoly- Features, short run and long run price determination
1.3 Equilibrium of the firm and industry
1.4 Case Studies with field work based on real life examples

Unit 2: Imperfect Competitions

2.1 Monopolistic Competition- Features, short run and long run price determination
2.2 Oligopoly and Duopoly – Features and Price determination
2.3 Game Theory
2.4 Case Studies with field work based on real life examples

Unit 3: Factor Pricing

3.1 Theory of Marginal Productivity
3.2 Ricardian theory of rent, Quasi, and Scarcity rent
3.3 Theories of interest
3.4 Theories of profit
3.4 Theories of Wages
3.5 Collective Bargaining, Minimum Wage, Real and nominal Wage
3.6 Recent trends in factor pricing
3.7 Case Studies with field work based on real life examples

Modern College of Arts, Science and Commerce
Ganeshkhind, Pune

Faculty of Commerce

Board of Studies: Business Practices

First Year B. Com Semester I
Subject Name: Evolution of Entrepreneurship
Subject Code: -
Name of the Vertical: IKS

Unit No. .	Topics	No. of Lectures
1.	Entrepreneurship - Definitions, Concept of Entrepreneurship - Need and Importance of Entrepreneurship. - Process of Entrepreneurship - Role of entrepreneurship in Economic Development of a country - Entrepreneurship – The Indian Scenario	10
2	Growth of Entrepreneurship - Trade and Business in Ancient India - Pre independence Entrepreneurship - Post-independence Entrepreneurship - Famous Entrepreneurs in India - Tata, Birla, Ambani, Narayan Murty, Azim Premaji	10
3	Entrepreneurship after Globalization - Meaning and Concept of Globalization - Impact of Globalization on Indian entrepreneurship - Impact of Digitalization on Entrepreneurship	10

Modern College of Arts, Science and Commerce
Ganeshkhind, Pune
Faculty of Commerce

Board of Studies: Business Practices

First Year B.Com Semester I
Subject Name: Entrepreneur and Entrepreneurship
Subject Code: -
Name of the Vertical: Minor 1
Course Code:

Unit No. .	Topics	No. of Lectures
1.	Entrepreneurship - Definitions, Concept of Entrepreneurship - Need and Importance of Entrepreneurship. - Process of Entrepreneurship - Role of entrepreneurship in Economic Development of a country - Entrepreneurship – The Indian Scenario	10
2.	The Entrepreneur - Definition, Concept, Evolution of term Entrepreneur. - Advantage and Limitations of Entrepreneurs - Functions of Entrepreneur. - Competencies and characteristics of Entrepreneur. - Types of Entrepreneurs - Intrapreneur- Meaning and Importance	10
3.	Entrepreneurship Journey - Idea generation. - Feasibility Study and opportunity assessment - Business Plan: meaning, purpose and elements - Execution of Business Plan	10

Modern College of Arts, Science and Commerce
Ganeshkhind, Pune
Faculty of Commerce

Board of Studies: Business Practices

First Year B.Com Semester I
Subject Name: Image Building
Subject Code: -
Name of the Vertical: Other Elective 1
Course Code:
Objectives:

- Writing clear and concise emails;
- Pitching an idea to the clients;
- Creating a compelling presentation;
- Socialising with co-workers and clients;
- Collaborating with team members.

Unit No. .	Topics	No. of Lectures
1.	**Soft Skills:** • Communication Skills • Interview Skills • Telephone Etiquettes • Email Etiquettes	10
2	**Personality Development:** • Body Language • Personal Grooming • Stress Management • CV/Resume Writing	10
3	**Marketing Skills Development:** • Verbal Ability and Reasoning Ability • Leadership Skills • Public Speaking	10

Modern College of Arts, Science and Commerce
Ganeshkhind, Pune
Faculty of Commerce

Board of Studies: Business Practices

First Year B.Com Semester I
Subject Name: A Journey to be an Entrepreneur
Subject Code: -
Name of the Vertical: Other Elective 2
Course Code:

Unit No. .	Topics	No. of Lectures
1.	Entrepreneurship Awareness - Define meaning of Entrepreneur and Entrepreneurship - Competencies of an entrepreneur - Role of entrepreneur in society - Categories of business as per scale and law - Legal obligations for various categories of busines	10
2	Developing Business Idea - Preparation of Business plan - Functions of business - production, human resources, marketing etc. - Selection of Businesses opportunity - Documents required for the registration of businesses - information on various government and non- government institutions engaged in entrepreneurship development -	10
3	Study of Market - Selection of location - Target Market - Tools of marketing and new trends of marketing - Study of technologies of sales - Social Media Marketing	10

Progressive Education Society's
Modern College of Arts, Science and Commerce Ganeshkhind, Pune-16 (Autonomous)

First Year Bcom
SEMESTER 1 (IKS)
EVOLUTION OF MARKETING

Teaching Hrs: 2hr / week Credits: 2

Examination Pattern : CIA 20 + ESE 30= 50 Marks

Course Objectives

1. **To Understand the origin of the word Marketing and Traditional & Modern Concept of Marketing**
2. **To Acquaint students with various stages of evolution of Marketing**

Course Outcome

1. **Students will understands the origin of concept of Marketing, and traditional and Modern concept of Marketing**
2. **Students will understand various stages of marketing.**

Unit No	Topics	No. of Lecture
1	INTRODUCTION Origin of the term Marketing, Meaning of the term Market & Marketing, Traditional and Modern Concept of Marketing History of Marketing in India and The world in brief	10
2	Stages of evolution of Marketing Before 90S Barter system, Production era, Selling Era, Marketing era, Customer Era	10
3	Stages of evolution of Marketing After 90s Relationship Marketing, Societal/ Social Marketing, Digital Marketing Era	10

References

1.. Kotler, Philip, Gary Armstrong, Prafulla Agnihotri and Ehsanul Haque. Principles of Marketing. 13th edition. Pearson Education.
2. Michael, J. Etzel, Bruce J. Walker, William J Stanton and Ajay Pandit. Marketing: Concepts and Cases. (Special Indian Edition)., McGraw Hill Education
3. William D. Perreault, and McCarthy, E. Jerome., Basic Marketing. Pearson Education.
4. Zikmund William G. and Michael D'Amico. Marketing; Creating and Keeping Customers in an E-Commerce World. Cengage Learning.
5. The Consumer Protection Act 1986.
6. Iacobucci and Kapoor, Marketing Management: A South Asian Perspective. Cengage Learning. B.Com (Hons.) CBCS 60
7. Dhruv Grewal, Michael Levy, Marketing, McGraw Hill Education.
8. Chhabra, T.N., and S. K. Grover. Marketing Management. Fourth Edition. Dhanpat Rai & Company.
9. Neeru Kapoor, Principles of Marketing, PHI Learning

Links

Evolution of marketing concept in hindi | Marketing Management | - YouTube
Evolution of Marketing | History of Marketing in Hindi - YouTube

Progressive Education Society's
Modern College of Arts, Science and Commerce Ganeshkhind, Pune-16
(Autonomous)

First Year Bcom
SEMESTER 2 (OPEN ELECTIVE 3)
FUNDAMENTALS OF ADVERTISING

Teaching Hrs: 2hr / week **Credits: 2**

Examination Pattern : CIA 20 + ESE 30= 50 Marks

Course Objectives

- To introduce the basic concepts of advertising
- To Acquaint students with meaning, types of advertising media.

Course Outcome

- Students will understand basic concepts in Advertising
- Students will understand various types of Advertising and types of Advertising Media

Course Content

Unit No.	Topics	No. of Lectures
1	INTRODUCTION- Meaning & definition of Advertising , Nature, Scope, Functions Of Advertising, Difference between Advertising and Publicity, Advertising and Personal Selling	10
2	TYPES OF ADVERTISING- On the basis of Area, Target Audience,on the basis of Media, On the basis of Nature of appeal, On the basis of demand influence level and other types	10
3	ADVERTISING MEDIA - Meaning of Advertising Media, Factors influencing advertising media and Classification of Advertising Media	10
		30

References

1.George E Belch, Michael A Belch, Keyoor Purani, Advertising and Promotion : An Integrated Marketing Communications Perspective (SIE), McGraw Hill Education

2. S. Wats Dunn, and Arnold M. Barban. Advertising: Its Role in Marketing. Dryden Press

3. Burnett, Wells, and Moriatty. Advertising: Principles and Practice. 5th ed. Prentice Hall of India, New Delhi

4. Batra, Myers and Aakers. Advertising Management. PHI Learning.

5. Terence A. Shimp. Advertising and Promotion: An IMC Approach. Cengage Learning.

6. Sharma, Kavita. Advertising: Planning and Decision Making, Taxmann Publications

7. Jaishree Jethwaney and Shruti Jain, Advertising Management, Oxford University Press, 2012

8. Chunawala and Sethia, Advertising, Himalaya Publishing House

9. Ruchi Gupta, Advertising, S. Chand & Co.

10. O'Guinn, Advertising and Promotion: An Integrated Brand Approach, Cengage Learning.

Batra, Myers and Aakers. Advertising Management. PHI Learning.

11. R.S. N. Pillai & Bagavathi Marketing Management S, Chand Publication

Links

sybcom-avtg-eng.pdf (mu.ac.in)

No.01 ~ Introduction to Advertising | Meaning | Nature | Feature | Importance | Scope | Types | - YouTube

No.9 ~ Types of Advertising || Based on the Media, Geographic area, Target audience, and Internet || - YouTube

No.03 ~ Advertising Media | Meaning | Function | Types | Media Scheduling | Media Selection | 5Ms | - YouTube

Modern College of Arts, Science and Commerce

Ganeshkhind, Pune

Faculty of Commerce

Board of Studies: Business Practices

First Year BBA CA Sem I

Subject Name: Business Communication

Subject Code: -

Name of the Vertical: Major

Course Code:

Credits 2

Depth of the syllabus - Reasonable knowledge of the communication

Objectives of the Course:

To understand what is the role of communication in personal and business world.

To understand system and communication and their utility.

To develop proficiency in how to write business letters and other communications.

Unit No	Content	No of Lectures
1	**1.Introduction to Business Communication** 1.1 Role of Communication in social and economic system 1.2 Need for effective communication 1.3 Meaning and definition 1.4 Principles of effective communication	10
2	**2.Methods and Types of Communication** 2.1 Written communication, 2.2 Forms of written communication. 2.3 Qualities, difficulties in written communication, 2.4 Constraints in developing effective written communication 2.5 Merits and Limitations of written communication 2.6 Listening Written communication, 2.7 Forms of written communication. 2.8 Qualities, difficulties in written communication, 2.9 Constraints in developing effective written communication	10

3	**3. Business Correspondence and Media of Communication** 3.1 Introduction and Meaning of Business Correspondence 3.2 Need and functions of Business Correspondence, 3.3 Types of Business letters, 3.4 Layout Drafting of business, 3.5 Sales Letter, 3.6 Orders sales circulars and business promotion letters 3.7 written methods& types of communication 3.8 Different Media of Communication	10

Progressive Education Society's
Modern College of Arts, Science and Commerce, Ganeshkhind, Pune - 16
www.moderncollegegk.org

Board of Studies in Cost & Works Accounting

F.Y.B.Com (Revised NEP) Sem-I

Subject: Basics of Cost Accounting and Material Cost (Course Code: 24COB11101A)
Total Credits: 04 (Theory)

Objectives:

1. **To equip the students to understand the basic concepts of cost.**
2. **To understand the classification of cost.**
3. **To facilitate students to prepare a cost sheet.**
4. **To enable the students to understand, and apply the techniques of inventory control.**

Unit No.	Unit Title	Contents	Skills to be developed
1	Basics of Cost & Management Accounting	• Cost Accounting: Definition and Meaning. • Objectives of Cost Accounting. • Advantages & Limitations of Costing. • Introduction of Management Accounting. • Difference between Management Accounting and Cost Accounting.	• To understand the limitations of financial Accounting. • To understand the concept of cost, costing and cost accounting.
2	Elements of Cost	• Cost Units, Cost Centers and Revenue Center • Role of a Cost accountant in an organization Material, Labour and other Expenses. • Classification of Cost- Direct and Indirect Cost	• To Understand the classification of cost • To trace the cost to cost centers and cost units. • To identify role of cost accountant in an organization

3	Material Management	• Need and Essentials of Material Control. • Methods of Inventory control • Stock Levels. • Economic Order Quantity (EOQ). • ABC analysis • Perpetual and Periodic InventoryControl • Physical verification Inventory Turnover Ratio	• To understand the different methods of inventory control. • To calculate EOQ , stock levels and inventory ratio
4	Material Accounting	• Functions of the Purchase Department. • Purchase Procedure /Policy • Store Location and Layout. • Classification and Codification of Material. • Stores and Material Records. • Bin Card & Store Ledger etc. • Issue of Material and Pricing Methods for Issue of Material: FIFO. LIFO Simple Average, Weighted Average Use of computer in store Accounting.	• To understand the purchase procedureand its documentation • To understand differentpricing methods used for issuing the material. • To gain knowledge about the documents used in store departments.

Teaching Methodology

Unit No	Total Lectures	Innovative Methods to beused	Films Shows and AV Applications	Practical	Expected Outcome
1	16	PowerPoint Presentations,Group discussions	YouTube Lectures and relevant multimedia CD)	Poster Presentation	To remember and understand basic concept of cost accounting. Development of an overall outlookof Cost Accounting
2.	10	PPT, Quiz		Visit small industries to develop an understandingof various costinputs	Ability to understand elements of cost
3	10	PPT, Quiz		Visit small industries to develop an understandingof various costinputs	Ability to prepare cost sheet.

4	12	Invite a storekeeper in the classroom to provide practical knowledge about inventory control		Visit smallunits and understandwhich	Understanding methods used for controlling the inventory.

Methods of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add-On Course
Unit I Unit II Unit III Unit IV	Multiple Choice Questions, WrittenTest, Internal Examination, PowerPoint Presentations, Orals, Assignments, Tutorials etc.	Modern College Ganeshkhind	Two industrial visits and subsequently reports on the visits.

References:

Sr. No	Titles of the Book	Names of Authors	Names of Publisher	Place
01	Cost Accounting-Principles &Practices	Jawahar Lal & Seema Shrivastava	Tata Mcgraw Hill	New Delhi
02	Advanced Cost AccountingAnd Cost Systems	Ravi M Kishor:	Taxmann	New Delhi
03	Cost Accounting Theory AndProblems	S. N. Maheshwari	Mittal Shree Mahavir Book Depot.	New Delhi
04	Advanced Cost Accounting	Jain and Narang	Kalyani Publication	New Delhi
05.	Horngren's Cost Accounting-A Managerial Emphasis	Srikant M Datar & Madhav V Rajan	Pearson	Noida Up
06	Cost Accounting-Principles &Practices	Dr. M.N. Arora	Vikas Publishing House,	New Delhi
07	Advanced Cost Accounting	Dr. D. M. Gujarathi	Idol Publication	Pune
08	Advanced Cost Accounting	Dr. Kishor. M.Jagtap	Tech-Max Publication	Pune
09	Cost Accounting PrinciplesAnd Practice	Jain and Narang	Kalyani Publication	New Delhi
10	Principles and Practice ofCost	N.K Prasad	Books indicate Private Ltd	Kolkata

	Accounting			
11	Cost Accounting: Methods and problems	B.K.Bhar	Academic Publications	Kolkata

Web References:

Sr.No	Lectures	Films	PPTs	Articles
For all the units.	Guest Lectures by Field Personnel such as working executives from industries and of practising Cost and Management Accountants.	YouTube films showing the working of different industries .	Relevant powerpoint presentations are available on all these topics.	Articles from the Professional Journals such as The Management Accountant, The Chartered Accountant, The Chartered Secretary, The Institute of Chartered Financial Analyst of India

Notes: The breakup of marks in the Examination will be as follows:

1. 50 % of the Total marks are assigned for Theory purpose whereas rest 50 % of the total marks allotted for Numerical Problems.
2. Numerical Problems will be of Simple nature only.
3. **Areas of Practical Problems**:

- Preparation of Cost Sheet, Tender, Quotation and Estimates.
- EOQ and Stock level.
- Inventory Turnover Ratios.

Modern College (Autonomous) Ganeshkhind, Pune-16

Chairman
BOS (Cost & Works Accounting)

Progressive Education Society's
Modern College of Arts, Science and Commerce, Ganeshkhind, Pune - 16
F.Y.B.Com(Revised NEP) Sem-II
Subject: Labour Cost (Course Code: 24COB12101A)
Total Credits: 04 (Theory)

Objectives:

- **To know the documents that are used in Purchase department and stores.**
- **To understand how to calculate the issuingprice of material.**
- **To impart the knowledge of classification and codification.**
- **To equip the students with the knowledge of ascertainment of labour cost.**
- **To understand the concept of payroll, merit rating and labor turnover.**
- **To understand recent trends in cost accounting.**

Unit No.	Unit Title	Contents	Skills to be developed
1	Labour cost and Payroll	• Meaning and definition of wages. Difference Between Wages and Salary • Records and methods - time keeping and timebooking. • Methods of Wage PaymentTime rate system., Piece rate system. Taylor's differential piece rate system.Incentive Plan. Halsey Plan.Rowan Plan. Group Bonus scheme. Performance based incentive plan.Payroll meaning and components	• To Understand the differencebetween salary and wages. • To know the methods oftime keeping and time booking. • To understand meaning and components of payroll
2	Other Aspects of Labour	• Labour Turnover. • Job Analysis & Job Evaluation. • Merit Rating.	• To understand the labour turnover, job analysis and evaluation

3	Concepts of Overheads & Preparation of Cost Sheet	• Introduction of Overheads • Direct & Indirect Cost Concepts • Types of Overheads • Preparation of Cost Sheet	• To understand different elements of cost • To be able to prepare a cost sheet
4	Introduction to JIT,CAM and ERP.	Introduction to- Just In Time(JIT CAM (Computer Aided Manufacturing)Enterprise Resource Planning (ERP) Contract manufacturing	• Recent trends in cost and management accounting

Teaching Methodology

Uni tNo.	Total Lecture s	Innovative Methods tobe used	Films Showsand AV Application s	Project	Expected Outcome
1	16	Invite a storekeeper in the classroom to provide practical knowledge about which records are to bemaintained in the storedepartment and pricingmethods for issue of material	YouTube Lectures andrelevant multimedia compact discs(CD)	Visit small industries for understanding which records are to be maintained in store department	Understanding various methods usedin the pricing of the issue of materials
2.	16	Powerpoint presentation and guestlecture	You Tube clippings of methods of remuneration ,time keeping and time booking and their methods	Calculation of wage payment andincentives. Preparation of aspecimen of pay slip.	Enabling to calculatewage payment and incentives.
3	10	Power point presentation and groupdiscussion.	You Tube clippings of Labour turnover,Job Analysis & Job Evaluation Merit Rating.	Analysis and evaluation of jobs in any organization.	Understanding the process of job analysis, job evaluation and meritrating.
4	6	Guest lecture, power point presentation and group discussion.	You Tube clippings of Labour turnover,Job Analysis & Job Evaluation Merit Rating.	Read articles on therecent trends in cost accounting from Journals, e-journals and web resources.	Insight into recent processes used for cost reduction.

Methods of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested activity
Unit I	Multiple Choice Questions, Written Test, Internal Examination, Powerpoint Presentations, Orals, Assignments, Tutorials etc.	Modern College Ganeshkhind	Two industrial visits and subsequently reports on these visits.
Unit II			
Unit III			
Unit IV			

References

Sr. No	Titles of the Book	Names of Author	Name of Publisher	Place
01	Cost Accounting-Principles & Practices	Jawahar Lal & Seema Shrivastava	Tata Mcgraw Hill	New Delhi
02	Advanced Cost Accounting AndCost Systems	Ravi M Kishor:	Taxmann	New Delhi
03	Cost Accounting Theory And Problems	S. N. Maheshwari	Mittal Shree Mahavir Book Depot.	New Delhi
04	Advanced Cost Accounting	Jain and Narang	Kalyani Publication	New Delhi
05.	Horngren's Cost Accounting-AManagerial Emphasis	Srikant M Datar & Madhav V Rajan	Pearson	Noida Up
06	Cost Accounting-Principles & Practices	Dr. M.N. Arora	Vikas Publishing House,	New Delhi
07	Advanced Cost Accounting	Dr. D. M. Gujarathi	Idol Publication	Pune
08	Advanced Cost Accounting	Dr. Kishor. M. Jagtap	Tech-Max Publication	Pune
09	Cost Accounting Principles And Practice	Jain and Narang	Kalyani Publication	New Delhi
10	Principles and Practice of CostAccounting	N.K Prasad	Booksyndicate PrivateLtd	Kolkata
11	Cost Accounting: Methods and Problems	B.K.Bhar	Academic Publications	Kolkata

Web References

Sr. No	Lectures	Films	PPTs	Articles	Others
For allthe units.	Guest Lectures by Field Personnel such as working executives from industries and of practicing Cost andManagement Accountants.	YouTube films showingthe working of different industries.	Relevant power point presentation sare availableon all these topics.	Articles from the Professional Journals such as TheManagement Accountant, The Chartered Accountant, The Chartered Secretary,The Institute of Chartered Financial Analyst of India	https://icmai.inw ww.globalcma.in eclm.unipune.ac. in

Notes: The breakup of marks in the Examination will be as follows:

1. 50 % of the marks are assigned for Theory whereas rest50 % of the total marks areallotted for Numerical Problems.
2. The Numerical Problems will be of simple nature only.
3. Areas of numerical problems:
    - Pricing Methods of Issue of Material.
    - Methods of Wage Payment and Incentive Plan.
    - Measurement of Labour Turnover.

Chairman
BOS (Cost & Works Accounting)

Modern College (Autonomous) Ganeshkhind, Pune-16.

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Board of Studies in Cost & Works Accounting

S.Y.B.Com. Semester- III

Subject: Cost Accounting and Material Cost – I (Course Code: 23-COB236 (a)
Total Credits: 04 (Theory 03 + Practical 01=04)

Objectives:

1. **To equip the students to understand the basic concepts of cost.**
2. **To understand the classification of cost.**
3. **To facilitate students to prepare a cost sheet.**
4. **To enable the students to understand, and apply the techniques of inventory control.**

Unit No.	Unit Title	Contents	Skills to be developed
1	Basics of Cost & Management Accounting	• Origin of Costing. • Concept of Cost, Costing, Cost Accounting and Cost Accountancy • Objectives of Cost Accounting. • Advantages & Limitations of Costing. • Difference between Financial Accounting and Cost Accounting. • Introduction of Management Accounting	• To understand the limitations of financial Accounting. • To understand the concept of cost, costing and cost accounting.

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2	Elements of Cost	• Cost Units, Cost Centers and Revenue Center • Role of a Cost accountant in an organization • Material, Labour and other Expenses. • Classification of Costs.	• To Understand the classification of cost • To trace the cost to cost centers and cost units. • .To identify role of cost accountant in an organisation
3	Direct Cost and Cost sheet	• Direct cost concepts • Preparation of Cost Sheet • Tender, Quotation and Estimates.	• To Understand different elements of cost • To be able to • prepare a cost sheet
4	Material Management	• Need and Essentials of Material Control. • Methods of Inventory control • Stock Levels. • Economic Order Quantity (EOQ). • ABC analysis • Perpetual and Periodic Inventory Control • Physical verification o Inventory Turnover Ratio	• To understand the different methods of inventory control. • To calculate EOQ , stock levels and inventory ratio

Teaching Methodology

Un it No	Total Lectu res	Innovative Methods to be used	Films Shows and AV Application s	Practical	Expected Outcome
1	16	PowerPoint Presentation s, Group discussions	YouTube Lectures and relevant multimedia CD)	Poster Presentation	To remember and understand the basic concept of cost accounting. Development of an overall outlook of Cost Accounting
2.	10	PPT, Quiz		Visit small industries to develop an understanding of various cost inputs	Ability to understand elements of cost
3	10	PPT, Quiz		Visit small industries to develop an understanding of various cost inputs	Ability to prepare a cost sheet.
4	12	Invite a storekeeper in the classroom to provide practical knowledge about inventory control		Visit small units and understand which methods are used for inventory control.	Understanding methods used for controlling the inventory.

Methods of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested Add-On Course
Unit I Unit II Unit III Unit IV	Multiple Choice Questions, Written Test, Internal Examination, PowerPoint Presentations, Orals, Assignments, Tutorials etc.	Modern College Ganeshkhind	Two industrial visits and subsequently reports on the visits.

Modern College ★ Ganeshkhind, Pune-16 ★

References

Sr. No	Titles of the Book	Names of Authors	Names of Publisher	Place
01	Cost Accounting- Principles & Practices	Jawahar Lal & Seema Shrivastava	Tata Mcgraw Hill	New Delhi
02	Advanced Cost Accounting And Cost Systems	Ravi M Kishor:	Taxmann	New Delhi
03	Cost Accounting Theory And Problems	S. N. Maheshwari	Mittal Shree Mahavir Book Depot.	New Delhi
04	Advanced Cost Accounting	Jain and Narang	Kalyani Publication	New Delhi
05.	Horngren's Cost Accounting- A Managerial Emphasis	Srikant M Datar & Madhav V Rajan	Pearson	Noida Up
06	Cost Accounting- Principles & Practices	Dr. M.N. Arora	Vikas Publishing House,	New Delhi
07	Advanced Cost Accounting	Dr. D. M. Gujarathi	Idol Publication	Pune
08	Advanced Cost Accounting	Dr. Kishor. M. Jagtap	Tech-Max Publication	Pune
09	Cost Accounting Principles And Practice	Jain and Narang	Kalyani Publication	New Delhi
10	Principles and Practice of Cost Accounting	N.K Prasad	Booksyndicate Private Ltd	Kolkata
11	Cost Accounting: Methods and problems	B.K.Bhar	Academic Publications	Kolkata

Web References

Sr. No	Lectures	Films	Powerpoint presentations	Articles
For	Guest Lectures by	YouTube	Relevant	Articles from the Professional

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Modern College of Arts, Science and Commerce, Ganeshkhind, Pune - 16

S.Y.B.Com. Semester - IV
Subject: Labour Cost – II (Course Code: 23-COB246 (a)
Total Credits: 04 (Theory 03 + Practical 01=04)

Objectives:

- **To know the documents that are used in the Purchase department and stores.**
- **To understand how to calculate the issuing price of material.**
- **To impart the knowledge of classification and codification.**
- **To equip the students with the knowledge of ascertainment of labour cost.**
- **To understand the concept of payroll, merit rating and labor turnover.**
- **To understand recent trends in cost accounting.**

Unit No.	Unit Title	Contents	Skills to be developed
1.	Material Accounting	• Functions of the Purchase Department. • Purchase Procedure /Policy • Store Location and Layout. • Classification and Codification of Material. • Stores and Material Records. • Bin Card & Store Ledger etc. • Issue of Material and Pricing Methods for Issue of Material: FIFO. LIFO ▪ Simple Average, ▪ Weighted Average • Use of computer in store Accounting.	• To understand • the purchase procedure and its documentation • To understand different pricing methods used for issuing the material. • To gain knowledge about the documents used in store departments.
2	Labour cost and Payroll	• Meaning and definition of wages. Difference Between Wages and Salary • Records and methods - time keeping and time booking. • Methods of Wage Payment Time rate system., Piece rate system. • Taylor's differential piece rate system. Incentive Plan. • Halsey Plan. Rowan Plan.	• To Understand the difference between salary and wages. • To know the methods of time keeping and time booking. • To enable the student to calculate wages and incentives.

		• Taylor's differential piece rate system. Incentive Plan. • Halsey Plan. Rowan Plan. • Group Bonus scheme. Performance based incentive plan. Payroll meaning and components	• To enable the student to calculate wages and incentives. • To understand meaning and components of payroll
3	Other Aspects of Labour	• Labour Turnover. • Job Analysis & Job Evaluation. • Merit Rating.	• To understand the labour turnover, job analysis and evaluation
4.	Introduction to JIT, CAM and ERP.	• Introduction to- Just In Time(JIT) CAM (Computer Aided Manufacturing) Enterprise Resource Planning (ERP) • Contract manufacturing	• Recent trends in cost and management accounting

Teaching Methodology

Unit No.	Total Lectures	Innovative Methods to be used	Films Shows and AV Applications	Project	Expected Outcome
1	16	Invite a storekeeper in the classroom to provide practical knowledge about which records are to be maintained in the store department and pricing methods for issue of material	YouTube Lectures and relevant multimedia compact discs(CD)	Visit small industries for understanding which records are to be maintained in store department	Understanding various methods used in the pricing of the issue of materials
2.	16	Powerpoint presentation and guest lecture	You Tube clippings of methods of remuneration, time keeping and time booking and their methods	Calculation of wage payment and incentives. Preparation of a specimen of pay slip.	Enabling to calculate wage payment and incentives.
3	10	Powerpoint	You Tube	Analysis and	Understanding the

		presentation and group discussion.	clippings of Labour turnover, Job Analysis & Job Evaluation Merit Rating.	evaluation of jobs in any organization.	process of job analysis, job evaluation and merit rating.
4	6	Guest lecture, powerpoint presentation and group discussion.	You Tube clippings of Labour turnover, Job Analysis & Job Evaluation Merit Rating.	Read articles on the recent trends in cost accounting from Journals, e- journals and web resources.	Insight into recent processes used for cost reduction.

Methods of Evaluation

Subject	Internal Evaluation	External Evaluation	Suggested activity
Unit I	Multiple Choice Questions, Written Test, Internal Examination, Powerpoint Presentations, Orals, Assignments, Tutorials etc.	Modern College Ganeshkhind	Two industrial visits and subsequently reports on these visits.
Unit II			
Unit III			
Unit IV			

References

Sr. No	Titles of the Book	Names of Author	Name of Publisher	Place
01	Cost Accounting-Principles & Practices	Jawahar Lal & Seema Shrivastava	Tata Mcgraw Hill	New Delhi
02	Advanced Cost Accounting And Cost Systems	Ravi M Kishor:	Taxmann	New Delhi
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07	Advanced Cost Accounting	Dr. D. M. Gujarathi	Idol Publication	Pune
08	Advanced Cost Accounting	Dr. Kishor. M. Jagtap	Tech-Max Publication	Pune
09	Cost Accounting Principles And Practice	Jain and Narang	Kalyani Publication	New Delhi

PES's Modern College of Arts, Science & Commerce, Ganeshkhind , Pune 411016.

Faculty of Commerce

Board of Studies of Cost & Works Accounting

[Revised NEP Syllabus from academic year 2024-2025]

Semester I : Business Mathematics : Course Code – 24COB11103 A : 4 credits

Objectives of the Program

5. To introduce the basic concepts in Finance and Business Mathematics and Statistics
6. To familiar the students with applications of Statistics and Mathematics in Business.
7. To acquaint students with some basic concepts in Statistics.
8. To learn some elementary statistical methods for analysis of data.

Semester I : Business Mathematics : 4 credits
Assessment structure : Internal-CIE 40 and External 60 = Total marks 100

	Unit Title	Contents	Purpose /skill to be developed
1.	**Interest & Annuity**	Concept of Present Value and Future Value, Simple Interest Compound Interest ,Nominal and Effective Rate of Interest Meaning of Annuity , Equated Monthly Installments (EMI) by interest of Reducing Balance and Flat Interest methods Examples and Problems.	• To understand the concept of Simple interest, compound interest, effect of compounding. • To understand the concept of Annuity and its applications for EMIs and Amortization Schedule.
2.	**Shares**	Concept of Share, Face Value, Market Value, Dividend, Brokerage ,Equity Shares, Preferential Shares, Bonus Shares.	To understand the concept of shares and mutual funds. To understand contribution of shares and mutual funds in systematic investment plans

		Concept of Mutual Funds ,simple examples Examples and Problems.	• To solve problems related to shares and mutual funds
3.	**Matrices & Determinants (upto 3 order only)**	Definition of a matrix ,Types of Matrices ,Algebra of Matrices Determinants, Adjoint of Matrix Inverse of a Matrix via Adjoint Matrix , applications in Business & Economics, Examples & Problems	1.To understand the concept of matrices and determinants. 2. To understand applications of matrices and determinants in business and economics.
4.	**Linear Programming Problems [L.P.P.] (for two variables only)**	Definition & terms in the LPP Formulation of LPP Solution by Graphical method Examples & Problems	To understand the concept of LPP and its application in business and decision making. To understand graphical method to solve business optimization problems with two variables.
Semester II : Business Statistics : Course Code – 24COB12103A : 4 credits Assessment structure : Internal-CIE 40 and External 50= Total marks 100			
	Topics		
.	**Introduction to Statistics and Data presentation with Frequency distribution**	Definition of Statistics, Scope of Statistics in Economics, Management Science and Industry Concept of Population and Sample, Methods of Data Collection, Census & Sampling with illustration Methods of Random Sampling – SRSWR, SRSWOR, Stratified, Systematic (Description of sampling procedures only) Frequency distribution, Raw Data, Attributes and Variables Classification of data ,Frequency distribution, Cumulative frequency distribution	• Collection of data • Analyzing and interpreting data. • Knowing different method of sampling • To classify and represent data in tabular form.

2.	**Measures of Central Tendency**	Requisites of ideal measures of central tendency ,Arithmetic Mean, Median and Mode for ungrouped and grouped data. Combined mean ,Merits and demerits of measures of central tendency Examples and problems.	• To compute various measures of central tendency.
3.	**Measures of Dispersion**	Measures of Dispersion ,Concept of dispersion, Measures of dispersion ,Range, Variance, Standard deviation (SD) for grouped and ungrouped data Combined SD , Measures of relative dispersion : Coefficient of range, Coefficient of Variation Examples and problems.	To compute various measures of dispersion.
4.	**Correlation & Regression**	Concepts & types of correlation Scatter diagram, Karl Pearson's coefficient of correlation for ungrouped data, Spearman's rank correlation coefficient. Concept of regression[theory] Examples and problems.	• To use correlation for knowing the relationship between two variables. • To understand regression for prediction

Teaching Methodology

Topic no	No of lectures	Innovative methods	Expected Outcome
Semester I			
1	15	ICT	Students will be able to apply the concept of interest and calculation of EMI
2	15	ICT	Students will be able to calculate dividend ,return on shares .Students will be able to apply contribution of shares as a systematic investment plan
3	15	ICT	Students will be able to apply the theory of matrices to solve business and economic problems.

4	15	ICT	Students will be able to formulate LPP and its application in business and decision making.
Semester II			
Topic No	No of lectures	Innovative methods	Expected Outcome
1	15	ICT	Students will be able to recognize different types of data and also understand the concept of statistics ,it's scope and sampling Students will be able to know the Classification of data &Frequency distribution
2 & 3	30	ICT	Students will be able to use appropriate measure of central tendency-Mean ,Mode & Median & measures of Dispersion
4	15	ICT	Students will able to predict the type of relationship between bivariate data. Students will be able predict the value of unknown from give bivariate data

References

Sr. No.	Title of the Book	Author/s	Publication	Place
1.	Practical Business Mathematics	S. A. Bari	New Literature Publishing Company	New Delhi
2.	Mathematics for Commerce	K. Selvakumar	Notion Press	Chennai
3.	Business Mathematics with Applications	Dinesh Khattar & S. R. Arora	S. Chand Publishing	New Delhi
4.	Business Mathematics and Statistics	N.G. Das & Dr. J.K. Das	McGraw Hill	New Delhi
5.	Fundamentals of Business Mathematics	M. K. Bhowal	Asian Books Pvt. Ltd	New Delhi

6.	Operations Research	P. K. Gupta & D. S. Hira	S. Chand Publishing	New Delhi
7.	Mathematics for Economics and Finance: Methods and Modeling	Martin Anthony and Norman Biggs	Cambridge University Press	Cambridge
8.	Financial Mathematics and Its Applications	Ahmad Nazri Wahidudin	Ventus Publishing ApS	Denmark
9.	Fundamentals of Mathematical Statistics	Gupta S. C. and Kapoor V. K.:,	Sultan Chand and Sons	23, Daryaganj, New Delhi 110002
10.	Statistical Methods	Gupta S. P.:	Sultan Chand and Sons	23, Daryaganj, New Delhi 110002
11.	Applied Statistics	Mukhopadhya Parimal	New Central Book Agency Pvt. Ltd.	Calcutta.
12.	Fundamentals of Statistics	Goon A. M., Gupta, M. K. and Dasgupta, B.	World Press	Calcutta.

Progressive Education Society's

Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016

(Autonomous)

Syllabus for

F. Y. B.C.A (Science) 1st and 2nd Semester

Introduction:

The Structure is of three year bachelor basic degree and four year bachelor honors programme allows the opportunity to the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minor as per their choices and feasibility of exploring learning in different institution.

This Undergraduate Degree Program has been designed with a semester approach in mind.

The First-year courses are aimed at skills development in computers using various technologies while the second year is more focused on core courses providing conceptual frame work. The thirdyear provides the specialization and the project work and fourth year focused on initiate research binge at start-ups level.

Students will be awarded certificate in computer application after one-year completion, diploma in computer application after two years of completion, get B.C.A. degree after three years completion and B.C.A. (honors) degree after completion of four years. A four-year degree (Eight - semesters) in Computer Applications will get skills and information not only about Computer and Information Technology but also in communication, organization, research and management with multidisciplinary approach.

Programme Objectives:

- To produce knowledgeable and skilled human resources that is employable in IT and ITeS.
- To impart knowledge required for planning, designing and building Complex Application Software Systems as well as to provide support for automated systems or applications.
- It helps students analyse the requirements for system development and exposes students to business software and information systems.
- This course provides students with options to specialize in legacy application software, system software or mobile applications.
- To produce entrepreneurs

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

Eligibility:

Any candidate who has passed the XII standard Examination in Science stream from, Maharashtra State Board of Secondary and Higher Secondary Education or equivalent Board of Examination, is eligible for admission to the First Year of this program.

OR

Passed Three Year Diploma Course in Computer Engineering/ Technology/ Information Technology/ Electronics Communication/ Electronics Telecommunications/ Electronics or equivalent subjects approved by the DTE, Maharashtra State or Equivalent authority.

Subject List

Teaching Methodology:

FYBCA(Science) Sem I

Course Type	Sr. No.	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
	1	C Programming (T)	BCA11101	2	20	30		50
	2	C Programming (L)	BCA11102	1	10	15		25
	3	Fundamental of Computer (T)	BCA11103	2	20	30		50
	4	Fundamental of Computer (Lab)	BCA11104	1	10	15		25
	5	Applied Mathematics and Statistics (T)	BCA11105	2	20	30		50
	6	Applied Mathematics and Statistics (L)	BCA11106	1	10	15		25
	7	Open Elective for Arts Basket BCA(Science) Students may opt the OE courses offered by Arts and Commerce Faculty	OE 1	2	20	30		50
	8	Open Elective for Commerce Basket BCA(Science) Students may opt the OE courses offered by Arts and Commerce Faculty	OE 2	2	20	30		50
	9	Basic Web Designing (L)	BCA11407		20	30		50

	10	**Soft Skills and Personality Development**		2	10	30		50
	11	**Value Education Course (T)**		2	**20**	30		**50**
TOTAL					**220**	**330**		**550**

Total Credits: [17(TH) + 5 (PR)] = 22

FYBCA(Science) Sem II

Course Type	Sr. No	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
		Advance C Programming (T)	**BCA12101**	2	20	30		50
		Advance C Programming (L)	**BCA12102**	**1**	10	15		25
		Computer Organization (T)	**BCA12103**	2	20	30		50
		Computer Organization & Embedded C Programming (L)	**BCA12408**	**1**	10	15		25
		Database Management system (T)	**BCA11105**	2	20	30		50
		Database Management system (L)	**BCA12407**	**1**	10	15		25
		Open Elective for Arts Basket BCA(Science) Students may optthe OE courses offered by Arts and Commerce Faculty	**OE 3**	2	20	30		50
		Open Elective for CommerceBasket	**OE 4**	2	20	30		50
		Advance Web Technology (L)	**BCA12407**	2	20	30		50
		Corporate Communication	**ENG12508**	2	20	30		50
		Democracy Election and Governance (T)	**VEC12507**	2	20	30		50

Total	**22**	**220**	**330**		**550**

Credit Allocation: - CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses, SEC-Skill Enhancement Courses.

Total - 22 Credits for First years Programme.

F.Y.B.C.A (Science) Semester I

Course Code: BCA11102

Course Name: C Programming

Total lectures: 30 **Total Credits: 2**

Prerequisites: - None

Course Objectives:

- To provide a broad overview of problem solving techniques
- To learn C programming to solve problems

Course Outcome:-

At the end of the course, students will be able to

- Define algorithms and explain their characteristics
- Formulate algorithm and draw flowchart to solve a given problem
- Explain use of appropriate data types, control statements
- Demonstrate ability to use top-down program design

Unit	Topic	No of lectures
1	**Unit-I Problem solving, algorithms and flowcharts** 1. Types of Problems, Problem solving using computer, Difficulties with problem solving,Problem solving aspects. 2. Definition & Characteristics of algorithm, Examples of algorithms, Flow charts withexamples, Top-down design 3. Problem solving using Arithmetic Statements, Conditional Statement & IterativeStatements	4 Hrs
2	**Unit-II C Fundamentals** 1. Introduction to C, Features of C, Structure of C Program, C Character Set, Identifiers andKeywords, Variables and constants 2. Data types- Basic data types, Enumerated types, Type casting, Declarations,	6 Hrs

	Expressions **3.** Operators and Expressions Unary and Binary arithmetic operators, Increment Decrement operators Relational and logical operators, Bit wise operators, Assignmentoperators, Comma operator, size of operator, Ternary conditional operator, Precedence and associativity	
	Unit-III Input Output Statements 1. printf, scanf functions, getchar, putchar, getch functions, gets, puts functions 2. Escape sequence characters, Format specifiers	4 Hrs
	Unit-IV Control & Iterative Structures 1. If, If- Else Statements, Nested If Statements 2. Conditional Branching – switch statement, Loop (while, do…while, for), break,continue, goto statements	6 Hrs
	Unit-V Functions 1. Introduction to Functions, Function Arguments, Library & User defined functions, 2. Methods for parameter passing, Recursion, Storage Classes – Auto, Static, Global andRegister	5Hrs
	Unit-VI Arrays 1. Introduction, Array Declarations, Bounds Checking 2. Types - Single dimension Arrays, Two dimensional Arrays, Arrays & Function	5 Hrs

Reference Books:

1. Cormen, Leiserson, Rivest, Stein, "Introduction to algorithms"
2. Brian W. Kernighan, Dennis M. Ritchie , "The C Programming Language", ISBN:9788120305960, PHI Learning
3. R.G. Dromey, "How to Solve it by Computer", ISBN: 9788131705629, Pearson Education
4. Behrouz A. Forouzan, RichardF. Gilberg, "A Structured Programming Approach Using C", ISBN:9788131500941, Cengage Learning India
5. E. Balaguruswamy, "Programming in ANSI C", ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi
6. Maureen Spankle, "Problem Solving and Programming Concepts", ISBN: 81-317-0711- 3
7. Y S Kanetkar, "Let Us C", BPB Publications

F.Y.B.C.A (Science) Semester I

Course Code: BCA11103

Course Name: C Programming Laboratory

Total lectures:21 **Total Credits: 1**

Prerequisites: - None

Course Objectives:

- To learn formulation of algorithm for a given problem
- To study various data types, arrays and functions in C
- To understand input-output and, control and iterative statements in C

Course Outcome:-

On completion of the course, students will be able to–

- Formulate an algorithm and draw flowchart for the given problem\
- Implement the given algorithm in C
- Write programs using appropriate data types and control structures in C

Sr.No	Assignment	No of lectures
1	Assignment on use of data types, simple operators (expressions)	3
2	Assignment on decision making statements (if and if-else, nested structures, Switch case)	3
3	Assignment on use of loops	3
4	Assignment on exit, go to, continue, break	3
5	Assignment on menu driven programs.	3
6	Assignment on functions and recursive functions	3
7	Assignment on use of arrays (1-D array, 2-D arrays) functions	3

F.Y.B.C.A (Science) Semester I

Course Code: BCA11101

Course Name: Fundamentals of Computers

Total lectures: 30 **Total Credits: 2**

Prerequisites: - None

Course Objectives:

- To study the basics of Computer System
- To learn how to configure computer devices
- To Learn Basic Commands of Operating system and application software
- To understand Open Source Software

Course Outcome:-

At the end of the course, students will be able to

- Define working of computers and peripherals, types of software and languages
- Troubleshoot the computer systems and use utility software
- Choose commands and features of operating systems and application software
- Use open source software

Unit	Topic	No of lectures
1	**Unit I Introduction to Computer System** 1. Introduction– Characteristics of Computers, Basic structure and operation of a computer,functional units and their interaction, 2. Types of computers and features- Mini Computers, Micro Computers, Mainframe Computers, Super Computers, Laptops and Tablets, 3. Types of Programming Languages- Machine Languages, Assembly Languages, High levelLanguages. Translators- Assembler, Compiler, Interpreter 4. Data Organization- Drives, Directories and Files Number Systems-Introduction to Binary,Octal, Hexadecimal system, Conversion, Addition, Subtraction, Multiplication, Division	8 Hrs

2	**Unit II Computer Peripherals** 1. Primary storage devices – RAM, ROM, PROM, EPROM 2. Secondary Storage Devices – HDD, CD, DVD, Pen drive 3. I/O Devices - Keyboards, Scanners, Digitizers, Plotters, LCD, Plasma Display, 4. Pointing Devices – Mouse, Joystick, Touch Screens 5. Introduction to Network devices – Hubs, Switches, Routers, MODEM and Access Points	6 Hrs
	Unit III Computer Software 1. Types of software: System Software, Application Software. System Software: OperatingSystem. Types of Operating System, Basic Commands in Linux 2. Introduction to GUI: Desktop Icons, File and Directory, Menu Items, Control Panel 3. Utility programs: Anti-plagiarism software, Anti-virus, Disk Cleaning, Compression/Decompression of files. 4. Application software: Examples of commercial software with brief introduction 5. Open Source Software and its features	8 Hrs
	Unit IV Editors, Word Processors, Spreadsheets & Presentation Tools 1. Editors and Word Processors: Features and functionalities, examples 2. Spreadsheets: Features and functionalities, Spreadsheet Applications 3. Presentation Tools : Design Slides (using Text, images, charts, clipart), Slide Animation,Template and theme creation 4. Introduction to Google Apps: Google Docs, Sheets and Forms and its applications	8 Hrs

Reference Books:

1. P.K. Sinha & Priti Sinha, “Computer Fundamentals”, 3rd Edition, BPB Pub.
2. John Walkenbach, Michael Alexander and Richard Kusleika, “Excel 2019 Bible”, WileyPublication
3. Steven Roman, “Writing Excel Macros with VBA”,O’reilly Publication.
4. Sumitabha Das, “Unix Concepts and Applications”,Tata McGraw Hill Education
5. Join Josh, “PC/HARDWARE”, O’Reilly Publication

F.Y.B.C.A (Science) Semester I

Course Code: BCA11408

Course Name: Fundamentals of Computers and Applied Mathematics & Statistics Laboratory

Total lectures: Total Credits: 1

A: Fundamentals of Computers

Prerequisites: -Basic Mathematics

Course Objectives:

- To understand installation process to install operating system and applications
- To learn various features of application software

Course Outcome:-

On completion of the course, students will be able to–

- Install operating system and execute various commands
- Effectively use various features of application software
- Create and use spreadsheets effective
- Prepare effective Presentation

Laboratory Assignments for Computers		
Sr. No	**Assignment**	
1	Operating System Commands	3
2	Word Processing	3
3	Spreadsheet	3
4	Presentation Tools	3
5	Utility programs, anti-plagiarism software etc	3
6	Google Apps: Word, Excel,Sheet	3

B: Applied Mathematics & StatisticsLaboratory

Course Objectives:

- To provide knowledge about applying theoretical concepts of applied mathematics and statistics to solve problems**.**
- To provide hands-on experience on statistical package

Course Outcomes:

On completion of the course, student will be able to

- Apply mathematical and statistical concepts to solve problems
- Use R to perform statistical operations and data visualization

List of Laboratory Assignments for Applied Statistics Laboratory	
Sr. No.	**Applied Mathematics: Assignments each based on following topics**
1	Set Theory
2	Logic, Mathematical Induction
3	Relations and Functions
4	Counting
Sr. No.	**Applied Statistics (Assignments may be performed using R)**
1	Diagrammatic and Graphical representation
2	Measure of central tendency and measure of dispersion
3	Skewness and kurtosis using R- Software
4	Scatter diagram, correlation coefficient (ungrouped data), fitting of line of regression using R- Software
5	Probabilities and Probability graph using R – Software: Binomial, Normal distribution
6	Sample test : Small sample (Mean test) and Large sample (Proportion test)
7	Case studies

F.Y.B.C.A (Science) Semester I

Course Code: BCA11407

Course Name: Applied Mathematics and Statistics

Total lectures:30 **Total Credits: 2**

Prerequisites*:* - Basic Mathematics

Course Objectives:

- Learn basic terminology formal logic, proofs, sets, relations, functions and perform the operations associated with same
- Use formal logic proof and logical reasoning to solve problems
- To understand significance of statistical measures
- To study Correlation, Probability and sampling theory

Course Outcome:-

On completion of the course, students will be able to–

- Relate and apply techniques for constructing mathematical proofs and make use of appropriate set operations, propositional logic to solve problems
- Use function or relation models to interpret associated relationships
- Apply basic counting techniques and use principles of probability
- Given a data, compute various statistical measures of central tendency
- Use appropriate Sampling techniques

Unit	Topic	No of lectures
1	**Unit-1 Set Theory and Logic** 1. Sets– Set Theory, Need for Sets, Representation of Sets, Set Operations, cardinality of set, 2. Types of Sets – Bounded and Unbounded Sets, Countable and Uncountable Sets, Finite andInfinite Sets, Countably Infinite and Uncountably Infinite Sets, power set, Propositional Logic-logic, Propositional Equivalences, Application of Propositional Logic- Translating English Sentences, Proof by Mathematical Induction and Strong Mathematical Induction.	6 Hrs

2	**Unit-2 Relations and Functions** 1. Relations: Properties, n-ary Relations and Applications, Representing Relations , Closures of Relations, Equivalence Relations, Partial Orderings, partitions, Hasse Diagram, Lattices,Transitive Closure and Warshall's Algorithm **2.** Functions- Surjective, Injective and Bijective functions, Inverse Functions andCompositions of Function, Graph Theory :Definition, Types and examples	6 Hrs
	Unit-3 Counting 1. The Basics of counting, Rule of sum and product 2. Permutation and combination , Binomial coefficients and identities 3. The Pigeonhole principle	4 Hrs
	Unit-4 Data Presentation and Aggregation 1. Data Types, Measures of Central Tendency: Mean Median and Mode and their types,Quartiles, Deciles and Percentiles 2. Measures of Dispersion: Standard Deviation, Root Mean Square, Variance, Absolute andRelative Dispersion	6 Hrs
	Unit-5 Correlation Theory and Sampling 1. Moments, Skewness and Kurtosis 2. Introduction to Correlation 3. Linear regression: Concept, The Least-Squares Method, Regression Lines 4. Elementary Sampling Theory: Sampling Theory, Random Samples and Random Numbers,Sampling With and Without Replacement, Stratified Sampling	4 Hrs
	Unit-6 Probability and Hypothesis testing 1. Introduction to Probability, Probability definition, Axioms of probability (without proof),Conditional probability, 'Bayes' theorem (without proof), Examples, Mathematical Expectations 2. Standard Distributions: Continuous and discrete, PDF/PMF,	4 Hrs

	Introduction and properties(without proof) for binomial, normal, Standard Normal, chi-square, t, F distributions 3. Introduction to Hypothesis testing: Concept, definition, Null hypothesis, alternativehypothesis one sided test, two sided test, type I error, type II error	

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, Tata Mcgraw-Hill, Isbn 978-0-07-288008-3, 7th Edition.
2. Trivedi, K.S., " Probability, Statistics, Design Of Experiments And Queuing Theory, With Applications Of Computer Science", Prentice Hall Of India, New Delhi
3. C L Liu, "Elements Of Discrete Mathematics", Tata Mcgraw-Hill, Isbn 10:0-07-066913-9.
4. Kulkarni, M.B., Ghatpande, S.B. And Gore, S.D., "Common Statistical Tests" Satyajeet Prakashan, Pune
5. J.N. Kapur And H.C. Saxena, "Mathematical Statistics", S. Chand Publications, 20th Ed.

F.Y.B.C.A (Science) Semester I

Course Code: 24BCA11407
Course Name: Basics of Web Designing Laboratory

Total lectures: 40 Total Credits: 2

Prerequisites: - None

Course Objectives:

- To develop an ability to design and implement static and dynamic website
- Choose best technologies for solving web client/server problems
- Create conforming web pages
- Use JavaScript for dynamic effects

Course Outcome:-

- Create web pages using HTML and Cascading Styles sheets
- Analyze a web page and identify its elements and attributes
- Create dynamic web pages using JavaScript

Sr. No.	Assignment	
1	Basic HTML Tags	4
2	List & Tables in HTML	4
3	Frames	4
4	Forms in HTML	4
5	CSS	4
6	Basics of JavaScript	4
7	Functions in JavaScript	4
8	Objects in JavaScript	4
9	Validation Using JavaScript & Event Handling	4
10	To demonstrate file handling	4

F.Y.B.C.A (Science) Semester II

Course Code: BCA12101

Course Name: Advanced C Programming

Total lectures: 38 Total Credits:2

Prerequisites: - BCA11201: Problem Solving and C Programming

Course Objectives:

- To learn advanced features in C Programming
- To study advanced data types
- To understand built-in library functions

Course Outcome:-

- On completion of the course, student will be able to–
- Write programs using pointers, structures and unions
- Use Pre-processor directives
- Manipulate strings using library functions
- Write programs to perform operations on Files

Sr. No	Topic	No of lectures
1	**Unit I Preprocessor** 1. Concept, Format of preprocessor directives, File inclusion directives (#include) 2. Macro substitution directives (#define), nested macros, parameterized macros, Macrosversus functions, #error / #pragma directives 3. Conditional compilation (#if/#ifdef/#else/#elif/#endif) 4. Predefined macros (_DATE_ / _TIME_ /_FILE_ /_LINE_/ _STDC_) 5. Preprocessor operators, Macro continuation (\), stringize (#), token pasting (##), defined() 1.	6 Hrs
2	**Unit II Pointers** 1. Concept – reference & dereference, Declaration, definition, initialization & use	6 Hrs

	2. Types of pointers, Pointer Arithmetic, Multiple indirection, parameter passing – call byvalue and call by reference 3. Arrays & Pointers - Pointer to array, Array of pointers, Functions & pointers - Passing pointer to function, Returning pointer from function, Function pointer, Pointers &const 4. Dynamic memory management, Allocation, Resizing, Releasing, Memory leak / dangling pointers	
3	**Unit III Strings** 1. Concept, Declaration, definition, initialization, format specifiers, String literals/ constants & variables 2. reading & writing from & to console, Importance of terminating NULL character 3. Strings & pointers Array of strings & array of character pointers 4. User defined functions & Predefined functions 5. Command line arguments – argc and argv	6 Hrs
4	**Unit IV Structures** 1. Concept, Declaration, definition, initialization 2. accessing structure members (. operator) 3. Array of structures, Pointers to structures, Declaring pointer to structure Accessing structure members via pointer to structure, Structures & functions 4. Passing each member of structure as a separate argument, Passing structure by value /address Nested structures, typedef & structures	6 Hrs
5	**Unit V Union** 1. Concept, Declaration, definition, accessing union members 2. Difference between Structures & unions,	6 Hrs

	3. Structures within union, union within structures, pointers and unions, nested unions,enumerated data types, Bit fields, Concept, need, use, multi-file programs	
6	**Unit VI File Handling** 1. Concept of streams, need, Types of files 2. Operations on text & binary files 3. Random access file, library functions for file handling – fopen, fclose, fgetc, fseek, fgets, fputc etc	8 Hrs

Reference:

1. The C Programming Language (Second Edition) – By B. W. Kerninghan& D. M. Ritchie

2.Programming in C – A Practical Approach – By Ajay Mittal (Pearson Publications)

3. Programming with C – By Byron S Gottfried (Schaum's Outlines)

4. A structural Programming Approach using C – By BehrouzForouzan& Richard Gilberg

5. Y S Kanetkar, "Let Us C", BPB Publications

F.Y.B.C.A (Science) Semester II

Course Code: BCA12103

Course Name: Advanced C Programming Laboratory

Total lectures: 30 Total Credits: 1

Prerequisites: - BCA11202 Problem Solving and C Programming Laboratory

Course Objectives:

- To learn advanced features in C Programming
- To study advanced data types
- To understand built-in library functions

Course Outcome:-

On completion of the course, students will be able to–

- Install operating system and execute various commands
- Effectively use various features of application software
- Create and use spreadsheets effective
- Prepare effective Presentation

Sr. No	Assignment	No of Hours
1	To demonstrate use of pre-processor directives	3
2	To demonstrate use of pointers	3
3	To demonstrate advanced use of pointers	3
4	To demonstrate concept of strings, array of string	3
5	To demonstrate string operations using pointers	3
6	To demonstrate command line arguments	3
7	To demonstrate structures (using array and functions)	3
8	To demonstrate nested structures and Unions	3
9	To demonstrate use of bitwise operators	3
10	To demonstrate file handling	3

F.Y.B.C.A (Science) Semester II

Course Code: BCA12204

Course Name: Computer Organization

Total lectures: 30 Total Credits: 2

Prerequisites: - BCA11103 Fundamentals Of Computer

Course Objectives:

- To study number system, logic gates
- To understand combinational and sequential circuits
- To provide a broad overview of architecture and functioning of computer systems
- To learn the basic concepts behind the architecture and organization of computers.

Course Outcome:-

On completion of the course, student will be able to–

- Design of combinational circuits
- Design of sequential circuits
- Explain block diagram of CPU, Memory and types of I/O transfers
- To understand the working principles of multiprocessor and parallel organization's as advanced computer architectures

Sr. No	Topic	No of lectures
1	**Unit 1 Data representation and Computers Arithmetic** 1. Review of Number system and their interconversion, BCD code, Gray code, Excess-3code, ASCII, EBCDIC, Unicode, and Concept of parity code. 2. Signed and Unsigned numbers, 1's and 2's complement of binary numbers, Binaryarithmetic (Addition, subtraction and subtraction using1's complement and 2's complement)	8 Hrs
2	**Unit-2 Fundamentals of Digital Logic** 1. Logic Gates, Truth Table, Boolean algebra, Simplification of Logic Circuits using Boolean Algebraic and Karnaugh Maps. 2. Combinational Circuits : Adders(HA and FA), subtractor(HS and FS), Multiplexer(Upto 4:1MUX), De multiplexer(Upto 1:4 DEMUX),Decoder,	10 Hrs

	Encoder, 4 bit-ALU, 3. Sequential Circuits : Flip-Flops (SR, JK & D),Counters : synchronous and asynchronous Counter	
3	**Unit-3 I/O Organization and Control unit** 1. Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, PriorityInterrupt, DMA, Input-Output Processor (IOP). 2. Bus organization, Micro programmed vs hardware control, instruction code and format	6 Hrs
4	**Unit-4 Memory system Organization** 1. Classification and design parameters of memory, Memory Hierarchy. 2. Internal and External Memory and its type, Cache Memory and its type, concept of Virtual Memory	6 Hrs

Reference:

1. R.P. Jain, “Modern Digital Electronics”, McGraw-Hill Publications

2. Flod and Jain, “Digital Fundamentals", Pearson Publication.

3. Morris Mano, “Computer System Architecture” Prentice-Hall.

4. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015

F.Y.B.C.A (Science) Semester II

Course Code: BCA12408

Course Name: Computer Organization and Embedded C Programming Laboratory

Total lectures: Total Credits: 2

A: Fundamentals of Computers

Prerequisites: - BCA11103 Fundamentals Of Computer

PartA: Computer Organization Laboratory

Course Objectives:

- To study architecture and functioning of computer systems
- To learn the basic concept behind the architecture and organization of computers

Course Outcome:-

On completion of the course, student will be able to–

- Design and implement combinational circuits
- Design and implement sequential circuits
- Translate real world problems into digital logic formulations

Sr. No.	Assignments
1	Study of Logic gates and their ICs and universal gates
2	Code converters (Grey to Binary and Binary to Grey)
3	Adder and Subtractor Arithmetic circuits
4	Design and implement combinational circuit based on the problem given and minimizing using K-map
5	Implement Encoder and Decoder and Multiplexer and De-multiplexers
6	Study of flip-flops and counters Memory Organization
7	Study of counter ICs and designing Mod-N counters

PartB: Embedded C Programming Laboratory

Course Objectives:

- To introduce the building blocks of Embedded System
- To study and understand Various Embedded Development Strategies
- To introduce sensors and actuator for embedded system
- To impart knowledge in various embedded system case studies.
- To study embedded system
- To learn the basic concept behind embedded system

Course Outcome:-

After completion of the course, a student will be able to

- Acquire a basic knowledge about fundamentals of microcontrollers
- Acquire a basic knowledge about programming and system control to perform a specific task.
- Acquire knowledge about sensor and actuator used in embedded system
- Develop programming skills in embedded systems for various applications. Interfacing basic component of embedded design using Arduino
- Interfacing Arduino with Sensors and Actuators

Sr. No	Assignment
1	Introduction to embedded systems, Basic components of embedded system.
2	Introduction Microprocessor and Microcontroller Environment Setup the IDE, Writing Arduino Software, Arduino Libraries, Basics of Embedded C programming for Arduino
3	Interfacings LED: Blinking LED's , 8-bit binary LED counter
4	Interfacing DC motor
5	Interfacing LCD interfacing
6	Interfacing temperature sensor
7	Interfacing temperature and humidity sensor
8	Interfacing IR sensor and DC motor
9	Interfacing ultrasonic sensor and buzzer
10	Interfacing gas sensor and relay
11	Interfacing Bluetooth

Reference Books:

2. Tianhong Pan,Yi Zhu, “Designing Embedded Systems with Arduino”, Springer

3. Raj Kamal, “Embedded Systems: Architecture, Programming and Design”, McGraw Hill Education India Private Limited

4. K.V. Shibu, “Introduction to Embedded Systems” 2nd Edition, McGraw Hill Education India Private Limited

F.Y.B.C.A (Science) Semester II

Course Code: BCA12102

Course Name: Database Management Systems

Total lectures: 28 Total Credits: 2

Prerequisites: - BCA11305 Applied Mathematics

Course Objectives:

- To study and understand systematic database design approaches
- To explain basic database concepts, applications, data models, schemas and instances
- Describe the basics of SQL and construct queries using SQL.
- To emphasize the importance of normalization in databases

Course Outcome:-

After completion of the course, a student will be able to

- Design E-R Model for given requirements and convert the same into database tables.
- Formulate database queries using SQL
- Design a database in appropriate normal form

Sr. No	Topic	No of lectures
1	**Unit 1: File Organization** 1. Introduction to File Organization 2. Physical / logical files 3. Record organization (fixed, variable length) 4. Types of file organization(heap, sorted, indexed, hashed) 2.	4 Hrs
2	**Unit 2: Introduction of DBMS** 1. Overview of DBMS, File system Vs. DBMS 2. Levels of abstraction, Data independence 3. Structure of DBMS, Users of DBMS, Advantages of DBMS	4 Hrs
3	**Unit 3: Conceptual Design (E-R model)** 1. Overview of DB design 2. ER data model (entities, attributes, entity sets, relations, relationship sets)	6 Hrs

	3. Additional constraints (key constraints, participation constraints, weak entities)aggregation, generalization, specialization Case Studies	
4	**Unit 5: SQL** 1. Introduction to SQL 2. DDL commands (create, drop, alter) with examples 3. Basic structure of SQL query 4. Set operations, Aggregate functions, Null values 5. Nested Sub-queries 6. Modifications of Database (insert, delete, update) 7. SQL mechanisms for joining relations (inner joins, outer joins and their types) 8. Examples on SQL (case studies)	9 Hrs
5	**Unit 6: Relational Database Design** 1. Functional dependencies (Basic concepts, Closure of set of functional dependencies, Closureof an Attribute set) 2. Concept of Decomposition, Desirable Properties of Decomposition (Lossless join andDependency preservation) 3. Concept of Normalization - Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF Examples on Normalization	5 Hrs

Reference:

2. Henry F. Korth, Abraham Silberschatz, S. Sudarshan, “Database System Concepts”, TataMcGraw-Hill Education

3. Raghu Ramakrishnan and Johannes Gehrke, “Database Management Systems”, McGraw-HillScience/Engin

F.Y.B.C.A (Science) Semester II

Course Code: BCA12407

Course Name: Database Management Systems Laboratory

Total lectures: 21 Total Credits: 1

Prerequisites: - BCA11306 Applied Mathematics

Course Objectives:

- To learn design of E-R diagrams
- To prepare and execute database queries

Course Outcome:-

On completion of the course, student will be able to–

- Prepare E-R Diagram for the given problem statement
- Formulate appropriate SQL DDL Queries
- Formulate appropriate SQL DML Queries

Sr. No.	Assignment	
1	Case study – ER diagram (generalization, specialization and aggregation)	3
2	Data Definition Language (DDL) - Create, Alter, Drop, Truncate, Rename andComment	3
3	Data Manipulation Language (DML) – Select, Insert, Update, Delete and Merge,	3
4	Normalization	3
5	Queries using joins	3
6	Aggregate Functions and Clauses	3
7	Nested Queries	3

F.Y.B.C.A (Science) Semester II

Course Code: 24BCA12408

Course Name: Web Technology using PHP Laboratory

Total lectures: 40 Total Credits: 2

Prerequisites: - BCA111407 Basic Web Designing

Course Objectives:

- To get familiar with basics of the Internet Programming.
- To acquire knowledge and skills for creation of web site using client and server side programming
- To understand process of developing responsive web applications
- To explore different web extensions and web services standards

Course Outcome:-

After successful completion of this course, learners will be able to

- Design and implement static and dynamic websites using appropriate client side and server side technologies.
- Build Dynamic web site using PHP Programming and Database connectivity.
- Build applications using AJAX and XML and web services

Sr. No.	Assignment	
1	Introduction to PHP	**4**
2	PHP Functions and Array	**4**
3	Classes and Objects	**4**
4	Inheritance, Interface and Constructor	**4**
5	Cookies and Session	**4**
6	Processing Forms and File Uploading	**4**
7	Databases	**4**
8	Clauses (OrderBy and GroupBy)	**4**
9	XML	**4**
10	Ajax	**4**

Progressive Education Society's

Modern College of Arts, Science and Commerce (Autonomous)

Ganeshkhind, Pune 411 016

Three-Year BSc Biotechnology and
Four-Year BSc (Hons. With Research) Biotechnology
Degree Programs

Syllabus for

F. Y. B. Sc. Biotechnology

(As per revised NEP pattern; to be implemented from 2024-25)

Introduction:

Biotechnology has expanded and established as an advanced interdisciplinary applied science. The study of Life itself is at the core of it and the interdisciplinary networking potential of biotechnology has given it a separate status in fundamental research as well as in modern industrial enterprise. Global and local focus has slowly shifted to not only current "Century of Knowledge" but also on to technology development and application in life sciences. In the milieu of research and industrialization for economic development and social change, biotechnology is an ideal platform to work.

The interdisciplinary nature of biotechnology integrates living systems including animal, plant and microbes and their studies from molecular biology to cell biology, from biochemistry to biophysics, from genetic engineering to stem cell research, from bioinformatics to genomics-proteomics, from environmental biology to biodiversity, from microbiology to bioprocess engineering, from bioremediation to material transformation and so on. The relevance and application of these studies on living organisms and their bioprocesses is extensively covered in this field with the help of technology. Green revolution and white revolution was possible in India thanks to the deeper and intrinsic understanding of biotechnology. Economic and social renaissance is staged on biotechnology especially, since it' s biomedical and cutting-edge technological applications are tremendously powerful in shaping this century and exciting future. Biotechnologists are always in demand as an efficient work force in fundamental research and industries. Education and research sectors require such interdisciplinary trained work force to develop future generations of science leaders. Career opportunities for graduate students are created and expanding at the biotechnology parks and in manufacturing industries, teaching, research institutes and IT industry.

The newly developed syllabus is a choice-based credit system with semester pattern. Biotechnology has grown extensively in last couple of decades. With the changing scenario at local and global level, we feel that the syllabus orientation should be altered to keep pace with developments in the education and industrial sector. The need of the hour is to design appropriate syllabi that emphasize on teaching of technological as well as the economic aspects of modern biology. The proposed credit-based curriculum ensures the requirement of academia and industry. Theory supplemented with extensive practical skill sets will help a graduate student to avail the opportunities in the applied fields (research, industry or institutions) without any additional

training. Thus, the college itself will be developing the trained and skilled man-power. Biotechnology being an interdisciplinary subject, this restructured syllabus will combine the principles of different sciences along with developing advanced technology

Biotechnology curricula are operated at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart primarily basic knowledge of the respective subject from all possible angles while postgraduate syllabus emphasizes on more applied courses. In addition, students are to be trained to apply this knowledge particularly in day-to-day applications of biotechnology and to get a glimpse of research. The basic aim of the revised course curriculum is to integrate various disciplines of life sciences which will cater the needs of human resources in academia and industry. The Overall objective of the Program is to promote education and research in biotechnology and provide academic and professional excellence for immediate productivity in academics, government organization, biomedical sectors, health and nutrition settings for ultimate benefit of society and sustainable development.

Program Objectives:

- To introduce the concepts in various allied subjects
- To enrich students' knowledge in basic and applied aspects of life sciences.
- To help the students to build interdisciplinary approach in teaching/learning & in research.
- To inculcate the sense of scientific responsibilities and social awareness
- To help the students build-up progressive and successful careers in academia and industry.

Program Specific Outcomes (PSOs):

Program Outcomes:

After successful completion of B.Sc. Biotechnology program, the students should be able:

PO1: to have competencies in the area of basic and applied biological sciences.

PO2: to learn and explore various fields and specializations of Biotechnology such

as molecular biology, genetic engineering, large-scale manufacturing processes, environmental biotechnology and tissue culture

PO3: to get engaged and carry out biotechnological research independently and in team

PO4: to develop and explore the biotechnological tools with keeping in mind the social and ethical responsibilities

PO5: to prepare and pass competitive exams like GAT-B for higher studies

Examination Pattern

40:60 [Continuous Internal Evaluation: Formative, Summative and End semester exam (ESE)]

Evaluation of Students:

1) The Internal evaluation will be in form of continuous assesement format of 20 marks and End-Semester examinations will be of 30 marks making total to 50.

2) Student has to obtain 40% marks in the examination of In-Semester and End-Semester assessment. Separate passing is mandatory

4) Internal marks remain unchanged and internal assessment cannot be repeated. If student remain absent during internal assessment examination, he/she will have chance with the permission of the competent authority. But it will not be right of the student. It will be under the discretion of the competent authority and internal departmental assessment committee. In case he/she wants to repeat Internal, he/she can do so only by registering for the said courses.

In-semester Examination: Internal assessment for each course would be continuous and dates for each tutorials/practical tests etc. will be pre-notified in the time table for teaching or placed separately as a part of time table. Department/ College Internal Assessment Committee will coordinate this activity.

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Students Seminar
2. Short Quizzes / MCQ Test
3. Home Assignments
4. Tutorials/ Practical
5. Oral test
6. Research Project
7. Group Discussion
8. Open Book Test
9. Study Tour
10. Written Test
11. PPT presentation
12. Field Visit
13. Industrial Visit
14. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. Research Papers & Projects
8. E-content

Course Structure

	Vertical 1		V2	V3	V4	V5		V6		
Sem.1						**AEC**	**VEC**	**IKS**	**0**	**Total Credits**
	24BIO11101 Biological Chemistry (2C) (T)	**24BIO11103 Microbial Science (2C) (T)**	**24BIO11105 Bio-instrumentation (2C) (T)**	**24BIO11307 OE1 (2C) (T)**	**24BIO11408 Experiments in Computational tools for Biotechnology (2C) (2p)**	**AEC: Developing Communicative competence (2C) (T),**	**VEC: 24VEC11501 Value Education1 (2c) (T)**	**IKS: 24IKS11501 Foundation course in Indian Knowledge System (2C) (T)**		**22**
Credits	**2 T+2 P=4**	**2 T+2 P=4**	**2 T+2 P=4**	**2**	**2**	**2**	**2**	**2**		
Sem 2	**24BIO12101 Plant Science (2C) (T)**	**24BIO12103 Animal Science 2C) (T)**	**24BIO12105 Metabolism &Physiology (2C) (T)**	**24BIO12307 OE2 (2C) (T)**	**24BIO12406 Experiments in Microscopy (2C) (P)**	**AEC: 24ENG12506 Mastering English for Professional Purposes (2C) (T)**	**VEC: 24VEC11502 India's Constitution,Democracy,Election and Governence (2C) (T)**	**CC 1(2C)**	**0**	**22**
	24BIO 12102 Experiments in Plant Science (2) (P)	**24BIO 12104 Experiments in AnimaScience (2C) (P)**	**24BIO 12106 Experiments in Metabolism & Physiology (2C) (P)**				**0**		**0**	
Credits	**2T+2P=4**	**2T=2P=4**	**2T+2P=4**	**2**	**2P**	**2**	**2**	**2**		

Semester I

Course Code	Theory/ Practical	Course title	Credits	No. of Lectures/ Practical	Evaluation		
					Marks for CIE	Marks for ESE	Total Marks
24BIO11101	T	Biological Chemistry	2	30L	20	30	50
24BIO11102	P	Experiments in Biological Chemistry	2	15P	20	30	50
24BIO11103	T	Microbial Science	2	30L	20	30	50
24BIO11104	P	Experiments in Microbial Science	2	15P	20	30	50
24BIO11105	T	Bioinstrumentation	2	30L	20	30	50
24BIO11106	P	Experiments in Bioinstrumentation	2	15P	20	30	50
24BIO11408	P	Experiments in Computational tools for biotechnology	2	15P	20	30	50

Semester II

Course Code	Theory/ Practical	Course title	Credits	No. of Lectures/ Practical	Evaluation		
					Marks for CIE	Marks for ESE	Total Marks
24BIO12101	T	Plant Science	2	30L	20	30	50
24BIO12102	P	Experiments in Plant Science	2	15P	20	30	50
24BIO12103	T	Animal Science	2	30L	20	30	50
24BIO12104	P	Experiments in Animal Science	2	15L	20	30	50
24BIO12105	T	Metabolism and Physiology	2	30L	20	30	50
24BIO12106	P	Experiments in Metabolism&Physiology	2	15P	20	30	50
24BIO12408	P	Experiments in Microscopy	2	15P	20	30	50

Open electives offered by the Department of Biotechnology

Course Code	Theory/ Practical	Course title	Credits	No. of Lectures/ Practical	Marks for CIE	Marks for ESE	Total Marks
	T	Introductory Biotechnology	2	30L	30	20	50

	T	Biotechnology for Environment and Agriculture	2	30L	30	20	50

CIE: Continuous Internal Examination; ESE: End Semester Examination

24BIO11101 Biological Chemistry [T, 2C, 30L]

On successful completion, the students should be able to:
CO1: Gain knowledge of the biochemical basis of life
CO2: Understand the importance of water as a universal solvent
CO3: Learn the different classes, structural and biochemical properties of basic biomolecules including carbohydrates, proteins, lipids, vitamins, enzymes, and nucleic acids
CO4: Know the functions of various vital biomolecules

Unit	Topic	Lectures
I	**Historical perspective of biochemistry** Atomic structures, molecules, valence and valence bond theory, chemical bonding (covalent, ionic, hydrogen)Origin of life, abiotic production of biomolecules, cellular and chemical foundation of life.	02
II	**Water** Properties of water, Hydrogen bonding, ionization of water, interaction of biological molecules in water, osmosis, pH, titration curves, buffers, biological buffers.	03
III	**Carbohydrates** Classification of carbohydrates, sugars and non-sugars, Monosaccharides, oligosaccharides, and polysaccharides. Functions of Carbohydrate Monosaccharides: Structure and properties, ketoses and aldoses, D and L configuration, chemical and physical properties. Polysaccharides and their classification based on function (Storage polysaccharide: eg starch, glycogen, Structural polysaccharides: eg. cellulose, chitin)	05
IV	**Lipid** Classification of lipids: Simple and complex lipids, fatty acids. Structure, chemical and physical properties complex lipids: Triacylglycerol, Sphingolipids, Phospholipids and Glycolipids, Steroids, Lipoproteins, Storage and structural lipids.	05

	Function of lipids	
V	**Proteins:** Polymer of amino acids, Classification of amino acids, Chemistry of amino acids: Ionization of amino acid side chains, Configuration, zwitterion, reactions of amino acids, titration of amino acid, Isoelectric pH. Protein structure: Primary structure and peptide bond formation, Secondary structure, secondary repeats, Tertiary and Quaternary structure (eg. Haemoglobin). Protein denaturation and renaturation. Functions of proteins	05
VI	**Enzymes**: General properties; classification of enzymes Concepts of Biocatalyst, Active site, Specificity, Energy of activation, Reaction Rate. Rate law for enzyme-catalyzed reaction Enzyme units, specific activity, turnover number. Lock and key, Induced fit hypothesis. Parameters affecting enzyme activity (temperature, pH, substrate, cofactor, enzyme concentration) Enzyme inhibition	06
VII	**Nucleic acids** Concepts of Purine, Pyrimidines, Nucleosides, Nucleotides, structure of DNA and RNA, Forces stabilizing nucleic acid structure Properties of Nucleic Acid. Denaturation & renaturation of Nucleic Acids. Different forms of DNA	04

Reference Books:

1. Outlines of Biochemistry: 5th Edition, (2009), Erice Conn & Paul Stumpf ; John Wiley and Sons, USA

2. Fundamentals of Biochemistry. 3rd Edition, (2008), Donald Voet & Judith Voet , John Wiley and Sons, Inc. USA

3. Principles of Biochemistry, 4th edition (1997), Jeffory Zubey, McGraw-Hill College, USA

4. Biochemistry: 7th Edition, (2012), Jeremy Berg, Lubert Stryer, W.H.Freeman and company, NY

5. Lehninger , Principles of Biochemistry. 5th Edition (2008), David Nelson & Michael Cox, W.H. Freeman and company, NY.

BIO11102 Experiments in Biological Chemistry [P, 2C, 15P]

On successful completion, the students should be able to:

CO1: Gain knowledge of the preparation of solutions of various concentration

CO2: Understand the preparation of buffers and reagents pertaining to biochemistry

CO3: Learn the tests for estimation of biomolecules including carbohydrates, proteins, lipids, vitamins, enzymes, and nucleic acids

CO4: Know the extraction of biomolecules from various biological sources and quantitate them

UNIT	TITLE OF EXPERIMENT	No. of practical
1.	Numerical based on Molarity, Molality, Normality	1
2.	Handling of pipettes and micropipettes	1
3.	Preparation of biochemical reagents	1
4.	Preparation of buffer of desired pH and molarity	1
5.	Spot test for carbohydrates & amino acids	2
6.	Spectrophotometric analysis of nucleic acid	1
7.	Extraction of casein from milk	1
8.	Estimation of protein by Biuret method	1
9.	Estimation of protein by Lowry method	1
10.	Thin layer chromatography for amino acids	1
11.	Estimation of cholesterol by Zak's method from given sample	1
12.	Estimation of sugar by DNSA method	1
13.	To perform enzymatic assay using amylase	1

References:

1.Principles and Techniques of Biochemistry and Molecular Biology" by Keith Wilson and John Walker

2.Walker, J. M. and Rapley, R. (2008) "Practical Biotechnology: Principles and Protocols".

3.Practical biochemistry by Sadashivam and Manicckam

4.Biochemical Techniques: Theory and Practice" by John F. Robyt and Bernard J. White

5."Laboratory Manual for Principles of Biochemistry" by Albert L. Lehninger, David L. Nelson, and Michael M. Cox

24 BIO11103 Microbial Science [T, 2C, 30L]

On successful completion, the students should be able to:

CO1: Understand the different classes of microorganisms
CO2: Know the various structural aspects of different microbes
CO3: Understand the various approaches of microbial cultivation and observation
CO4: Get familiar with the concept of disinfectants and antibiotics

Unit	Topic	No.of Lectures
I	**Introduction to Microbial World:** • History of Microbiology, Abiogenesis vs Biogenesis, Discovery of Microorganisms, Germ theory of diseases, Koch's postulates, Pre golden era, Golden Era, post golden Era, Contributions of various scientists in path breaking discoveries, inventions and Product Development. • General Characters and their importance of Prokaryotes, Eubacteria, Archaebacteria, Eukaryotic Microorganisms- (Fungi, Algae, protozoa), Viruses, viroid and prions. • Importance of study of Microbiology and relevance in Biotechnology (Brief discussion of application of Microbiology invarious fields) **Classification of Microorganisms:** • All 5 major groups of microorganisms, Similarities anddissimilarities in relation to evolution. • Difference between Prokaryotic and Eukaryotic organisms. • Bacterial Classification: Bergey's Manual of SystemicBacteriology	6
II	**Bacterial cell structure:** Ultrastructure of Bacteria- Cell wall (Gram Positive and Gram negative), Cell Membrane, Capsule, Flagella, Pili, slime layer, Ribosome, Nucleoid, Mesosomes, Endospore, Cell inclusions (Gas vesicles, carboxysomes,magnetosomes, PHB granules, Glycogenbodies, metachromatic granules)	5

III	**Observation of Microorganisms:** • Theory of staining: Classification of stains, Stain (Basic and Acidic), Fixative, Mordant, Decoloriser, Accentuator Principles and methods of staining techniques for following (Monochrome, Negative, Differential (Gram, Acid fast), Specialstaining-Endospore, flagella, cell wall, nucleic acid, capsule)	5
IV	**Cultivation and isolation of microorganisms** • Basic Nutritional (Macro and micro), and environmental requirements (Hydrogen ion concentration, Temperature and Oxygen and other), Nutritional classification of bacteria • Design of media (Bacterial and Fungal): Types of media and Composition: Liquid, semi-solid and solid media, Selective media, Enrichment media, Enriched media, differential media, selective and differential media, Minimal media and thereuses. • Cultivation of microorganisms: Concept of Pure culture, co-culture and Mixedculture, Colony characteristics. • Reproduction in microorganisms: Binary Fission and other asexual methods of reproduction, logarithmic representation of bacterial populations, phases of growth, calculation of generation time and specific growth rate. • Isolation of microorganisms and pure culture techniques: Streak, Spread, Serial Dilution, Pour plate, Enrichment, Singlecell isolation Colony • Preservation and Maintenance methods	8
V	**Control of microbial growth:** • Definition: Sterilization and Disinfection. • Physical Agents – Heat (Dry and Moist heat), pasteurization, Radiation, Filtration • Principle and working of Autoclave and Hot air oven. • Sterilization Efficiency • **Chemical Agents and their Mode of Action** - Aldehydes, Halogens, Quaternary Ammonium Compounds, Phenol and Phenolic Compounds, Heavy Metals, Alcohol, Dyes, and Detergents **Disinfectant**-Characteristics of an Ideal disinfectant**,** Examples of Disinfectants and Evaluation of Disinfectant	5

Recommended Textbooks and References

1. Ingraham J. L. and Ingraham C.A. (2004). Introduction to Microbiology.3rdEdition.Thomson Brooks / Cole.

2. Madigan M.T., Martinko J.M. (2006). Brock's Biology of Microorganisms. 11th Edition. Pearson Education Inc.

3. Prescott L.M., Harley J.P., AND Klein D.A. (2005). Microbiology, 6thEdition.MacGraw Hill Companies Inc.

4. Salle A.J. (1971) Fundamental Principles of Bacteriology.7th Edition. Tata MacGraw Publishing Co.

5. Stanier R.Y., Adelberg E.A. and Ingraham J.L. (1987) General Microbiology, 5thEdition. Macmillan Press Ltd.

6. Tortora G.J., Funke B.R., Case C.L. (2006). Microbiology: An Introduction. 8th Edition. Pearson Education Inc.

24BIO11104 Experiments in Microbial Science [2C,15P]

Course outcome

CO1: Learn the basic technique of aseptic handling

CO2: Get hands-on experience in sterilization, media preparation, and glassware preparation

CO3: Get hands-on experience in microbial isolation, culture purification, and enumeration

No.	Title of experiment	No. of practical
1	**Introduction to Microbiology Laboratory and common microbiology laboratory instruments** (Incubator, Hot Air Oven, Autoclave, Distillation Unit, Chemical Balance, Laminar air flow hood, Centrifuge, Handling of Microorganisms and Biosafety measures)	01
2	**Observation of Microorganisms** (Use and Care of Compound Microscope, Wet Mount- pond water, Fungal staining, Monochrome staining, Negative staining, Gram staining, Spore staining, Motility: Hanging drop technique)	08
3	**Aseptic transfer techniques**	01
4	**Preparation of Media and Glassware** (Bacterial growth media: Nutrient broth, Nutrient agar plates, butts, and slants, Fungal growth media: Potato dextrose agar plates)	01
5	**Demonstration of microbes in the air, on the table surface, fingertips on nutrient media.**	01
6	**Isolation and enumeration of bacteria** (Streak plate technique, Serial dilutions, Spread plate and pour plate technique, Yeast cell counting using Neubauer's chamber)	05

BIO11105 Bioinstrumentation [T, 2C, 30L]

On successful completion, the students should be able to:

CO1: Get knowledge of the principles behind the working of various instruments
CO2: Learn the basics of pH metry and buffers
CO3: Understand the theory of spectroscopy
CO4: Familiarize with the concept of planar and column chromatography **Bioinstrumentation**

Unit	Topic	Lectures
I	**Biophysics and biophysical properties** (Adsorption, absorption, diffusion, osmosis, surface tension, colloidal properties and dialysis)	02
II	**Biophysical properties and cell membrane** Organization of plasma membrane, Passive and active transport. Membrane potential, Passive and active electrical properties of cell, Depolarization, hyperpolarization of membrane (neuronal), Generation of action potential	03
III	**Introduction to bioinstrumentation**, techniques for analysis of biomolecules	02
IV	**Spectroscopy** Definition, Electromagnetic wave and spectrum, Applications of each region of electromagnetic spectrum for spectroscopy Lambert-Beer's Law, types of sources, Instrumentation of single beam and double beam instrument. Introduction to molecular energy levels. Excitation. Absorption. Emission. Rotational spectra. Energy levels of rigid diatomic molecules. Electron spectroscopy. UV-visible spectroscopy. Principle, construction and working of colorimeter, Spectrophotometer. Application to biomolecules (proteins, DNA, Hb, chlorophyll).	05
V	**Chromatography** Concept, planar chromatography and types, column chromatography and types, applications of chromatography	05
VI	**Microscopy** Concepts - Resolving power, Construction and working principles of the following microscopes: Stereo zoom (Dissecting), Compound, Light microscopy, Bright and Dark Field microscopy, Inverted, Phase contrast, Fluorescence microscopy and Electron microscopy	05
VII	**pH meter** Principle, construction and working, concept of pH, isoelectric pH, buffers	03
VIII	**Centrifuge** RCF, sedimentation concept, different types of centrifuges. different rotors, differential and density gradient centrifugation, analytical ultra-centrifugation, determination of molecular weights and other applications	03
IX	**Mass spectroscopy** (Bainbridge mass spectrometer) Principle and applications	01

X	**Atomic absorption spectrometer** (AAS) Principle and applications	01

References

1. Biophysics, an introduction. 1st edition. (2002) Cotteril R. John Willey and SonsLtd., USA
2. Biophysics. 1st edition (2002), Pattabhi V and Gautham N. Kluwer AcademicPublisher, USA.
3. Textbook of optics and atomic physics, 8th edition (1989) P.P. Khandelwal,Himlaya Publishing House, India.
4. Instrumentation measurements and analysis – 2nd edition (2003). Nakra and Choudhari, Tata McGraw Hill, India.

BIO11106 Experiments in Bioinstrumentation [P, 2C, 15P]

On successful completion, the students should be able to:

CO1: Calibrate and use the pH meter, colorimeter
CO2: Use the centrifuge machine for the separation of components
CO3: Gel hands-on training of using UV-Vis spectrophotometer
CO4: Separate the different components using chromatography

No.	Title of experiment	No. of practical
1	Calibration of weighing balance and its working for micro measurements	01
2	Calibration of pH meter and estimation of pH of unknown solutions	01
3	Prepare acidic and basic buffers and adjust the pH	01
4	Handling, calibration, and maintenance of micropipettes	01
5	Separation of mixtures using different types of centrifuge	01
6	Separation of a mixture of *E. coli* and Yeast using sucrose density gradient	01
7	Study the components and working of the colorimeter	01
8	Measure the absorbance of a given solution using a colorimeter and spectrophotometer.	01
9	Determination of lambda max and molar extinction coefficient using a spectrophotometer. Validate the beer-lamberts law.	03
10	Determination of the unknown concentration of the sample using a colorimeter/spectrophotometer	02
10	Separation of dyes using paper chromatography	01
11	Demonstration of ELISA reader	01

References:

1.Veerakumari, L. (2015). Bioinstrumentation. C. jamarthanan, MJ publishers:Triplicane.

2.Arumugam, N. and Kumaresan, V. (2015). Biophysics and Bioinsturmentation. SarS Publications.

BIO11408: Computational Tools for Biotechnology [T, 1C,15L]

On successful completion, the students should be able to:

CO1: Understand the basic hardware and operating systems in computers
CO2: Concept of computer viruses
CO3: Learn the concept of the internet and different databases
CO4: Introduce to the concept of bioinformatics

Unit	Topics	No. of Lectures
I	**Introduction to computers:** Overview and functions of a computer system, Input and output devices, Storage devices: Hard disk, Diskette, Magnetic tape, RAID, ZIP devices, Digital tape, CD-ROM, DVD (capacity and access time) **Introduction to the operating system:** Operating system concept-Windows and UNIX/Linux **Data processing & presentation:** Introduction: MS Office (Word, Excel & PowerPoint) **Computer viruses:** An overview of Computer viruses, What is a virus? Virus symptoms, How do they get transmitted?, General Precautions **Internet searches:** Concepts in text-based searching, Searching Medline. PubMed, bibliographic database	**05**
II	**Databases** Introduction & need of databases, Types of databases Basic concepts in: Data Abstraction, Data Models, Instances & Schemes, E-R Model (Entity and entity sets; Relations and relationship sets; E-R diagrams; Reducing E-R Diagrams to tables), Network Data Model: Basic concepts, Hierarchical Data Model: Basic concepts Multimedia Database: Basic concepts and Applications, Indexing and Hashing, B + Tree indexed files, B Tree indexed files, Static Hash functions, Dynamic Hash functions Text Databases: Introduction & Overview of Biological database, Types of Biological Database	**08**
III	**Bioinformatics:** Introduction to bioinformatics, History, Goals, Relation to other fields.	**02**

BIO11408 Experiments in Computational Tools for Biotechnology Lab [P, 1C, 15P]

On successful completion, the students should be able to:

CO1: Learn the basics of operating system (DOS), Microsoft Word
CO2: Learn different methods to represent and process the data in digital form

No.	Title of experiment	No. of Practical
1	Tutorials operating systems: DOS File handling: copy, rename, delete, type Directory structure: make, rename, and move directory	01
2	Word Processing (Microsoft Word): Creating, Saving & Operating a document, Editing, Inserting, Deleting, Formatting, Moving & Copying Text, Find & Replace, Spell Checker & Grammar Check, Document Enhancement (Borders, Shading, Header, Footer), Printing Document (Page Layout, Margins)	03
3	Introduction to the use of Wizards & Templates, Working with Graphics (Word Art), Working with Tables & Charts, Inserting Pictures	01
4	Spreadsheet Applications (Microsoft Excel): Worksheet Basics: Entering information in a Worksheet, Saving & Opening a Worksheet, Editing, Copying & Moving Data, Inserting, Deleting & Moving Columns & Rows, Clearing	02
5	Database Applications (Microsoft Access): Fields, Records, Files, Organization of Files. Access Modes: Updating Records, Querying, Reports, Forms & sub forms	03

BIO12101 Plant Science [T, 2C, 30L]

On successful completion, the students should be able to:

CO1: Gain knowledge of different classes of plants
CO2: Learn the structural and functional aspects of various plant tissue types and organs
CO3: Understand the water and photosynthate conduction in plants
CO4: Understand the basics of growth and development in plants

Unit	Topic	Lectures
I	**Introduction to plant kingdom, Classification of plants** (General & Unique features of plants, Principles/Basis of plant classification, Outline of the classification with example: Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms, Characteristic features of Dicot and Monocot)	03
II	**Structure of plant Cell** (characteristic features of plant cells and cell wall)	02
III	**Plant tissues and tissue systems** (Meristematic tissues and Permanent tissues: Simple and complex)	03
IV	**Vegetative and reproductive organs of plants** (structure, function and modifications of root, shoot and leaves, structure of flower, primary and secondary growth, growth ring formation)	04
V	**Plant water relationship** (Cell permeability, diffusion, imbibition, Osmosis & its types, relation between osmotic pressure (OP), turgor pressure (TP) and wall pressure (WP), DPD (Suction pressure), Absorption and transport of water, mechanism of Ascent of sap: transpiration and guttation, translocation via capillarity action, Cohesion-tension theory)	05
VI	**Translocation in phloem** (phloem as the site of sugar translocation, Pressure–Flow Model, Phloem loading and unloading, Source-sink relationship.)	04
VII	**Photosynthesis** (Photosynthesis pigments, concept of two photo systems, photophosphorylation, Calvin cycle, CAM plants, photorespiration)	03
VIII	**Respiration** (Glycolysis, Krebs's cycle and ETS)	03
IX	**Growth and development of plant** (macro and micro elements, plant growth regulators, photoperiodism, nitrogen fixation)	02
X	**Economic importance of plants**	01

References:

1. Dutta A.C. (2000) A Classbook of Botany (Oxford University Press, UK)
2. Ganguli, Das Dutta (2011) – College Botany Vol I, II and III (New Central BookAgency, Kolkata)
3. Esau K. (1977) Anatomy of seed plants (Wiley, USA)
4. Fahn, A. 1974 Plant Anatomy. Pergmon Press, USA and UK.

24BIO12102 Experiments in Plant Science lab [2C - 15P]

No.	Title of experiment	No. of practical
1	Study of algae, fungi, bryophytes, pteridophytes, gymnosperms, angiosperms with one example each	02
2	Microscopic observation of various types of plant cells	01
3	Study of anatomy of plant organs using tissue sectioning and staining	02
4	Study of various plant tissues using maceration	02
5	Study of stomata and rate of transpiration	01
6	Study of osmotic potential using incipient plasmolysis	01
7	Determination of Diffusion Pressure Deficit (DPD)	01
8	Study of rate of respiration	01
9	Study of Hill's reaction using isolated chloroplasts	01
10	Preparation of plant growth media, effect of plant growth regulators, mineral deficiency of rate of seed germination	03

24BIO12103 Animal Science [T, 2C, 30L]

On successful completion, the students should be able to:

CO1: Understand the basis of animal classification, different classes and examples
CO2: Learn the structural and functional aspects of animal tissues and organs
CO3: Know different model systems used in animal science
CO4: Understand animal physiological processes including digestion, respiration, circulation, excretion, and reproduction along with different systems
CO5: Learn the lifecycles of different animal parasites

Unit	Topic	Lectures
I	**Introduction to Kingdom Animalia** (Outline classification of non-chordates and chordates with examples)	02
II	**Animal Tissues** (Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nerve tissue)	04
III	**Introduction to Invertebrate model system** a) Hydra b) *C. elegans* c) *Drosophila* d) Honey bee (*Apis* sp. i. Morphology ii. Mouthparts, sting apparatus iii. Social organization iv. Communication in bees)	04
IV	**Animal Physiology I** Digestion: Structure and function of digestive glands; Digestion and absorption of carbohydrates, fats and proteins Respiratory: Physiology, External and internal respiration, Transport of oxygen and carbon dioxide in blood, Factors affecting transport of gases. Circulation: Structure of heart, Physiology of circulation, Pulmonary and systemic circulation	07

	Excretion: Physiology of excretion and osmo- regulation (Water and Salt Balance)	
V	**Animal Physiology II** Functioning of Excitable Tissue (Nerve and Muscle) Structure of neuron, Propagation of nerve impulse (myelinated and nonmyelinated nerve fibre); Muscle Physiology:Structure of skeletal muscle, Mechanism of muscle contraction (Sliding filament theory), Neuromuscular junction Endocrine Physiology: Brief overview on: Structure and function of endocrine glands (pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries, and testes), Reproductive Physiology Brief account of spermatogenesis and oogenesis	07
VI	**Parasitology** Introduction to Host-parasite Relationship Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism Parasitic Protozoa Life history and pathogenicity of *Plasmodium vivax* Parasitic Helminths Life history and pathogenicity of *Fasciola hepatica*, *Taenia* sp	04
VII	**Economic Zoology** An overview on Vermiculture, Aquaculture, Sericulture, Apiculture	02

Reference books:

1. Jordan, E.L. and Verma P.S. 1978, (i) Chordate Zoology S. Chand & Company Ltd. Ram Nagar. New Delhi.

2. Jordan, E.L. and Verma P.S. 1978 (ii) Invertebrate Zoology. S. Chand & Company Ltd. Ram Nagar. New Delhi.

3. Modern Text Book of Zoology: Invertebrates., R.L.Kotpal. Publisher, Rastogi Publications, 2012.

4. Economic Zoology, Shukla & Upadhyaya, 4th Edition., Rastogi Publications, 2009.

5. Modern Parasitology: A Textbook of Parasitology, 2nd edition, (1993) F. E. G. Cox, Wiley & Sons, USA

24 BIO 12104 Experiments inAnimal Science [2C - 15P]

On successful completion, the students should be able to:

CO1: Learn the structural aspects, and lifecyle of animals from different classes
CO2: Understand the concept of the vital capacity of the lungs
CO3: Learn the method for the collection, classification, and preservation of Insects

No.	Title of experiment	No. of practical
1	Study of *Paramoecium* (Morphology, Reproduction: Binary fission & Conjugation, culturing of *Paramoecium*)	02
2	Study of Hydra (Permanent slides) (Morphology, Reproduction, Regeneration)	02
3	Study of Drosophila (Characters, sexual dimorphism eye & wing mutations, Life cycle, Culturing Drosophila using standard methods)	03
4	Study and Dissection of Honey Bee (Mounting of Mouth parts, pollen basket, Antenna Cleaner, Sting apparatus, legs and wings)	02
5	Experiment on squamous epithelium	01
6	Experiment on Skeletal (Voluntary) Muscle	01
7	Experiment on Human Sex Chromatin	01
8	To find the vital capacity of the lungs Collection	01
9	Collection, Classification and preservation of Insects	02

24BIO12105: Metabolism and Physiology [T, 2C, 30L]

Upon successful completion of this course, student should be able to:

CO1: Students will gain the knowledge about various metabolic pathways
CO2: Students will learn the energy dynamics with relation to the different metabolites
CO3: Students will understand the concepts of plant, animal, and microbial physiology
CO4: Students will gain knowledge about adaptations of plant, animal and microbes in extreme environmental conditions

Units	Topic	No. of Lectures (30)
1	Introduction to Metabolism • Biochemistry-Definition, scope & importance in Biotechnology • Chemistry of Metabolism: Oxidation–reduction reaction, Grouptransfer reactions etc, • Concept of Bioenergetics, ATP & Phosphoanhydride bond.	2
2	Carbohydrate Metabolism – • Aerobic & Anaerobic glycolysis, sequence of reactions in glycolysis, regulation in glycolysis, • Pyruvate metabolism, citric acid cycle & its regulation, Electron transport Chain, & oxidative phosphorylation, chemiosmotic hypothesis • glycogenesis, glycogenolysis (sequence of reactions& regulation), • Pentose-phosphate pathway (sequence of reactions & regulation, significance),	5
3	Amino acid Metabolism – • Essential & non-essential amino acids, Brief outline of amino acid synthesis, • General reactions of amino acid metabolism- Transamination, deamination & decarboxylation. • Urea Cycle- reactions, energetics & regulation • Disorders related to amino acid metabolism-Phenylketonuria, albinism, Maple syrup urine disease, Tyrosinemia, Homocystinuria with reactions. • Metabolic network – Interrelationship of metabolisms, Krebs cycle, amino acid synthesis	5
4	Lipid Metabolism – • Outline of lipid synthesis, • Catabolism of Fatty acid: beta oxidation, Oxidation of unsaturated fatty acids, Oxidation of odd chain fatty acids, Cholesterol, ketone bodies.	4

5	Nucleotide Metabolism – • Biosynthesis of purine & pyrimidine (de novo & salvage pathway); Degradation of purine & pyrimidine.	4
6	Plant, Animal, and Microbial Physiology • Introduction and scope • Physiology with respect to growth and development • Physiology of stress (abiotic and biotic) responses in plants, animals, and microbes • Physiology of adaptive responses to climate change and environmental challenges	10

Reference Books :

1. Conn EE and Stump PK. 2010. Outlines of Biochemistry. 5th Ed. John Wiley Publications.

2. Voet D and Voet JG. 2011. Biochemistry. 4th Ed. John Wiley and Sons, Inc. NY, USA .

3. Nelson DL and Cox MM. 2012. Lehninger‟s Principles of Biochemisry, 6th Ed . Macmillan Learning, NY, USA.

4. Berg JM, Tymoczko JL, Stryer L and Gatto GJ. 2002. Biochemistry, 7th Ed. W.H. Freeman and Company, NY, USA.

5. Stryer, L., “Biochemsitry”, 4th Edition, W.H. Freeman & Co., 2000. 6. Murray, R.K., et al “Harper’s Biochemistry”, 23rd Edition, Prentice Hall International, 1993.

6. DP Singh, New Age International Publishers, 2003 “Stress Physiology”.

24BIO12106: Experiments in Metabolism and Physiology [2C, 15P]

Upon successful completion of this course, student should be able to:

CO1: Students will learn the nature and importance of enzymes in living systems
CO2: Students will also learn to appreciate how enzymes are regulated and the physiological importance of enzyme regulation in the cell
CO3: Students will gain hands on to design experiments on plant, animal, and microbial physiology

Sr. No.	Title	No. of Practical (15)
1	Estimation of glucose by Benedict's method	1
2	Estimation of amylase activity from given sample	1
3	Estimation of reducing sugar by DNSA (dinitrosalicylic acid) method	1
4	Estimation of alkaline phosphates activity from given sample	1
5	Estimation of creatinine in urine or Preparation of lactalbumin from milk or Chlorophyll from plant source	1
6	Estimation of cholesterol by ZAK's method	1
7	Bacterial growth curve	2
8	Effect of pH/Temperature on bacterial growth	2
9	Effect of salt stress on bacterial growth	1
9	Physiological parameters in plants/animals pertaining to growth and development (biomass production/ relative water content, root-shoot ratio	2
10	Physiological parameters in plants/animals pertaining to biotic/abiotic stress (ROS generation, Lipid peroxidation)	2

References

1. Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13:978-1-4641-0962-1 / ISBN:10:1-4641-0962-1.

2. Principles of Biochemistry (2013) 4th ed., Voet, Donald,Voet, Judith &Pratt, charlotte. Wiley & Sons, Inc. (New Jersey), ISBN:978-1-11809244-6.

3. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New Jersey), ISBN:978-0-470-28173-4.

24BIO12408: Experiments in Microscopy [2C, 15P]

On successful completion, the students should be able to:

CO1: Understand the basic principles of microscopy, working of different types of microscopes
CO2: Evaluate the cell morphologies under microscope

CO3: Understand the basic techniques of centrifugation and chromatography for studying cells and separation of biomolecules

No.	Title of experiment	No. of practical
1	Construction, working, and principle of different types of microscopes: light, compound, and inverted microscope	04
2	Handling, maintenance and troubleshooting of compound microscope	01
3	Visualization of bacteria using bright and dark field microscopy	01
4	Visualization of animal cell culture using an inverted microscope	01
5	Determination of cell size using micrometry	01
6	Examine microscopic specimens to determine cell shape and arrangement.	01
7	Preparation of permanent slides	03
8	Visit the central instrumentations facility (SEM and TEM)	02
9	Study of electron micrographs	01

References:

- David L., Spector. and Robert D., Goldman. (2006). Basic Methods in Microscopy, Protocols and Concepts from Cells: A Laboratory Manual. *Northwestern University Medical School, Chicago.*
- Bradbury, S. and Bracegirdle, B. (1998). Introduction to light microscope: microscopy handbooks. BIOS Scientific Publishers – Springer, oxford, UK. Volume 42;69-76.
- Inoue, S. and Oldenbourg, R. (1995). Handbook of optics. Nass, M. (ed), McGraw-Hill, New York. Volume 2:17.

Open Electives (OE)

OE1: Introductory Biotechnology [T, 2C, 30L]

Unit	Topic	Lectures
1	Biotechnology – Definition, scope and potentials	02
2	Types of Biotechnology: Blue Biotechnology, Green Biotechnology Red Biotechnology, White Biotechnology, Nanobiotechnology	05
3	Plant tissue culture and Plant Biotechnology and their applications	03
4	Environmental Biotechnology and its applications, with case studies	03
5	Animal biotechnology and its applications, with case studies	03
6	Microbial biotechnology and its applications, with case studies	03
7	Biotechnology in: 1. Medicine and health care 2. Crop production and agriculture 3. Food processing 4. Environmental protection	06
8	Biotechnology based industries (Agriculture, Diagnostics and Therapeutics, Food and Pharmaceuticals)	05

OE2: Biotechnology for Environment and Agriculture [T, 2C, 30L]

Unit	Topic	Lectures
1	Biotechnology – concept and scope in environmental and agricultural sectors	02
2	Major environmental calamities and accidents (e.g. Chernobyl, Sea oil spills, etc.)	03
3	Biotechnological tools useful for environmental protection, conservation, pollution abatement and restoration of degraded environments	06
4	Bioremediation of contaminated sites using biotechnological approaches – ex situ and in situ, with case studies	04
5	Biotechnology for conservation of biodiversity	02
6	Biotechnological tools used in agriculture – Crop improvement Development of biotic and abiotic stress tolerant crops Animal husbandry and allied fields	06
7	Biofertilizers their production and applications	03
8	Genetically modified crops, their advantages, biosafety issues and ethical concerns related with them	04

Progressive Education Society's

Modern College of Arts, Science and Commerce, Ganeshkhind, Pune-411016, India

(Autonomous)

(Affiliated to Savitribai Phule Pune University)

B. Sc. Blended

A

Degree Program

In collaboration with

University of Melbourne, Australia

and

Savitribai Phule Pune University, Pune-411007, India

Syllabus and Course structure

Choice Based Credit System (CBCS) NEP-2024

from

Academic Year 2024-25

About B. Sc. Blended Degree Program

B. Sc. Blended is an innovative Bachelor Degree in collaboration with the University of Melbourne (UoM), Australia. The UoM is the topmost university in Australia and among the top 40 universities in the world.

The syllabus has been designed by the experts from University of Melbourne (UoM), Indian Institute of Science Education and Research (IISER), Savitribai Phule Pune University (SPPU) and Modern College of Arts, Science and Commerce, Pune (Shivajinagar and Ganeshkhind campus)

Highlights

- The DST-INSPIRE Fellows get scholarships for perusing B. Sc. Blended.
- The B.Sc. Blended program is internationally recognized and allows the Students for direct admission for post-graduation Program with appropriate majors in University of Melbourne, Australia (UOM) and other universities in Australia.
- The rank holders will get special fellowships for pursuing higher education in UOM.
- Guidance by experts from India and abroad.
- The students will be imparted solid training to enable them to prepare for the entrance examination and pursue Masters and Integrated Ph. D. degrees in reputed institutes such as IITs, IISERs and Central Universities
- In the first two years Biology, Physics, Chemistry and Mathematics are compulsory subjects and in the third year the students will take Chemistry as a special subject.
- The students get the essence of Chemistry with the multidisciplinary approach towards Biology, Physics, Mathematics, Computers and English.
- Free access to online learning resources of UOM.
- Guidance for the start ups.
- Guidance for the out of the box career opportunities for the creative students. E.g. Scientific writing, Scientific photography etc.

B. Sc. Blended Program Outcomes

After the completion of B.Sc. Blended, the student should be able to

1. apply their broad knowledge of science across a range of fields, with in-depth knowledge in at least one area of study, while demonstrating an understanding of the local and global contexts in which science is practised;
2. articulate the methods of science and explain why current scientific knowledge is both contestable and testable by further inquiry;
3. apply appropriate methods of research, investigation and design, to solve problems in science, including the planning and/or conduct of a significant project, problem or investigation;
4. recognize the need for information; effectively search for, evaluate, manage and apply that information in support of scientific investigation or scholarly debate;
5. employ highly developed conceptual, analytical, quantitative and technical skills and are adept with a range of technologies;
6. evaluate the role of science in addressing current issues facing local and global communities, for example climate change, health and disease, food security, sustainable energy use;
7. work effectively in groups to meet a shared goal with people whose disciplinary and cultural backgrounds may differ from their own;
8. communicate clearly and convincingly about science ideas, practice and future contributions to expert and non-expert audiences, matching the mode of communication to their audience.

Eligibility

First Year B. Sc. Blended

Higher Secondary School Certificate (10+2) or its equivalent Examination in Science stream with Physics Chemistry, Mathematics and/or Biology.

Reservation and relaxation will be as per the Government of Maharashtra.

Second Year B. Sc. Blended

The students who has earned all the credits of F.Y.B.Sc. Blended

OR

The student who has earned the partial credits of F.Y.B.Sc. Blended and allowed to keep term (ATKT) as per the rules of SPPU.

Third and fourth Year B. Sc. Blended

The students who has earned all the credits of the previous years.

OR

The students who has earned all the credits of F.Y.B.Sc. Blended and allowed to keep term (ATKT) as per the rules of SPPU.

Duration: Multiple entry and multiple exit as per National Education Policy

Exit after first year: Certificate
Exit after second year: UG diploma
Exit after third year: Degree
Exit after forth year: Degree with honors

Medium of Instruction: English.

Examination

Examination of each credit course has two parts: continuous assessment (internal) and end semester examination (External) The internal assessment consists of Class Room Examinations (subjective/objective), Field Work, Viva-Voce, seminars, activities, tutorials, group discussions, assignments, Lab Work, , etc conducted throughout the semester. The end semester examination is based on the entire syllabus at the end of the semester.

Course Structure

22 credits per semester

1 Credit = 1 Contact hour per week for theory course

= 2 contact hours per week for practical course

B. Sc. Blended Credit Framework for the academic year 2024-25

F.Y. B. Sc. Blended credit framework for 2024-25			
Semester I	**NEP -2024**		
Course Code	**Course Name**	**Credits**	**Chemistry major & Biology minor**
MTH101	**Calculus**	**4**	GE/OE
PHY101	**Introductory Classical Physics**	**3**	DSC
CHM101	**Introductory and Organic Chemistry**	**3**	DSC
BIO101	**The Diversity of Life**	**3**	DSC
PHY102	**Physics Practical**	**1**	SEC
CHM102	**Chemistry Practical**	**1**	SEC
BIO102	**Biology Practical**	**1**	SEC
IDC101	**English: Critical Writing & Communication**	**2**	AEC
FLX101	Flexible Timetabling*	1	IKS
FLX102	Flexible Timetabling*	1	VEC
FLX103	Flexible Timetabling*	**2**	CC
	Total	**22**	
Semester 2	**NEP 2024**		
Course Code	**Course Name**	**Credits**	**Chemistry major & Biology minor**
MTH201	**Algebra**	**4**	GE/OE
PHY201	**Modern Physics**	**3**	DSC
CHM201	**Inorganic and Physical Chemistry**	**3**	DSC
BIO201	**Biology of Cells**	**3**	Minor
PHY202	**Physics Practical**	**1**	SEC
CHM202	**Chemistry Practical**	**1**	DSC
BIO202	**Biology Practical**	**1**	VSC
IDS201	**Scientific Computation and Modelling**	**2**	AEC
FLX201	Flexible Timetabling*	1	IKS-Generic
FLX202	Flexible Timetabling*	1	VEC
FLX203	Flexible Timetabling*	**2**	CC
	Total	**22**	
	Additional 4 NSQF credit course/ internship		
After Year 1:-	44 credits + 4 NQSF credits/ internship		
Exit after 1 year : Certificate in B.Sc. Blended (Chemistry)			B.Sc. Blended

***The course codes and course names in Flexible timetabling will be as approved by the academic council for the common basket. The student can select these courses from the common basket.**

Credit Framework as per NEP 2020 for S. Y. B. Sc. Blended

S.Y.B.Sc. Blended Credit Framework for 2024-25			
Semester 3	**NEP 2020**		
Course Code	**Course Name**	**Credits**	**Chemistry major & Biology minor**
MTH301	**Vector Calculus and Differential Equations**	**2**	GE/OE
PHY301	**Quantum Mechanics and Thermodynamics**	**2**	DSC
CHM301	**Chemistry: Reactions and Synthesis**	**2**	DSC
BIO301	**Functional Biology of Organisms**	**2**	Minor
PHY302	**Physics Practical**	**2**	DSC
CHM302	**Chemistry Practical**	**2**	DSC
BIO302	**Biology Practical**	**2**	Minor
EVS301	**Environmental Studies-I (UGC Mandatory Course)**	**2**	FP
IDC301	Flexible Timetabling* (Language/ Advanced Programming)#	2	AEC
FLX302	Flexible Timetabling*	2	VSC
FLX303	Flexible Timetabling*	2	CC
	Total	**22**	
Semester 4			
Course Code	**Course Name**	**Credits**	**Chemistry major & Biology minor**
MTH401	**Probability and Statistics**	**2**	GE/OE
PHY401	**Electricity, Magnetism, Special Relativity & Optics**	**2**	DSC
CHM401	**Chemistry: Structure and Properties**	**2**	DSC
BIO401	**Genetics, Evolution and Ecology**	**2**	Minor
PHY402	**Physics Practical**	**2**	DSC
CHM402	**Chemistry Practical**	**2**	DSC
BIO402	**Biology Practical**	**2**	Minor
EVS401	**Environmental Studies-II (UGC Mandatory Course)**	**2**	CEP
IDC401	Flexible Timetabling* (Language/ Advanced Programming)#	2	AEC
FLX402	Flexible Timetabling*	2	SEC
FLX403	Flexible Timetabling*	2	CC
	Total	**22**	
After Year 2:-	88 credits + 4 NQSF credits/ internship		
Exit after 2 years: UG Diploma in B.Sc. Blended Chemistry			
Year 1 (India)	200 poits credit to Melbourne degree		
Year 2 (India)			

***The course codes and course names in Flexible timetabling will be as approved by the academic council for the common basket.**

 # Language options will be as per the directions of SPPU.

After the successful completion of second year, the student will have two options:-

Option 1] Continue third year in the same college and get the degree of SPPU and Quality Assurance certificate from the University of Melbourne, Australia after the successful completion of the degree.

Option 2] Take admission at the University of Melbourne, Australia in any one major subjects offered and continue two years to get the degree of the University of Melbourne.

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Credit Framework as per Autonomous for T. Y. B. Sc. Blended Chemistry

T.Y.B.Sc. Blended Credit Framework for 2024-25		
Semester 5	**Autonomous**	
Course Code	**Course Name**	**Credits**
CHM 501	Chemical Kinetics, Thermodynamics & Quantum Chemistry	3
CHM 502	Catalysis and Industrial Processes	3
CHM 503	Design and Synthesis of Organic Molecules	3
CHM 504	Introduction to Analytical Chemistry	3
CHM 505	Biochemistry (Elective-1)	2
CHM 506	Introduction to Forensic Science and Technology (Elective-2)	2
CHM 507	Physical & Analytical Chemistry - LAB	2
CHM 508	Inorganic & Organic Chemistry - LAB	2
CHM 509	Project/ Dissertation	2
	Total Credits	**22**
*The students can take electives from other streams instead of mentioned electives. The course code and course name will be as approved by the concerned Board of studies		

Semester 6	**Autonomous**	
Course Code	**Course Name**	**Credits**
CHM 601	Solid State Chemistry & its Applications	3
CHM 602	Bioinorganic and Coordination Chemistry	3
CHM 603	Natural Product and Heterocyclic Chemistry	3
CHM 604	Separation Techniques and Advanced Analytical Techniques	3
CHM 605	Materials Chemistry (Elective-3)	2
CHM 606	Phytochemistry (Elective-4)	2
CHM 607	Physical & Analytical Chemistry - LAB	2
CHM 608	Inorganic & Organic Chemistry - LAB	2
CHM 609	Project/ Dissertation	2
	Total Credits	**22**
*The students can take electives from other streams instead of mentioned electives. The course code and course name will be as approved by the concerned Board of studies		

Curriculum for F.Y. B.Sc. Blended Program
(Semesters I -II)

Semester I

Course code: MTH 101 Course Name: Calculus

Number of credits: 4

Open Elective (OE)/Generic Elective (GE)

Course Outcomes

CO1: Understand the concepts and applications in calculus
CO2: Find Partial derivatives, Directional derivatives, Extrema of Functions
CO3: Solve Riemann integration, improper integration •
CO4: Solve first and second order differential equations

MTH 101 Maths1: Calculus	
Logic and Proof	**No. of lectures**
Basic set theory (review)	1
Logical connectives (conjunction, disjunction, negation, conditional, bi-conditional) and truth tables	1
Propositional logic, logical equivalence, logical laws	1
Quantifiers, predicate calculus	1
Relations, equivalence relations, ordering	1
Functions including injective, surjective, bijective, inverse, composition	1
Number systems: Natural numbers, integers, rational numbers and their properties (eg closure under addition/multiplication/division; existence of additive/multiplicative identity/inverses)	1
Real numbers and their properties; completeness property	1
Proof methods: direct proof, contrapositive	1
Proof methods: contradiction, proof by cases	1
Proof methods: induction	1
Natural numbers, integers, rational numbers	1
Real numbers	1
Sequences and series	**No. of lectures**
Sequences, limits, convergence and divergence	1
Proving limits using definition	1
Methods for evaluating limits: standard limits, limit theorems, continuity rule, sandwich theorem	1
Series, convergence and divergence of series, geometric series, harmonic p-series	1
Series convergence tests: divergence test, comparison test	1

Series convergence tests: ratio test, integral test, alternating series test	1
Power series, Taylor polynomials	1
Taylor series	1
Taylor's theorem, error in Taylor polynomial estimates	1
Differential calculus	**No. of lectures**
Review of differential calculus: limits, derivative, differentiation rules incl. polynomials, trigonometric, exponential, log functions; product, quotient, chain rules	1
Review of inverse trigonometric functions and their derivatives, implicit differentiation	1
Integral calculus	**No. of lectures**
Riemann integration	1
Fundamental Theorem of Calculus; review of standard anti-derivatives	1
Techniques of integration (review): derivative present substitution, linear substitution	1
Techniques of integration (review): integration of trigonometric functions using identities	1
Techniques of integration (review): integration of rational functions including partial fractions, integration yielding inverse trig functions	1
Techniques of integration (review): trigonometric substitutions; integration by parts	1
Improper integrals	1
Applications of integration: areas between curves	1
Applications of integration: volumes of surfaces of revolution	1
Ordinary differential equations: definition of ODE, order, general solution, initial conditions; separable ODEs	1
Solving linear ODE using integrating factor	1
Particular solutions of inhomogeneous constant coefficient linear ODEs using method of undetermined coefficients; principle of superposition	1

References:

1) Mathematical Analysis by S.C. Malik and Savita Arora, New Age International Private Limited (Fifth Edition), 2017
2) Ordinary and partial differential equations by Dr. M. D. Raisinghania, S. Chand

Learning outcomes MTH101

1) Understanding of the concepts and applications in calculus
2) Problem solving of Partial derivatives, Directional derivatives, Extrema of Functions
3) Solving Riemann integration, improper integration
4) Solving First and second order differential equations.

Course code: PHY101

Course Name: Introductory Classical Physics

Number of credits: 3 Discipline Specific Course (DSC)

Course Outcomes

CO1: Application of Newton's laws of motion to solve various problems related to day today life.

CO2: Concepts like zero work done, conservative forces, mass energy equivalence ($E= mc^2$).

CO3: Effect of force on various types of materials is described and physical properties like elasticity, different moduli etc. along with their relation.
CO4: To understand various thermodynamic processes like Isothermal, isobaric, isochoric and laws of thermodynamics with their real world applications.
CO5: To understand the concept of entropy

PHY 101 Introductory Classical Physics	
Classical Mechanics	**No. of lectures**
Straight line motion	1
Vectors	1
Two-and three-dimensional motion	1
Force and Motion: Newton's Laws	1
Force and Motion: Drag and Friction	1
Kinetic energy, work, power	1
Potential energy, conservation of energy	1
Collisions and momentum	1
Rotational motion	1
Angular momentum-I	1
Angular momentum-II	1
Gravitation	**No. of lectures**
Newton's law of gravity, superposition	1
Gravity at the earth's surface, far above the earth and within the earth	1
Work and gravitational potential energy	1
Kepler's laws: the planets and satellites	1
Orbital motion and energy	1
Einstein, the equivalence principle, gravity, gravitational lenses, gravitational waves	1
Thermal physics	**No. of lectures**
Zeroth Law of Thermodynamics	1

Thermal expansion and absorption of heat First Law of Thermodynamics; adiabatic processes, constant volume processes, enthalpy, cyclical processes, free expansions	2
Heat transfer, conduction, emission, absorption. Second Law of Thermodynamics, Irreversible processes, entropy, free energy	2
Elasticity, fluids and gases	**No. of lectures**
Equilibrium and elasticity	1
Density and Pressure, Pascal's and Archimedes' Principles	1
Continuity and Bernoulli's Equation	1
Ideal gases (Kinetic theory of gases)	1
Mean free path, molecular speed distribution	1
Specific heat, adiabatic expansion	1
Real world examples - eg wind power, hydro, blood circulation, water in plants, materials, osmosis, wind and atmosphere	2
Ordinary Differential Equations (ODEs)	
Applications of 2nd order ODEs: Springs	2
Applications of 2nd order ODEs: LRC series electrical circuits	2
Real world contextual examples in physics and application of ODEs	1

References:

1) Concept of Physics: H. C. Verma, BharatiBhavan Publisher.
2) Heat and Thermodynamics: Brijlal, N. Subrahmanyam, S. Chand and Company Ltd.
3) Heat and Thermodynamics: Mark W. Zemansky, Richard H. Dittman, 7 th Edition, Mc-Graw Hill International Edition.
4) Fundamentals of Physics: HallidayResnik and Walkar, 8th Edition.
5) Electromagnetics: B. B. Laud.

Learning Outcomes

1) Solving various problems of Application of Newton's laws of motion to related to day today life.
2) Understanding of the concepts like zero work done, conservative forces, mass energy equivalence ($E= mc^2$).
3) Understanding the effect of force on various types of materials is described and physical properties like elasticity, different moduli etc. along with their relation.
4) Understanding various thermodynamic processes like Isothermal, isobaric, isochoric and laws of thermodynamics with their real world applications.
5) Understanding the concept of entropy.

Course code: CHM 101

Course Name: Introductory and Organic Chemistry

Number of credits: 3 Discipline Specific Course (DSC)

Course Outcomes

CO1: Introduction to the s,p,d,f blocks, trends of atomic size, valency, electro negativities, ionization potentials along the row and periods
CO2: Types of bonds-ionic, covalent coordinate covalent
CO3: Types of acid and bases. Derivation of Hinderson's equation
CO4: Buffer and buffer capacity, choice of indicator
CO5: Writing the balancing of chemical equation.
CO6: Understanding of different types of chemical reactions with mechanism
CO7: Understanding of hybridisation types and bonding
CO8: Numerical problem solving

CHM 101 Introductory and Organic Chemistry	
General Chemistry	**No. of lectures**
The Periodic Table	1
Molecular Structure and Bonding	2
Acids and Bases	3
Stoichiometry	1
Organic Chemistry	**No. of lectures**
Carbon – the basis of life	4
Structure and Bonding Alkanes (sp^3Hybridisation)	
Structure and Bonding Alkenes (sp^2Hybridisation)	2
Benzene and its derivatives	1
Structure and Bonding of Alkynes (sphybridisation)	1
Functional Groups	1
Electrophiles and Nucleophiles	2
Nucleophilic substitution reactions	1
Elimination reactions	1
Addition reactions	1
Electrophilic aromatic substitution reactions	1
Nucleophilic addition reactions	1
Organic redox reactions	1
ODEs	
Applications of 1st order ODES: ecology models	1
Applications of 1st order ODES: chemical reaction rates, Newton's law of cooling	2

Second-order ODEs: definitions of homogeneous/inhomogeneous, linear/non-linear; solution of homogeneous constant-coefficient linear ODEs	1
Physical Chemistry	
First Law of Thermodynamics; adiabatic processes, constant volume processes, enthalpy, cyclical processes, free expansions	3
Second Law of Thermodynamics, Irreversible processes, entropy, free energy	2
Real world examples - eg solar energy, geothermal, wind power	4

References: •

1) Principles of Physical Chemistry, 4th edition (1965), S.H. Maron and C.F. Prutton, Collier Macmillan Ltd
2) The elements of Physical Chemistry, 5th edition (2009), Atkins P, de Paula J. , W. H. Freeman Publication, USA
3) University General Chemistry , 1st edition (2000), C.N. R. Rao, Macmillan Publishers, India
4) Stereochemistry: Conformation and mechanism by P.S.Kalsi
5) Organic chemistry by Jonathan clayden, nick greeves and stuart warren
6) An Introduction to Electrochemistry , edition reprint, 2011, Samuel Glasstone, BiblioBazaar, USA
7) Physical Chemistry for biological sciences, 1st edition, (2005), Chang R., University Science Books, USA
8) Physical Chemistry, 1st edition, (2003) David Ball, Thoson Learning, USA.
9) Essentials of Physical Chemistry, 24th edition, (2000), B S Bahl, G D Tuli, ArunBahl, S. Chand Limited, India.
10) Organic Chemistry, 6 th edition, (1992), Morrison Robert Thornton, Pearson Publication, Dorling Kindersley (India Pvt. Ltd.)
11) Guide book to Mechanism in Organic Chemistry by Peter Sykes, 6 th edition, (1996), Prentice Hall,
12) Concise Inorganic Chemistry. 5th edition (2008), Author: J. D. Lee, John Wiley & Sons, USA.

Learning outcomes

1) Identification of trends in s,p,d,f block elements with respect to atomic size, valency, electro negativities, ionization potentials along the row and periods.
2) Identification of types of bonds-ionic, covalent coordinate covalent
3) Identtification of types of acid and bases.
4) Derivation of Hinderson's equation to understand the concept of pKa
5) Selection of proper buffer system for the experiment.
6) Understanding of buffer capacity
7) Selection of proper indicator for the acid-base titration.
8) Writing the balanced chemical equation.
9) Understanding of different types of chemical reactions with mechanism
10) Understanding of hybridisation types and bonding
11) Numerical problem solving

Course code: BIO104

Course Name: The Diversity of Life

Number of credits: 3 Discipline Specific Course (DSC)

Course Outcomes

CO1:To understand life's diversity.

CO2: To understand evolutionary relationship about origin of life,

CO3: To understand the concepts of cell theory and different types of cell.
CO4: To understand concepts of evolution and origin of multicellularity.
CO5: To understand classification of plants and animal kingdom.

BIO 101 The Diversity of Life	
Evolution and the Diversity of Life	**No. of lectures**
Theory of evolution: understanding life's diversity	1
Evolutionary relationships (phylogenies) are summarized in classifications	1
Chemical evolution of life – Molecules to cells	1
Cell theory and the origin of life	1
Prokaryotic Cells: Bacteria and Archaea	2
Evolution of the eukaryotic cell	1
Endosymbiosis	1
Protists 1 - Red and Green algae	1
Protists 2 – Chromists	1
Protists 3 - Dinoflagellates and apicomplexans, flagellates, ciliates, amoebae	1
Evolution of sex, life cycles	1
Origins of multiculticellularity	1
Slime moulds and fungi	1
Fungi	1
Introduction to Land Plants	1
Bryophytes	1
Evolution of vascular tissue, Lycophytes, fern allies, early fossil land plants	1
Ferns	1
Seed plants, the seed and secondary growth, Cycads and Ginkgo	1
Conifer diversity and biology	1

Angiosperm structure, biology and diversity, the flower, double fertilization.	1
Angiosperm phylogeny and evolution	1
Introduction to animals (Metazoa)	1
Simple animals	1
Protostomes-Flatworms and annelids	1
Molluscs	1
Arthropods	1
Deuterostomes, Echinoderms-Chordates	1
Fishes –sharks/rays, teleosts, coelacanth, lungfish	1
Amphibians	1
Reptiles	1
Birds	1
Mammals	2
The Primate story	1

References:

1. Reece, Taylor, Simon and Dickey - Campbell Biology: concepts and connections, 7th Edition, Pearson Education (Singapore) Pvt. Ltd.
2. General Zoology - By Goodnight and others, IBH Publishing Co.
3. Modern text book of Zoology, Invertebrates , R.L. Kotpal, 10th Edition.,2009 -, Rastogi publications, Meerut.
4. Parker J. and Haswell, W., - Text-Book of Zoology, ELBS Edition.
5. Cleveland Hickman Jr., Larry Roberts, Susan Keen, Allan Larson and David Eisenhour - Animal Diversity, 8th Edition, McGraw Hill Publication.
6. Das, Datta and Gangulee - College Botany (Vol I), Published by New Central Books Agency (P). Ltd.
7. V. Verma - Botany, 2010, Ane Books Pvt Ltd.
8. A.C. Dutta - Botany for Degree Students, 6th Edition, Oxford University Press, New York.
9. Richard S.K. Barnes - The Diversity of Living Organisms, John Wiley and Sons Ltd., Oxford, United Kingdom.
10. Lynn Margulis and Michael J. Chapman - Kingdoms and Domains:An Illustrated Guide to the Phyla of Life on Earth, 4th edition,Academic Press; (1st edition in January 26, 2009).
11. Brian K. Hall; BenediktHallgrímsson - Strickberger's Evolution, Fourth Edition, Jones and Bartlett Publishers, Inc.
12. Mark Ridley, 2004, 3rd Edition - Evolution, Blackwell Publishing.
13. Carl T. Bergstrom & Lee Alan Dugatkin - Evolution (second edition), W. W. Norton & Company; Second edition.
14. Douglas J. Futuyma - Evolution, 2nd/ 3rd Edition,Sinauer Associates

Learning Outcomes

1) Understanding of life's diversity.

2) Understanding of evolutionary relationship about origin of life,

3) Understanding the concepts of cell theory and different types of cell.
4) Understanding concepts of evolution and origin of multicellularity.
5) Understanding classification of plants and animal kingdom.

Course code: PHY102

Course Name: Physics Practical

Number of credits: 1 Skill Enhancement Course (SEC)

Course Outcomes

CO1: Laboratory maintainance
CO2: Use of pendulum
CO3: Use of instruments in physics

List of practcicals

1. Simple Pendulum: To plot a L-T^2 graph using a simple pendulum and find the effective length of the simple pendulum for a given time period using the graph.
2. To calculate the acceleration due to gravity at a place.
3. Torsional Pendulum**:** To find the moment of inertia of the disc and the rigidity modulus of the material of the suspension wire subjected to torsional oscillations.
4. Young's Modulus: To determine the Young's modulus of elasticity of the material of a given wire using Searle's apparatus.
5. Spring: To determine the restoring force per unit extension of a spiral spring by statistical and dynamical methods and also to determine the mass of the spring.
6. Euler's Method: To determine the coefficient of friction by Euler's Method.
7. Viscosity: To determine Coefficient of Viscosity by Stoke's Method.

Learning outcomes

1) Maitainance of the Laboratory
2) Handling of the instruments
3) Working of pendulum

Course code: CHM102

Course Name: Chemistry Practical

Number of credits: 1 Skill Enhancement Course (SEC)

Course Outcomes

CO1: To develop the laboratory safety and maintenance skill

CO2: To prepare the solution of desired concentration

CO2: To get the hands on experience of pH meter

CO3: To synthesis organic molecules

List of Physical chemistry experiments (Any 3)

1. Titration of weak base with strong acid using

3. Determine the rate constant of the hydrolysis of Ethyl acetate using an acid catalyst

4. Determination of dissociation constant of a weak acid.
5. Analysis of water hardness through EDTA complexometry.

List of Inorganic chemistry experiments (Any 3)

1. Oxalate Complexes of Aluminium and Chromium
2. Network Complexes of Copper(I) Halides
3. Schiff Base Complexes of Nickel(II)
4. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture using a) two indicators and b) pH meter
5. Estimation of Fe (II) ions by titrating it with $KMnO_4$.

List of Organic chemistry experiments (Any 3)

1. Techniques:

Crystallization, Sublimation, Record melting point & Boiling Point.

2. Functional group tests following functional groups

Alcohols, Alkenes, Aldehydes and Ketones, Acids, Phenols, Amines, Amides, Esters, Aromatic compounds.

3. Preparations: (Any 3)

1. Vanillin to vanillyl alcohol using NaBH4
2. Synthesis of paracetamol
3. Preparation of 4, 4'-Dimethoxy-dibenzylideneacetone
4. Preparation of 4-tert-Butylphenol
5. Reduction of p-nitrobenzaldehyde by sodium borohydride

6. Nitration of Salicylic acid by green approach (using ceric ammonium nitrate).

Learning outcomes

1) Laboratory safety and maintenance skill
2) Preparation of solution
3) Hands on experience of pH meter
4) Synthesis of organic molecules

Course code: BIO102

Course Name: Biology Practical

Number of credits: 1 Skill Enhancement Course (SEC)

Course Outcome:

CO1:To get the hands on training on biochemical experiments.
CO2: To understand about zooplanktons from field visits.
CO3: To understand the world of animal kingdom by visiting zoology museum.

List of the practicals

1. Observation of zooplankton from pond samples under microscope
2. Determination of dissolved oxygen in water sample using Winkler titration
3. Collection and identification of invertebrate samples from pond by using different types of nets.
4. Visit to the museum at zoology department at Pune University and observe the collected specimens.
5. Using a taxonomic browser to identify the taxonomic lineage and explain key characteristics of the species.
6. Observe the characteristics of prokaryotic and eukaryotic cells.

Learning outcomes

1) Hands on training on biochemical experiments.
2) Understanding from field visits about zooplanktons.
3) Understanding the world of animal kingdom by visiting zoology museum.

Course code: IDC101

Course Name: English: Critical Writing & Communication

Course Outcomes:

CO1: Development of listening ability

CO2: Development of English reading ability
CO3: Development of Critical thinking in English
CO4: Speaking English with proper pronunciation
CO5: Development of proper conversation skill

IDC101 English: Critical Writing & Communication (Theory and Practical) – Syllabus		
Sr. no	**Theory**	**Practical**
1	**Listening -** Overview, Question Types, Listening Tips, Completing the blanks, Making Assumptions, Understanding numbers Understanding the alphabet, Distinguishing similar sounds	Listening for - Description, Time, Frequency, Similar meanings, Emotions, Explanation, Classification, Comparison and contrasts, Negative meaning, Chronology
2	**Reading-** Overview, Question Types, Reading Tips	Using first paragraph to make predictions, Using the topic sentence to make predictions, Looking for specific details Analyzing Questions and Answers, Identifying the tasks
3	**Writing-** Overview, Question types, Writing tips	Responding to task, Coherence and cohesion, Lexical resource, Generalizing and Qualifying, Grammatical range and accuracy
4	**Speaking-** Overview, Question type, Speaking tips	Introduction and Overview, Giving Information, Organizing and discussing a topic, Sequence, Comparing and contrasting Respond to follow up questions, Ask for clarification, Avoid short answers, Transition and intonation

Learning Ourcomes **1)** Development of proper conversation skill

2)Development of Critical thinking in English

The syllabus of Indian Knowledge System (IKS) , Value Enhancement Course (VEC) and Curricular Course (CC) will be as per the common basket.

Semester II

Course code: MTH201

Course Name: Algebra

Number of credits: 4

Open Elective (OE)/Generic Elective (GE)

Course Outcomes

CO1: Find roots of the polynomials in Complex Numbers
CO2: Solve System of linear equations using matrices
CO3: Know about Mean Value theorems and its applications
CO4: Know about Scalar and Vector projections

MTH 201 Algebra	
Analysis	**No. of lectures**
Limits of real-valued functions	1
Proving limits using the definition	1
Continuity & differentiability	1
Examples of differentiable and non-differentiable functions; continuity and differentiability of standard functions including polynomials, trigonometric, exponential, log functions and their inverses	1
Techniques for evaluating limits including L'Hopital's rule, sandwich theorem	1
Mean Value Theorem and applications	1
Applications of differential calculus eg related rates	1
Complex numbers	**No. of lectures**
Review of complex numbers including algebra, Argand plane, cartesian and polar form	1
Complex exponential	1
Fundamental Theorem of Algebra	1
de Moivre's theorem; roots of complex numbers	1
Vectors	**No. of lectures**
Vector arithmetic, dot product, vector projections (review)	1
Vector cross product; scalar triple product; parametric curves specified by vector equations	1
Lines and planes in R^3	1
Lines and planes in R^3	1

Linear Algebra 1	**No. of lectures**
Solving systems of linear equations with Gaussian elimination	1
Solutions of systems of linear equations - consistency, uniqueness	1
Geometric interpretation of solutions	1
Matrices, matrix addition, multiplication, transpose and properties (review)	1
Matrix inverse	1
Determinant	1
R^n as a vector space, linear independence of vectors in R^n	1
Span of a set of vectors, subspaces of R^n	1
Basis and dimension in R^n	1
Abstract vector space axioms; examples and non-examples of vector spaces	1
Bases, dimension and co-ordinates in (finite dimensonal) abstract vector spaces	1
Definition of linear transformation and examples/non-examples	1
Linear transformations of the plane	1
Matrix representation of a linear transformation	1
Image and kernel of a linear transformation	1
Rank and nullity	1

References:

1) Ordinary and partial differential equations by Dr. M. D. Raisinghania, S. Chand (18th Edition), 1976
2) Mathematical Analysis by S.C. Malik and Savita Arora, New Age International Private Limited (Fifth Edition), 2017

Learning Outcomes

1) Finding roots of the polynomials in Complex Numbers
2) Solving System of linear equations using matrices
3) Knowing about Mean Value theorems and its applications
4) Knowing about Scalar and Vector projections

Course code: PHY201

Course Name: Modern Physics

Number of credits: 3 Discipline Specific Course (DSC)

Course Outcomes

CO1: To understand matter waves in quantum mechanics.

CO2: To understand expectation values, observables and operators.
CO3: To understand tunnelling phenomenon and hydrogen atom, helium atom in quantum mechanics.
CO4: To learn about the zeroth law of thermodynamics and thermodynamic equilibrium.
CO5: To understand Carnot's cycle, Heat engines and Stirling cycle.
CO6: Apply the basic knowledge of classical mechanics

PHY201 Modern Physics	
Electricity and Magnetism	**No. of lectures**
Electric charge, conductors and insulators	1
Coulomb's Law, superposition principle	1
Electric field, superposition principle	1
Electric flux	1
Gauss's law, applications	1
Energy and electric field; electric potential	1
Calculating potential from the field, electric potential, potential energy surfaces.	1
Electric dipoles	1
Capacitance; parallel plate capacitors	1
Energy storage in capacitors, dielectrics, series and parallel circuits	1
Conductors, electric current, electric power, Ohm's law	1
Kirchoff's rules, resistors in series and parallel circuits	1
Magnetic field, magnetic force, Lorentz force, cyclotrons	1
Lorentz force, ion velocity filter, Hall effect, Biot-Savart Law	1
Bio-Savart Law, Ampere's Law, solenoids, earth's magnetic field	1
Magnetic field due to a current, forces on current-carrying wires, Electromagnetic induction, magnetic flux	1
Lenz' Law, Faraday's law, Maxwell's equations, applications	1
Magnetic materials	1
Oscillations and Waves	**No. of lectures**
Simple harmonic motion, pendulum, diatomic molecules,Damped harmonic motion, resonance - electronic circuits, evolution of populations	2
One dimensional waves, Interference and standing waves, Sound waves and the speed of sound, Intensity, sound level and the physics of music	2
Doppler effect and supersonic motion, shock waves	1
Optics	**No. of lectures**

Images and mirrors	1
Thin lenses and optical instruments	1
Young's experiment, interference	1
Thin films and the Michaelson interferometer	1
Diffraction by slits and apertures	1
Diffraction by gratings and X-ray diffraction	1
Optical Microscopy	1
Spectroscopy	1
Modern Physics	**No. of lectures**
Challenges to classical physics; special relativity	1
Lorentz transformation, transformation of velocities, Doppler effect	1
Relativistic momentum and energy	1
Photons and the photoelectric effect	1
Quantum physics, blackbody radiator, matter waves	1
Trapped particles and the tunneling particles	1
Nuclear physics, nuclear properties, nuclear decay	1
Quarks, Leptons, The Big Bang	1

References

1) Concept of Physics: H. C. Verma, BharatiBhavan Publisher.
2) Fundamentals of Physics: HallidayResnik and Walkar, 8th Edition.
3) 'The Feynman lectres' by Feynman
4) Principles of physics by Halliday, Resnick and Walker
5) Concepts of modern physics by Arthur Beiser

Learning Outcomes

1) Understanding matter waves in quantum mechanics.
2) Understanding expectation values, observables and operators.
3) Understanding tunnelling phenomenon and hydrogen atom, helium atom in quantum mechanics.
4) Learning about the zeroth law of thermodynamics and thermodynamic equilibrium.
5) Understanding Carnot's cycle, Heat engines and Stirling cycle.
6) Applying the basic knowledge of classical mechanics

Course code: CHM 201

Course Name: Physical and Inorganic Chemistry

Course Outcomes

CO1: To understand the development of electrochemical cells

CO2: To understand the concepts and use of quantum chemistry

CO3: To understand the bonding in coordination compounds and their chemistry

CO4: Application of stereochemistry in biomolecules and understanding the mechanism

CO5: Application of thermodynamics in Bioenergetics

CHM 201 Physical and Inorganic Chemistry	
Chemistry of Life	**No. of lectures**
The chemical basis of life	1
Bioenergetics	1
Enzymes and catalysed reactions	2
Metabolism: Catabolism and anabolism	2
Concatenation and Biopolymers	1
Stereochemistry and Biomolecular chirality	1
Biochemistry and Biomolecular structure	2
Small inorganic molecules of biological importance	2
Inorganic Chemistry	**No. of lectures**
Ionic Compounds and their Solutions	2
Structures of Solids	3
Main Group Chemistry	4
Redox reactions and electrochemistry	4
The transition metals : a survey	1
Coordination Chemistry	4
Bonding in complex ions	2
Transition metals in biological systems	1
Simple harmonic motion, pendulum, diatomic molecules	2
Quantum Chemistry	
Schrödinger's equation and Heisenberg's Uncertainty Principle	1
Bohr and Schrodinger models of the hydrogen atom	1
Complex atoms; Pauli Exclusion Principle, Periodic Table of Elements, selection rules and spectra	1
Nuclear fission and fusion	1

References:

1) Principles of Physical Chemistry, 4th edition (1965), S.H. Maron and C.F. Prutton, Collier Macmillan Ltd
2) The elements of Physical Chemistry, 5th edition (2009), Atkins P, de Paula J. , W. H. Freeman Publication, USA
3) University General Chemistry , 1st edition (2000), C.N. R. Rao, Macmillan Publishers, India
4) Stereochemistry: Conformation and mechanism by P.S.Kalsi
5) Organic chemistry by Jonathan clayden, nick greeves and stuart warren
6) An Introduction to Electrochemistry , edition reprint, 2011, Samuel Glasstone, BiblioBazaar,

USA
7) Physical Chemistry for biological sciences, 1st edition, (2005), Chang R., University Science Books, USA
8) Physical Chemistry, 1st edition, (2003) David Ball, Thoson Learning, USA.
9) Essentials of Physical Chemistry, 24th edition, (2000), B S Bahl, G D Tuli, ArunBahl, S. Chand Limited, India.
10) Organic Chemistry, 6 th edition, (1992), Morrison Robert Thornton, Pearson Publication, Dorling Kindersley (India Pvt. Ltd.)
11) Guide book to Mechanism in Organic Chemistry by Peter Sykes, 6 th edition, (1996), Prentice Hall,
12) Concise Inorganic Chemistry. 5th edition (2008), Author: J. D. Lee, John Wiley & Sons, USA.

Learning Outcomes

1) Understanding the development of electrochemical cells
2) Understanding the concepts and use of quantum chemistry
3) Understanding the bonding in coordination compounds and their chemistry
4) Application of stereochemistry in biomolecules and understanding the mechanism
5) Application of thermodynamics in Bioenergetics

Course code: BIO201

Course Name: Biology of Cells

Number of credits: 3 Discipline Specific Course (DSC)

Course Outcomes

CO1:To understand life's diversity.
CO2: Understanding of evolutionary relationship about origin of life,
CO3: Understanding the concepts of cell theory and different types of cell.
CO4: Understanding concepts of evolution and origin of multicellularity.
CO5: Understanding classification of plants and animal kingdom.

BIO 201 Biology of Cells	
The Biology of Cells	**No. of lectures**
Introduction to Cell Biology	2
Theme: The cell contained	
The plasma membrane	2
Cell walls, extracellular matrix, cellulose synthesis, other cell wall components	2
Cytoplasm: content, chemistry and properties	1

Cytoskeleton, actin filaments, microtubules	2
Theme: Information flow in the cell	
Nucleus, chromosomes, DNA	2
Genes and the genetic code	2
Control of gene expression	2
Theme: Endomembrane system and intracellular trafficking	
ER and ribosome, proteins and enzymes	3
Golgi apparatus	1
Vesicles, transport and secretion, Lysosomes	2
Theme: Harvesting energy	
Mitochondria, ATP, energetic reactions, electron transport pathways, cellular respiration	2
Chloroplasts, photosynthesis, historical experiments, pigments, photosystems	2
Theme: Multicellularity and the Dividing Cell	
Cell division, cell cycle, mitosis, cytokinesis, division and distribution of organelles	2
Meiosis, formation of haploid cells	1
Communication and signaling, recognizing and responding	2
Cell differentiation and multicellularity	2

References

1) Molecular Cell Biology. 7th Edition, (2012) Lodish H., Berk A, Kaiser C., KReiger M.,Bretscher
2) A., Ploegh H., Angelika Amon A., Matthew P. Scott M.P., W.H. Freeman and Co., USA
3) Molecular Biology of the Cell, 5th Edition (2007) Bruce Alberts, Alexander Johnson,Julian Lewis,
4) Martin Raff, Keith Roberts, Peter Walter. Garland Science, USA • Cell Biology, 6th edition, (2010)
5) Gerald Karp. John Wiley & Sons., USA • The Cell: A Molecular Approach, 6th edition (2013), Geoffrey M. Cooper, Robert E. Hausman, • Sinauer Associates, Inc. USA

Course Outcomes

1) Understanding life's diversity.
2) Understanding of evolutionary relationship about origin of life,
3) Understanding the concepts of cell theory and different types of cell.
4) Understanding concepts of evolution and origin of multicellularity.
5) Understanding classification of plants and animal kingdom.

Course code: PHY202

Course Name: Physics Practical

Number of credits: 1 Skill Enhancement Course (SEC)

Course Outcomes

CO1: To determine the Refracting Angle, Refractive Index and Dispersive power of prism using spectrometer.

CO2: To determine the coefficient of thermal Conductivity of bad conductor

CO3: Study of charging and Discharging of Capacitor.

CO4: Verification of Kirchhoff's law

CO5: Wavelength determination of main spectral line of mercury light using plane transmission grating.

CO6: Apply the basic knowledge of classical mechanics in day to day life

List of Practicals (Any6)

1. To find the specific charge density of an electron particle in a CRT by Thomson method.
2. Determination of the radius of a current carrying coil 2-Determination of magnetic field with the variation of distance along the axis of current carrying coil.
3. To determine the Wavelength of main spectral line of mercury light using plane transmission grating.
4. To determine the Refracting Angle, Refractive Index and Dispersive power of prism using spectrometer.
5. To determine the coefficient of thermal Conductivity of bad conductor by Lee's Disc.
6. Charging and Discharging of Capacitor.
7. Verification of Kirchhoff's law.

Learning Outcomes

1) To determine the Refracting Angle, Refractive Index and Dispersive power of prism using spectrometer.
2) To determine the coefficient of thermal Conductivity of bad conductor
3) Study of charging and Discharging of Capacitor.
4) Verification of Kirchhoff's law
5) Wavelength determination of main spectral line of mercury light using plane transmission grating.

6) Apply the basic knowledge of classical mechanics in day to day life

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Course code: CHM201

Course Name: Chemistry Practical

Number of credits: 1 Skill Enhancement Course (SEC)

Course Outcomes

CO1: Determination of heat of solution

CO2: Use of pH meter for determination of the chemical changes

CO3: Skill in the synthesis of inorganic complexes

CO4: Techniques for the separation of natural products

CO5: Skill in the single stage preparation of the compound

List of experiments (Any 6)

List of Physical chemistry experiments

1. To determine the rate of chemical reaction by using hydrolysis of *tert*-Butyl chloride.
2. To measure the vapour pressure of n- Pantane by using high vacuum line.
3. Heat of solution of KNO_3/ NH_4Cl.
4. To calculate the free energy of the given system using potentiometry.

List of Inorganic chemistry experiments

1. Synthesis of hexamminenickel (II) $[Ni(NH_3)_6]I_2$

2. Preparation of a pure sample of ferrous ammonium sulphate (Mohr's salt) [FeSO4. (NH4)2SO4. 6H2O] and to estimate its water o f crystallisation

3. To estimate the water To synthesize a typical coordination complex, hexaamminecobalt (III) chloride, $[Co(NH_3)_6]Cl_3$.

4. Estimation of Cu(II) and K2Cr2O7 using sodium thiosulphate solution (Iodimetrically).

5. Estimation of available chlorine in bleaching powder iodometrically. **List of Organic chemistry experiments**

1. Element detection in organic qualitative analysis

2. Paper Chromatography (Any 1)

Separation of pigments from the extract of vegetables (e.g. Spinach leaves)

Separation of pigents in the mixture of ink

3.Organic single stage preparation: (Any3)

a. Isolation of natural products- Caffeine from tea leaves.
b. Piperine from Black pepper
c. Preparation Glucose pentaacetate from Glucose.
d. Preparation of 2-iodobenzoic acid from Anthranilic acid.

3. **Use of Computer (Chemistry Software)** –

Chem Draw-Sketch, ISI – Draw, Draw the structure of simple aliphatic, aromatic, heterocyclic organic compounds with substituents. Get the correct IUPAC name.

Learning Outcomes

1) Determination of heat of solution
2) Use of pH meter for determination of the chemical changes
3) Skill in the synthesis of inorganic complexes
4) Separation of natural products by paper chromatography
5) Skill in the single stage preparation of the compound

Course code: BIO202

Course Name: Biology Practical

Course outcomes

CO1: To understand handling of microscope for observations of slide.
CO2: To understand and hands on training to handle Gel apparatus.
CO3: Understand the working of electron and fluorescent microscopy.
CO4: Learning and handling hematocytometer for counting of cells.
CO5: Observing and learning to prepare slides to study cell division from onion root tip.

List of practicals (Any 6)

1. Microscopy and observation recording of representative organelle readymade specimens
2. Staining of cell for observations of- Flagella, cell wall, endospores, etc.

a. Plant call, bacterial, fungi samples

b. malachite green, safranin, Leifson flagella stain/RYU flagella stain,

nitric acid, crystals of potassium chlorate

3. Introduction and visualization DNA-Proteins in silico
4. A one day visit to IISER Pune for electron/ fluorescence microscopy observations
5. Observation of budding in yeast & different kinds of cells
6. Observation of live/dead cells using Trypan blue staining
7. Isolation of DNA
8. Mitosis in onion root tips

Learning outcomes

1) Handling of microscope for observations of slide.
2) Hands on training to handle Gel apparatus.
3) Understanding the working of electron and fluorescent microscopy.
4) Learning and handling hematocytometer for counting of cells.
5) Observing and learning to prepare slides to study cell division from onion root tip.

Course code: IDC201

Course Name: Scientific Computation and Modelling

Practical Course

Number of credits: 2 Ability Enhancement Course (AEC)

Course Outcomes

CO1: Basic concepts in computing

CO2: use of free resource softwares

CO3: understanding of concepts in computer progamming

IDC201 Scientific Computation and Modelling (Practical Course)	
Topics	**No. of Lectures**
Introduction to computing - What is computing; - Introduction to Electronic data processing; Electronic devices; - Information storage; access and management; - Key terms used in IT; - Introduction to computer networks; - Brief introduction to compilers, interpreters and associated languages - Introduction to Scientific Computing (Definition,Need and design of Scientific Computing processes, Use of different software systems for Scientific Computing, Examples)	7

Introduction to Open Source Software - History and use of Open Source Software - Examples of popular Open Source Software in different domains with special focus on Environmental Science, - Examples	3
Algorithms and System Analysis Design and components of algorithms, flowcharts, steps to design the optimum algorithm, analysis of algorithms, examples; System thinking, steps of system analysis, defining the problem and designing the optimum solution, examples	7
Python Syntax: Variables and Assignments; variable types; input-output; arithmatic; functions and built-in function; If & While; Lists & Tables for loops, Simple Visualisations	18
Numerical Analysis: 1D integrals using Trapezoidal and Simpson's Rule; Euler's Method ; Generating Random numbers	10
Mathematical Modelling: Agent Based Modelling; using NET Logo or similar tool, simple Harmonic Oscillator, Random Walks	10

Learning Outcomes

Understanding the basic concepts in computing and developing a small program

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The syllabus of Indian Knowledge System (IKS), Value Enhancement Course (VEC) and Curricular Course (CC) will be as per the common basket.

PE S Modern College Ganeshkhind BBA(CA)Structure of Four Year Degree Programme

Level	Sem	Credits related to Major					Minor	OE	SEC	AEC	VEC	CC	Total
		Mandatory	Elective	VSC	IKS	FP / CEP / OJT							
	Vertical	V-1	V-1	V-4	V-5	V-6	V-2	V-3	V-4	V-5	V-5	V-6	
4.5	1	4 (T) +2 (P) **BBA11101**:2cr(Th)Introduction to C Programming **BBA11102:**2cr(Th)Database Management System **BBA11103:**2cr(Pr) Practical on C and DBMS	0	2 (T) **BBA11404:** VSC:2Cr:(Th) Principles of Programing and Algorithm	2 (T) **BBA11505:** IKS: 2cr(Th) Generic IKS	0	0	2 (T) + 2 (P) **BBA11306:**2cr(Th)Basics of Computers 2cr(Pr)Introduction to Word,Excel and Power point	2 (T/P): **BBA11407:**2Cr:(Pr)Practical on Principles of Programing and Algorithm	2 (T) **BBA11508**: AEC:2cr(Th)English	VEC:2cr (Th) **BBA11509** : Value Education	**BBA11610** :cc:2crNCC /NSS /Cultural /Sports/Community Service/Yoga & fitness	22
	2	4 (T) +2 (P) **BBA12101:**2cr(Th) Relational databse Management System **BBA12102:**2cr(Th)Web Technologies **BBA12103:**2cr(Pr)Practical on Web Technologies and RDBMS	0	2 (P) **BBA12404:** VSC:2cr(Pr) Advanced C Programming	0	0	2 (Th) **BBA12205:**Business Communication	2 (T) + 2 (P) **BBA12306:** Web Desigining/ Digital Tech. Solution	2 (T/P) **BBA12407:**2cr(Th)Advanced C Programming	2 (T) **BBA12508:** AEC:2cr(Th)English	VEC:2cr (Th) **BBA12509** : Value Education	**BBA12610** :cc:2crNCC /NSS /Cultural /Sports/Community Service/Yoga & fitness2	22
		12	0	4	2	0	2	8	4	4	4	4	44

Exit Option : Award of UG Certificate in Major with 44 Credits and additional 4 credits core NSQF course / Internship or continue with Major and Minor

	3	4 (T) +2 (T) +2 (P) **BBA23101:**2 Cr(Th)Data Structures using C **BBA23102:**2Cr(Th)Big Data Analytics **BBA23103:**(Th)Software Engineering **BBA23104:**2Cr(Pr)Practical on DS and Big Data	0	2 (T) **BBA23405:** VSC:2Cr: (Th) Java Script Programming	0	2(FP) **BBA23606:**2Cr (Pr) Field Project	2 (T) + 2 (P) **BBA23207:** 4cr(Th+Pr) Digital Marketing	2 (T) **BBA23308:**2 Cr(Th) Digital Marketing Awareness /Digital Tech. Solution	0	2 **BBA23509:** AEC:2cr(Th)English/ Marathi	0	**BBA23610 :**2cc:2crNCC/NSS /Cultural /Sports/Community Service/Yoga & fitne	22
5	4	4 (T) +2 (T) +2 (P) **BBA24101:**2Cr(Th)Object Oriented programing using C++ **BBA24102:**2Cr(Th)Node Js **BBA24103:**2Cr(Th)Networking **BBA24104:**2Cr(Pr)Practical on C++ and Node JS	0	0	0	2 (CEP)CEP **BBA24605:**2Cr (Pr) Innovative Application Design	2 (T) + 2 (P) **BBA24606:**4 cr(Th) Business Ethics	2 (P) **BBA24307:**2 Cr(P) Introduction to Hardware & Networkin	2 (T/P) **BBA24408:**SEC: 2Cr(Th) Operating System	2AEC: **BBA24509:** 2cr(Th)English/ Marathi	0	2 **BBA24610 :**2cc:2crNCC/NSS /Cultural /Sports/Community Service/Yoga & fitne	22
		12+16=28	0	6	2	4	10	12	6	8	4	8	88
Exit Option : Award of UG Diploma in Major and Minor with 88 Credits and additional 4 credits core NSQF course / Internship or continue with Major and Minor													

	5	4 (T) + 2 (T) + 4 (P) **BBA35101:**4Cr(Th) Core Java **BBA35102:**2Cr(Th)Python **BBA35103**:4Cr(Pr)Practical on Java and Python	2 (T) + 2 (T/P) **BBA35104:**2Cr(Th) Cyber Security **BBA35105:**2Cr(Th) Software Eng	2 (P) VSC: **BBA35406:** 2Cr(Pr) IOT	0	2 (FP/CEP) **BBA35606:**2Cr: (Pr)Mini Project/FP	2 (T) + 2 (P) 4 Cr **BBA35607:**(Th+Pr)Financial Accounting	0	0	0	0	0	22
5.5	6	4 (T) + 2 (T) + 4 (P) **BBA36101:**4Cr(Th) Advanced Java **BBA36102:**2Cr(Th) PHP **BBA36103**:4Cr(Pr)Practical on A.Java and PHP	2 (T) + 2 (T/P) **BBA36104:**2Cr(Th) Object oriented Software Engineering **BBA36105:**2Cr(Th) Software Testing	0	0	4 OJT **BBA36606:** 4Cr(Pr) On Job Training using Scientific Survey	2 (T) + 2 (P) **BBA36607:** 4Cr(Th) Human Resource Mgmt.	0	0	0	0	0	22
		28+20=48	8	8	2	10	18	12	6	8	4	8	132
Exit Option : Award of UG Degree in Major with 132 credits or continue with Major and Minor													

	7	4 (T) + 4 (T) + 2 (T) + 4 (P) **BBA47101:**4cr(Th)Artificial Intellegence **BBA47102:**4cr(Th)Advanced PHP **BBA47103:**2cr(Th)Software Project Management **BBA47104:**4cr(Pr)Practical on AI and Adv.PHP	2 (T) + 2 (T/P) **BBA47105:**4cr(2Th+2Pr) Cloud Computing	0	0	0	4 (RM-T) **BBA47606:** Research Methodology	0	0	0	0	0	22
6	8	4 (T) + 4 (T) + 2 (T) + 4 (P) **BBA48101:**4cr(Th)Mobile Computing **BBA48102:**4cr(Th)Machine Learning **BBA48103:**2cr(Th)Advanced Operating System **BBA48104:**4cr(Pr)Practical on Mobile computing and Machine Learning	2 (T) + 2 (T/P) **BBA48105:**4Cr(Th+Pr) Recent Trends in IT	0	0	4 (OJT) **BBA48605:**4Cr(Pr) On Job Training /Induatrial Project/Internshi p	0	0	0	0	0	0	22
		48+28=76	**8+8 =16**	**8**	**2**	**14**	**22**	**12**	**6**	**8**	**4**	**8**	**176**
Four Year UG Honours Degree in Major and Minor with 176 credits													

F.Y.BBA (CA) SEMESTER – I

VALUE EDUCATION COURSE

DIGITAL TECHNOLOGY SOLUTION

Subject Code-
Subject Name: Digital Technology Solution
Total Contact Hours: 30 Total Credits: 02

Course Objectives:

- To gain familiarity with digital paradigms
- To sensitize about role & significance of digital technology
- To provide know how of communications & networks
- To bring awareness about the e-governance and Digital India initiatives

Course Outcome:

1. Knowledge about digital paradigm.
2. Realization of importance of digital technology, digital financial tools, e-commerce.
3. Know-how of communication and networks.
4. Familiarity with the e-governance and Digital India initiatives
5. An understanding of use & applications of digital technology.

COURSE CONTENTS:

Unit	Topic	No. of Hours
1	Introduction 1.1 Evolution of Digital Systems. 1.2 Role & Significance of Digital Technology. 1.3 Information & Communication Technology & Tools. 1.4Computer System & it's working, 1.5 Software and its types. 1.6 Operating Systems: Types and Functions. 1.7 Problem Solving: Algorithmsand Flowcharts.	10
2	Communication Systems 2.1 Principles, Model & Transmission Media. 2.2 Computer Networks & Internet: Concepts & Applications, 2.3 WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking.	10

	2.4 Computer Based Information System: Significance & Types. 2.5 E-commerce & Digital Marketing: Basic Concepts, Benefits & Challenges.	
3	Digital India & e-Governance 3.1 Introduction 3.2 Initiatives, Infrastructure, Services and Empowerment. 3.2.1 Concepts of EDI and Limitation 3.2.2 Application of EDI 3.2.3 Disadvantages of EDI 3.2.4 EDI model 3.3 Electronic Payment System 3.3.1 Introduction and Types of electronic payment systems; 3.3.2 Digital token based electronic payment system: E-cash, properties of e-cash, electronic cash in action 3.3.3Digital Financial Tools: Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit/ Debit Cards, e-Wallets. 3.4 Introduction to Encryption and Decryption.	**10**
	Total	**30**

Reference Books:

1. Data Communications & Networking - Behrouz Ferouzan (III Edition)
2. Electronic Commerce by --Gary P. Schneider
3. Handbook of Cyber and E-commerce Laws-Bakshi P.M and Suri R.K.
4. Cyber Law – Ecommerce and M-Commerce- Ahmand Tabrez.
5. ArvindSathi, "BigDataAnalytics: Disruptive Technologies for Changing the Game",MC Press, 2012

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Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: Basics of Computers

Course Objective:

i. **To Know the Basics of Computer**
ii. **To Understand the Basics of Operating systems**
iii. **To Understand how to use software packages in day to day activities**

Course Outcome:

CO1**:** Converse in basic computer terminology.
CO2: Possess the knowledge of basic hardware peripherals.
CO3: Know and use different number systems and the basics of programming.

Unit No.	Topics	No. of Hours
1	**Introduction to Computers** 1.1 Introduction 1.2 Characteristics of Computers 1.3 Block diagram of computer 1.4 Types of computers and features 1.4.1 Mini Computers 1.4.2 Micro Computers 1.4.3 Mainframe Computers 1.4.4 Super Computers 1.5 Types of Programming Languages 1.5.1 Machine Languages 1.5.2 Assembly Languages 1.5.3 High Level Languages 1.6 Data Organization 1.6.1 Drives 1.6.2 Files 1.6.3 Directories 1.7 Types of Memory (Primary And Secondary) 1.7.1 RAM 1.7.2 ROM 1.7.3 PROM 1.7.4 EPROM 1.7.5 Secondary Storage Devices (FD, CD, HD, Pen drive) 1.8 I/O Devices 1.8.1 Scanners 1.8.2 Digitizers 1.8.3 Plotters 1.8.4 LCD 1.8.5 Plasma Display 1.9 Number Systems 1.9.1 Introduction to Binary, Octal, Hexadecimal system 1.9.2 Conversion 1.9.3 Simple Addition, Subtraction, Multiplication, Division	15

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2	**Operating System and Services in O.S.** 2.1 Dos - History 2.2 Files and Directories 2.3 Internal and External Commands 2.4 Batch Files 2.5 Types of O.S.	5
3	**Windows Operating Environment** 3.1 Features of MS – Windows 3.1.1 Control Panel 3.1.2 Taskbar 3.1.3 Desktop 3.1.4 Windows Application 3.1.5 Icons 3.2 Windows Accessories 3.2.1 Notepad 3.2.2 Paintbrush	5
4	**Introduction to Linux** 4.1 File system 4.2 Linux Commands 4.3 I/O redirection 4.5 VI Editor	5
	Total	30

Reference Books :-

1. Fundamental of Computers – By V. Rajaraman B.P.B. Publications
2. Fundamental of Computers – By P. K. Sinha
3. Computer Today- By Suresh Basandra
4. Unix Concepts and Application – By Sumitabha Das

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Semester I
Mandatory Course

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: Database Management System

Objectives:

i) Enables students to understand database concepts.
ii) To understand advantages of DBMS over File Processing System.
iii) Integrity of data means to bring the accuracy and consistency.

Outcomes:

CO1: Able to understand basic database concepts in database system.
CO2: To get knowledge of Front End and Backend.
CO3: Able to write SQL queries and do database connectivity with any front-end platform.

Sr. No.	Chapter No.	Name of Chapter and Contents	No. of Hours.
1	1	**File Structure and Organization** 1.1 Introduction 1.1.1 File 1.1.2 Logical and Physical Files Definitions 1.3 Basic File Operations 1.3.1 Opening Files 1.3.2 Closing Files 1.3.3 Reading and Writing 1.3.4 Seeking 1.4 File Organization 1.4.1 Field and Record structure in file 1.4.2 Record Types 1.4.3 Introduction to file organization	**3**
2	2	**Database Management System** 2.1 Introduction 2.2 Basic Concept and Definitions 2.2.1 Data Vs Information 2.2.2 Data Dictionary 2.3 Definition of DBMS 2.4 Applications of DBMS 2.5 File processing system Vs. DBMS 2.6 Advantages and Disadvantages of DBMS 2.7 Users of DBMS 2.7.1 Database Designers 2.7.2 Application programmer 2.7.3 Sophisticated Users 2.7.4 End Users 2.8 Views of Data 2.9 Data Models	**6**

		2.9.1 Object Based Logical Model • Object Oriented Data Model • Entity Relationship Data Model 2.9.2 Record Base Logical Model • Relational Model • Network Model • Hierarchical Model 2.10 Entity Relationship Diagram(ERD) 2.11 Extended features of ERD Overall System structure	
3	**3**	**Relational Model** 3.1 Introduction 3.2 Terms a. Relation b. Tuple c. Attribute d. Cardinality e. Degree of relationship set f. Domain 3.3 Keys 3.3.1 Super Key 3.3.2 Candidate Key 3.3.3 Primary Key 3.3.4 Foreign Key 3.4 Relational Algebra Operations a. Select b. Project c. Union d. Difference e. Intersection f. Cartesian Product g. Natural Join	**6**
4	**4**	**SQL (Structured Query Language)** 4.1 Introduction 4.2 DDL Commands 4.3 DML Commands 4.4 Constraints in SQL. 4.5 SQL Functions-Date, Time, Numeric, String , Conversion functions 4.6 Simple Queries 4.7 Nested Queries 4.10 Aggregate Functions	**15**
		Total	**30**

References:

1) Database System Concepts By Henry korth and A. Silberschatz
2) SQL, PL/SQL The Programming Language Oracle :- Ivan Bayross, BPB Publication.
3) Database Systems Concepts, Designs and Application by Shio Kumar Singh, Pearson
4) Introduction to SQL by Reck F. van der Lans by Pearson
5) Modern Database Management by Jeffery A Hoffer , V.Ramesh, Heikki Topi ,Pearson
6) Database Management Systems by Debabrata Sahoo ,Tata MacgrawHill

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Indian Knowledge System

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: India's preferred Computer language

Course Objective:

1. To understand how to develop web-based applications using JavaScript.
2. To understand the concepts of internet programming.
3. Create error free applications giving desired results.

Course Outcome:

CO1: To learn basics of Java Script and apply it in designing small web applications.
CO1: To aware of the world's best open-source web technology.
CO2: Able to design website user interfaces at client side.

Unit No	Topic	No. of Hours
1	**1. Introduction** 1.1 Clients- Servers and Communication 1.2 Internet-Basic, Internet Protocols (HTTP, FTP, IP) 1.3 World Wide Web(WWW) 1.4 HTTP request message, HTTP response message	**6**
2	**2. Web page creation** 2.1 Concepts of effective web design 2.2 Web design issues including Browser and width and Cache 2.3 Display resolution 2.4 Look and Feel of the Website 2.5 Page Layout and linking 2.6 User centric design 2.7 Sitemap 2.8 Planning and publishing website 2.9 Designing effective navigation	**9**
3	**5. Java Script with Hands-on** 5.1 Introduction to Java Script 5.2 Identifier & operator, control structure, functions 5.3 Document object model(DOM), 5.4 DOM Objects (window, navigator, history, location) 5.5 Predefined functions, math & string functions 5.6 Array in Java scripts 5.7Event handling in Java script	**15**
	Total	**30**

Reference Books:

1. HTML and JavaScript – Ivan Bayross
2. Mastering HTML, CSS & Javascript Web Publishing
3. JavaScript: The Definitive Guide- David Flanagan.
4. Javascript: the Complete Reference – Powell.
5. JavaScript Enlightenment- Cody Lindley

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Semester I
Skill Enhancement Course

Total Contact Hours: -60 Total Credits: -4
Subject Code: -
Subject Name -: Principles of Programming and Algorithms

Pre requisite: Basic Mathematics
Credit Distribution: 1 credit for theory (45 Hours) and 1 credit for practicals(30 Hours).

Objectives:1. To develop Analytical / Logical thinking and problem solving capabilities.
2. To introduce several different paradigms of programming.
3. The Greedy algorithm has only one shot to compute the optimal solution
4 to develop technology, procedures, and skills in computer graphics and multimedia.

Course Outcomes:
CO1: Analytical and Logical Thinking is developed amongst students.
CO2: Able to find solution of problems using Problem Solving Techniques.
CO3: Learn Basic idea of programming.
CO4: Able to write their own algorithms.

Unit No.	Contents	Total No. of Hours
1	**Number System** 3.1 Introduction: Binary, Octal, Hexadecimal system. 3.2 Conversion, Simple Addition, Subtraction, Multiplication, Division. 3.3 1's Complement, 2's Complement.	10
2	**Algorithm** 2.1Concept: Problem Solving. 2.2 Steps in problem solving (Define Problem, Analyze Problem, Explore Solution) Algorithms (Definitions) 2.3 Characteristics of an algorithm 2.4 Time complexity: Big-Oh notation, Omega notation, Theta notation, Efficiency 2.5 Space Complexity	6
3	**Flowchart** 3.1 Introduction 3.2: Flowcharts (Definitions, Symbols) 3.3 Examples (Write algorithms and draw flowcharts) 3.3.1 Addition / Multiplication of integers. 3.3.2 Determining if a number is +ve / -ve / even / odd. 3.3.3 Maximum of 2 numbers, 3 numbers.	5
4	**Divide and Conquer Method** 4.1 General Method, control abstraction. 4.2 Binary search. 4.3 insertion sort, Merge sort, Quick sort	7
5	**Greedy Method**	7

	5.1Control Abstraction. 5.2 Knapsack Problem 5.3 Job Sequencing with deadline. 5.4 Minimum cost spanning trees, Kruskal algorithm, Prims Algorithm	
6	Dynamic Programming Dynamic Programming: 5.1 Introduction to Dynamic Programming 5.2 Design and steps of execution of dynamic Programming 5.3 Recurrence relation 5.4 Examples: Fibonacci Series and LCS with dynamic programming	10
	Total	45

References:

Sr.No.	Title Of the Book	Author's	Publication
1	How to solve it by Computer	R.G.Dromy	Person
2	Fundamentals of Data Structures.	Horowitz and Sahani	Universities Press
3	Introduction to algorithms.	Comen, Lesierson Rivest ,Stein	MIT Press

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Mandatory Course

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: Introduction to C Programming

Course Objective:

i. To understand fundamental of programming
ii. Develop basic programming skill among students
iii. Develop understanding of converting logical thinking into programming
iv. Control the sequence of the program and give logical outputs.

Course Outcome:

CO1: To learn the basic terminologies of C language.
CO2: To solve problem by analyzing and converting logical thinking to computer understandable format using C Programming.
CO3: To design their own program to solve mathematical problems using C Programming.
CO4: To develop logic to solve any problem practically.

Unit No.	Topics	No. of Hours
1	**Introduction to C Programming** 1.1 Basic structure of C Programming 1.2 Language fundamentals 1.2.1 Keywords and identifiers 1.2.2 Variables and data types 1.3 Operators 1.3.1 Types of operators 1.3.2 Precedence and associativity **Managing I/O operations** 2.1 Console based I/O and related built-in I/O functions 2.1.1 printf(), scanf(),getch(), getchar(), getche()	5
2	**Decision Making and Looping Structures** 2.1 Introduction 2.2 Decision making structure 2.2.1 If statement 2.2.2 If-else statement 2.2.3 Nested if-else statement 2.2.4 Switch statement 2.3 Loop control structures 2.3.1 while loop 2.3.2 Do-while loop 2.3.3 For loop 2.3.4 Nested for loop 2.4 Jump statements 2.4.1 break 2.4.2 continue 2.4.3 goto 2.4.4 exit	6

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3	**Arrays and Strings** 3.1 Introduction to one-dimensional Array 3.1.1 one-dimensional Array Definition 3.1.2 one-dimensional Array Declaration 3.1.3 one-dimensional Array Initialization 3.2 Accessing and displaying array elements 3.3 Reversing array 3.4 Introduction to two-dimensional Array 3.4.1 two-dimensional Array Definition 3.4.2 two-dimensional Array Declaration 3.4.3 two-dimensional Array Initialization 3.5 Matrices: Addition, Multiplication, Transpose, Symmetry, upper/lower triangular 3.6 Introductions to Strings 3.6.1 Strings Definition 3.6.2 Strings Declaration 3.6.3 Strings Initialization 3.7 Standard library functions Implementations without standard library functions.	11
4	**Functions** 4.1 Introduction 4.2 Purpose of function 4.2.1 Function definition 4.2.2 Function declaration 4.2.3 Function call 4.3 Types of functions	8
	Total	30

Reference Books :-

1) Let us C –YashwantKanetkar, BPB publication.
2) Ansi C- Balagurusamy
3) The complete Reference- HerbeltSchildt
4) The C Programming Language- Brian W. Kernighan, Dennis M. Ritchie
5) C Programming:absolute the beginner's guide- By Greg Perry and Dean Miller

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Semester I
OE/Other Faculty Course

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: Introduction to Word, Excel and PowerPoint

Objectives:

i. To enable the students to study MS Office.

ii. To enrich the practical knowledge in MS Office.

iii. To be able to create documents for printing and sharing.

iv. To be able to create and share presentations.

v. To be able to manage and store data in a spreadsheet.

Outcomes:

CO1: To be able to create documents for printing and sharing.

CO2: To be able to create and share presentations.

CO3: To be able to manage and store data in a spreadsheet.

Sr. No.	Chapter No.	Name of Chapter and Contents	No. of Hours
1	1	**MS-Word** 1.1 Creating, editing, saving and printing text documents. 1.2 Font and paragraph formatting. 1.3 Simple character formatting. 1.4 Inserting tables, smart art, page breaks. 1.5 Using lists and styles. 1.6 Working with images. 1.7 Using Spelling and Grammar check. 1.8 Understanding document properties 1.9 Mail Merge	**8**
2	2	**MS-Excel** 2.1 Spreadsheet basics. 2.2 Creating, editing, saving and printing spreadsheets. 2.3 Working with functions & formulas. 2.4 Modifying worksheets with color & autoformats 2.5 Graphically representing data : Charts & Graphs 2.6 Speeding data entry: Using Data Forms. 2.7 Analyzing data : Data Menu, Subtotal, Filtering Data 2.8 Formatting worksheets 2.9 Securing & Protecting spreadsheets	**12**

3	**3**	**MS-Power Point** 3.1Opening, viewing, creating, and printing slides 3.2 Applying auto layouts 3.3 Adding custom animation 3.4 Using slide transitions 3.5Graphically representing data : Charts & Graphs 3.6 Creating Professional Slide for Presentation.	**10**
		Total	**30**

References:

1. Jodi Davenport, Critch Greaves, Michael Groh and Eruce Hall berg, Inside Microsoft Office Professional , 1994, New Riders Publications
2. . 2. CloriaMadumere, 3 – IN – 1 Microsoft Word, Powerpoint and Excel 2010, First Edition 2016, Create space Independent Publishing Platform.
3. R K Taxali, PC Software for Windows 98 Made Simple, 2015, McGraw Hill Education Pvt. Ltd.

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Semester II
Mandatory Course

Total Contact Hours: -30 Total Credits: - 2
Subject Code: -
Subject Name -: Relational Database Management System

Objectives:

1. Enables students to understand relational database concepts and transaction management concepts in database system.
2. Enables student to write PL/SQL programs that use: procedure, function, package, cursor and trigger.
3. An RDBMS includes functions that maintain the security, accuracy, integrity and consistency of the data.

Expected Outcome:

CO1: Understanding of various RDBMS products .
CO2: To get knowledge of Front End and Backend.
CO3: Understandingof various programming aspects and Writing of compact code (Small Program writing).

Unit No.	Unit Title	Contents	No. of Hours
1.	**Introduction To RDBMS**	Difference Between DBMS and RDBMS. Relationship among application programs and RDBMS.	2
2.	**PL-SQL**	Overview of PLSQL PLSQL Block Exception Handling Functions, Procedures Cursor Trigger Package	15
3	**Transaction Management**	Transaction Concept Transaction Properties Transaction States Concurrent Execution Serializability View Serializability and conflict serializability Problem solving on Transactions	6
4	**Concurrency Control & Recovery System**	Lock Based Protocol 2PL Protocol Timestamp Based Protocol Deadlock Handling Deadlock Problem Examples Failure Classification Recovery & Atomicity Recovery with concurrent transaction	7
		Total	30

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Mandatory Course

Suggested References:

Sr. No.	Title of the Book	Author/s	Publication	Place
1	Database Management System	Bipin Desai	Galgotia Publications	New Delhi
2	SQL/PLSQL the programming language of oracle	Ivan Bayross	BPB Publications	New Delhi
3	An Introduction to Database Systems Eighth Edition	C. J.Date, A.Kannan, S.Swamynathan	Pearson Publications	North America
4	Database System Concepts 5th Edition	Silberschatz, Korth, Sudershan	McGraw-Hill	New York
5	Beginning of Relational Data model second edition	Sharon Allen	Apress	New York

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Semester II
Skill Enhancement Course

Total Contact Hours: -60 Total Credits: -4

Subject Code: -

Subject Name -: Advance C

Pre requisite: Basics of C, Array, Structure, Pointer.

Credit Distribution: - 3 credit for theory (45 Hours) and 1 credit for Practical(15 Hours)

Objectives:

1. To study advanced concepts of programming using the 'C' language.
2. To understand code organization with complex data types and structures.
3. To work with files.
4. Develop Graphics Program.

Course Outcomes:

CO1: Able to solve problem by analysing and converting logical thinking to computer Understandable format using C Programming.

CO2: Able to design their own program to solve mathematical problems using C Programming

Unit No.	Contents	Total no. of Hours
1	**Structures and Pointer** 5.1 Introduction to structure and pointer 5.2 Definition of Structures 5.3 Declaration of Structures 5.4 Definition of Pointer 5.5 Declaration of Pointer 5.6 Initialization of structure and pointer 5.7 Call by value and call by reference	8
2	**File handling:** 2.1 File 2.1.1 Def 2.1.2 File Opening Modes 2.1.3 Types of files - text and binary, 2.2 Functions: fopen(), fclose(), fgetc(), fputc(), fgets(), fputs(),fscanf(),fprintf(),getw(), putw(), fread(), fwrite(), fseek(),ftell() etc 2.3 File Management 2.3.1 Opening/Closing a File 2.3.2. Input/Output operations on Files 2.3.3. Error Handling During I/O Operations 2.3.4. Command Line Arguments 2.4. Random Access File	10

3	**Graphics programming Tools** Developing Mini application development	12
4	**Strings :** 4.1 Introduction: Declaration, definition, initialization, format specifiers, String literals/ constants & variables – reading & writing from & to console, Importance of terminating NULL character. 4.2 User defined functions, predefined functions in string.h - strlen , strcpy , strcat , strcmp , strcmpi , strrev , strlwr , strupr , strset , strchr , strrchr , strstr , strncpy , strncat , strncmp , strncmpi , strnset , strtok. 4.3 Command line arguments – argc and argv	15
	Total	45

References:

1. C: the Complete Reference, Schildt Herbert, 4 th edition, McGraw Hill
2. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
3. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI
4. Programming in C, A Practical Approach, Ajay Mittal, Pearson
5. Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
6. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill
7. Let Us C by Yashwant Kanetkar

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Other Faculty Course

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: Web Design

Course Objective:

i. To design a website.
ii. Create and design banners and advertisements.
iii. Learning about the tools and techniques using software applications.

Course Outcome:

CO1: To better understand web development and design using bootstrap.
CO2: To learn how to create interactive and easily accessible websites
CO3: Analysing the development skills for the usability of websites and implementation of theory into practice.

Unit No	Topic	No. of Hours
1	**Adobe Photoshop** 1.1 Introduction of Adobe Photoshop 1.2 Basics of Photoshop 1.3 The Working Place 1.4 Customizing 1.5 Image and Color Modifications 1.6 Scaling, Crop, Slicing Tool 1.7 Filter Gallery 1.8 Move Tool and Marque Tool.	**5**
2	**Responsive Web Design with Bootstrap** 2.1 Introduction to Responsive Design 2.2 Introduction to Bootstrap 2.3 Installation of Bootstrap 2.3.1 Grid System 2.3.2 Forms 2.3.3 Buttons 2.3.4 Icons Integration	**10**
3	**Adobe Flash** 3.1 Introduction to Animation 3.2 Introduction to Adobe Flash 3.3 Tools in Adobe Flash 3.4 Various Flash Effects 3.5 Creating Flash Banners 3.6 Creating Flash Website	**8**
4	**Web Hosting** 4.1 Web Hosting Basics 4.2 Introduction of Hosting Packages types 4.3 Basic Knowledge of Registering domains 4.4 Maintaining a website	**7**
	Total	**30**

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Reference Books:

1. Complete HTML- Thomas Powell
2. HTML and JavaScript – Ivan Bayross
3. HTML & CSS: The Complete Reference, Fifth Edition
4. Learning Web Design- Jennifer Niederst Robbins

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Other Faculty

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: E-Commerce Basics

Course Objective:

i. Describe e-commerce framework.
ii. Explain electronic system for payment.
iii. Describe the use of e-commerce advertising and marketing.

Course Outcome:

CO1: Understand the basic concepts of E-commerce .
CO2: Describe Internet trading relationships including Business to Consumer, Business-to-Business.
CO3. Describe about Consumer Search and Resource Discovery

Unit No	Topic	No. of Hours
1	**Introduction to Electronic Commerce** 1.1 Introduction to Electronic Commerce 1.2 What is E-Commerce (Introduction and Definition) 1.3 Main activities E-Commerce 1.4 Goals of E-Commerce 1.5 Technical Components of E-commerce 1.6 Functions of E-commerce 1.7 Adv / Dis Adv of E-commerce 1.8 Scope of E-commerce 1.9 Electronic commerce Applications 1.10 Electronic commerce and Electronic Business (C2C) (2G, G2G, B2G, B2P, B2A, P2P, B2A, C2A, B2B, B2C).	**6**
2	**Electronic Payment System** 2.1 Types of electronic payment systems; 2.2 Digital token based electronic payment system: E-cash, properties of e-cash, electronic cash in action, business issues and electronic cash, operational risk and electronic Cash, electronic checks; 2.3 Smart cards and electronic payment system; Credit card based electronic payment system; 2.4 Risk and electronic payment system; 2.5 Designing electronic payment system.	**12**
3	**Electronic Data Interchange** 3.1 Introduction 3.2 Concepts of EDI and Limitation 3.3 Application of EDI 3.4 Disadvantages of EDI 3.5 EDI model	**6**
4	**Data Security** 4.1 Introduction to data security 4.2 Importance of protecting data 4.3 Data authorization, authentication and data corruption 4.4 Elements of data security 4.4.1 Confidentiality 4.4.2 Integrity 4.4.3 Availability 4.4 Encryption	**6**

	Total	**30**

Reference Books:

1. David Whitley, ―E-Commerce-Strategy, Technologies and Applications‖, Tata McGraw-Hill, 2 nd Edition, 2000.
2. Kamlesh K. Bajaj, ―E-Commerce- The Cutting Edge of Business‖, Tata McGraw-Hill, 1 st Edition, 2005.
3. J. Christopher Westland, Theodore H. K Clark, ―Global Electronic Commerce- Theory and Case Studies‖, University Press, 1st Edition, 1999.

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Mandatory Course

Total Contact Hours: -30 Total Credits: - 2

Subject Code: -

Subject Name -: Web Technologies

Course Objective:

1. To understand the concepts of internet programming.
2. Learn how to develop the overall look of the website.
3. Learn how to use CSS in HTML documents to format web pages.
4. Create error free applications giving desired results.

Course Outcome:

CO1: To understand the basic concept internet programming using HTML.
CO2: To use CSS in HTML code.
CO3: To understand uses of different tags in HTML.
CO4: Apply the syntax and concepts of programming language and generate dynamic web pages

Unit No	Topic	No. of Hours
1	**1. Introduction to Protocols** 1.1 Clients- Servers and Communication 1.2 Internet-Basic, Internet Protocols (HTTP, FTP, IP) 1.3 World Wide Web(WWW) 1.4 HTTP request message, HTTP response message	**5**
2	**2. Web development basics** 2.1 Concepts of effective web design 2.2 Web design issues including Browser and width and Cache 2.3 Display resolution 2.4 Look and Feel of the Website 2.5 Page Layout and linking 2.6 User centric design 2.7 Sitemap 2.8 Planning and publishing website 2.9 Designing effective navigation	**8**
3	**3. HTML** 3.1 Introduction to HTML 3.2 Basic HTML Structure 3.3 Common HTML Tags 3.4 Physical and Logical HTML 3.5 Types of Images, client side and server-side Imagemapping 3.6 List, Table, Frames 3.7 Embedding Audio, Video **3.8** HTML form and form elements 3.9 HTML Web Storage	**12**
4	**4. Cascading Style Sheets** 4.1 Need for CSS 4.2 Introduction to CSS 4.3 Basic syntax and structure 4.4 Using CSS- 4.4.1 background images, colors and properties, 4.4.2 manipulating texts, using fonts, borders andboxes, margins, padding lists, positioning using CSS 4.5 Overview and features of CSS2 and CSS3	**5**
	Total	**30**

Reference Books:

1. Complete HTML- Thomas Powell
2. HTML and JavaScript – Ivan Bayross
3. HTML & CSS: The Complete Reference, Fifth Edition
4. Web Technologies Black Book- Kogent Learning Solutions Inc. (with Cd)
5. Web Technologies - Godbole, Khate

Subject Teacher BOS Chairman Vice Principal

Progressive Education Society's

Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016 (Autonomous)

Syllabus for

F. Y. B.Sc.(Computer Science)

NEP 2023-24

Introduction:

In the first year of under-graduation, the basic foundations of two important skills required for software development are laid. A course in problem solving and programming along with a course in database fundamentals forms the preliminary skill set for solving computational problems. The practical courses are designed to supplement the theoretical training in the year. Along with Computer Science, the two theoretical and one practical courses each in Statistics, Mathematics and Electronics help in building a strong foundation. Career Advancement courses are introduced in both semesters to cover additional areas of Computer Science.

Programme Objectives:

To develop problem solving abilities using a computer.

- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To train students in professional skills related to the Software Industry.
- To prepare the necessary knowledge base for research and development in Computer Science.
- To help students build-up a successful career in Computer Science and to produce entrepreneurs who can innovate and develop software products.

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions

4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

Eligibility:

H.Sc (10+2) with Mathematics
or its equivalent

Subject List

F.Y.B.Sc(CS) Sem I

Course Type	Sr. No.	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage for External Marks	Weightage for practical	Total Marks
Mandatory	1	Problem Solving using Computers and C Programming	COM11101	4	40	60	-	100
Mandatory	2	Database Management Systems	COM11405	2	20	30	-	50
Mandatory	3	C Programming Practical	COM11102	2	20	30	-	50

F.Y.B.Sc(CS) Sem II

Course Type	Sr. No.	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
Mandatory	1	Data Structures Using C	COM12101	4	40	60	-	100
Mandatory	2	Data structure using ‘c’ Practical	COM12102	2	20	30	-	50

Credit Allocation: - CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses, SEC-Skill Enhancement Courses.

Total - Credits for First years Programme.

F.Y.B.Sc. (CS) Semester I

Course Code: COM11101

Subject Name: **Problem Solving using Computers and C Programming**

Total lectures: 48 Hours **Total Credits: 4**

Prerequisites: -Basic Knowledge of Maths

Course Objectives:

- To introduce the foundations of computing, programming and problem-solving using computers.
- To develop the ability to analyze a problem and devise an algorithm to solve it.
- To formulate algorithms, pseudo codes and flowcharts for arithmetic and logical problems
- To understand structured programming approaches.
- To develop the basic concepts and terminology of programming in general.
- To implement algorithms in the 'C' language.
- Solve simple computational problems using modular design and basic features of the 'C' language.
- To test, debug and execute programs.

Course Outcome:-

On completion of this course, students will be able to:

- Explore algorithmic approaches to problem solving.
- Develop modular programs using control structures and arrays in 'C'.

Unit	Topic	No of lectures
1	**Chapter 1:- Problem Solving Aspects** 1.1. Introduction to problem solving using computers. 1.2. Algorithms-definition, characteristics, examples, advantages and limitations. 1.3 Flowcharts - definition, notations, examples, advantages and limitations, Comparison with algorithms. 1.4 Pseudo codes - notations, examples, advantages and limitations. 1.5 Programming Languages as tools, programming paradigms, types of languages 1.6 Converting pseudo-code to programs. 7 Compilation process (compilers , interpreters), linking and loading, syntax and semantic errors, testing a program	5 Hours
2	**Chapter 2 :- 'C' Fundamentals** 2.1 History of 'C' language. 2.2 Application areas. 2.3 Structure of a 'C' program. 2.4 'C' Program development life cycle. 2.5 Function as building blocks.	4 Hours

	2.6 'C' tokens 2.7 Character set, Keywords , Identifiers 2.8 Variables, Constants (character, integer, float, string, escape sequences, constant). 2.9 Data Types (Built-in and user defined data types). 2.10 Operators, Expressions, types of operators, Operator precedence and Order of evaluation. 2.11 Character input and output. 2.12 String input and output. 2.13 Formatted input and output	
3	**Chapter 3 :- Control Structures** 3.1 Decision making structures: - if, if-else, switch and conditional operator. 3.2 Loop control structures: - while, do while, for. 3.3 Use of break and continue. 3.4 Nested structures. 3.5 Unconditional branching (goto statement).	6 Hours
4	**Chapter 4 :- Functions** 4.1 Standard library functions. 4.2 User defined functions:- declaration , definition, function call, parameter passing (by value), return statement. 4.3 Recursive functions. 4.4 Scope of variables and Storage classes.	6 Hours
5	**Chapter 5 :- Arrays** 5.1 Concept of array. 5.2 Types of Arrays – One, Two and Multidimensional array. 5.3 Array Operations - declaration, initialization, accessing array elements. 5.4 Passing arrays to function. 5.5 Array applications - Finding maximum and minimum, Counting occurrences, Linear search, 5.6 Two D Array Programs Matrix operations (trace of matrix, addition, transpose, multiplication, symmetric, upper/ lower triangular matrix)	6 Hours
6	**Chapter 6 :- Pointers** 6.1 Introduction to Pointers. 6.2 Declaration, definition, initialization, dereferencing. 6.3 Pointer arithmetic. 6.4 Relationship between Arrays & Pointers- Pointer to array, Array of pointers. 6.5 Functions and pointers- Passing pointer to function	8 Hours
7	**Chapter 7 :- Strings** 7.1 String Literals, string variables, declaration, definition, initialization. 7.2 Syntax and use of predefined string functions 7.3 Array of strings. 7.4 Strings and Pointers.	4 Hours

8	**Chapter 8 :- Structures** 8.1 Concept of structure, definition and initialization, use of typedef. 8.2 Accessing structure members. 8.3 Arrays of Structures 8.4 Structures and functions- Passing each member of structure as a separate argument, passing structure by value / address. 8.5 Pointers and structures.	6 Hours
9	**Chapter 9:- File Handling** 9.1 Introduction to streams. 9.2 Types of files. 9.3 Operations on text files. 9.4 Standard library input/output functions.	3 Hours

Reference Books:

1. How to Solve it by Computer, R.G. Dromey, Pearson Education.
2. Problem Solving and Programming Concept, Maureen Sprankle,7th Edition, Pearson Publication.
3. C: the Complete Reference, Schildt Herbert, 4th edition, McGraw Hill
4. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
5. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI
6. Programming in C ,A Practical Approach, Ajay Mittal , Pearson
7. Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
8. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.

9. C: the Complete Reference, Schildt Herbert, 4th edition, McGraw Hill
10. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
11. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI
12. Programming in C ,A Practical Approach, Ajay Mittal , Pearson
13. Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
14. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.

- **Text Book :**

Parijat Publication - Problem Solving Using Computer and 'C' Programming
Parijat Publication Advanced 'C' Programming.

F.Y.B.Sc. (CS) Semester I

Course Code: COM11405

Subject Name: **Database Management Systems**

Total lectures: 30 Hours **Total Credits: 2**

Prerequisites: - Basic Knowledge of file system, storing data in file system and Operations on sets

Course Objectives:

- To understand the fundamental concepts of databases.
- To understand user requirements and frame it in a data model.
- To understand creations, manipulation and querying of data in databases.

Course Outcome:-

On completion of the course, student will be able to–

- Solve real world problems using appropriate set, function, and relational models.
- Design E-R Model for given requirements and convert the same into database tables.
- Use SQL.

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to DBMS** 1.1. Introduction 1.2. File system Vs DBMS 1.3. Levels of abstraction & data independence 1.4.Structure of DBMS (Roles of DBMS Users) 1.5. Users of DBMS Advantages of DBMS	**3 Hours**
2	**Chapter 2 :- Conceptual Design** 2.1. Overview of DB design process . Introduction to data models (E-R model, Relational model, Network model, Hierarchical model) . Conceptual design using ER data model (entities, attributes, entity sets, relations, relationship sets) 2.4. Constraints (Key constraints, Integrity constraints, referential integrity, unique constraint, Null/Not Null constraint, Domain, Check constraint, Mapping constraints) 2.5. Extended features – Specialization, Aggregation, Generalization	**11 Hours**
3	**Chapter 3:- SQL** 3.1. Introduction to query languages 3.2. Basic structure	**9 Hours**

	3.3. DDL Commands 3.4. DML Commands 3.5. Forms of a basic SQL query (Expression and strings in SQL) 3.6. Set operations 3.7. Aggregate Operators and functions 3.8. Date and String functions 3.9. Null values 3.10. Nested Subqueries 3.11 SQL mechanisms for joining relations (inner joins, outer joins and their types) 3.12 Views	
4	**Chapter 4:- Relational Database Design** 3.1. Introduction to Relational-Database Design (undesirable properties of a RDB design) 3.2.Functional Dependency(Basic concepts, F+, Closure of an Attribute set, Armstrong's axioms) 3.3. Concept of Decomposition 3.4. Desirable Properties of Decomposition (Lossless join, Lossy join, Dependency Preservation) 3.5. Concept of normalization, Normal Forms (1NF,2NF and 3NF), Examples 3.6 Keys Concept with Examples : Candidate Keys and Super Keys, Algorithm to find the super keys / primary key for a relation	**7 Hours**

Reference Books:

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S.Sudarshan,ISBN:9780071289597,Tata McGraw Hill Education
2. Database Management Systems RaghuRamakrishnan, ISBN:9780071254342, Mcgraw hill higher Education.
3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke,McGraw Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, RamezElmasri,ISBN:9780132144988,PEARSON HIGHER EDUCATION
5. Beginning Databases with PostgreSQL: From Novice to Professional, Richard Stones, Neil Matthew, ISBN:9781590594780, Apress
6. PostgreSQL, Korry Douglas, ISBN:9780672327568, Sams
7. Practical PostgreSQL (B/CD),JohnWorsley, Joshua Drake,ISBN:9788173663925Shroff/O'reilly
8. Practical Postgresql , By Joshua D. Drake, John C Worsley **(**O'Reillypublications)

Text Book : Parijat Publication - Database Management Systems.

F.Y.B.Sc. (CS) Semester I

Course Code: COM11102

Subject Name: **C Programming Practical**

Total Practicals: 8 **Total Credits: 2 Credits**

Unit	Topic	No of Hours
1	**Assignment 1.** Problem Solving using Pseudocode and Flowchart, Simple programs, Understanding errors and error handling.	1
2	**Assignment 2.** Decision Making Control Structures.	2
3	**Assignment 3.** Loop Control Structures.	2
4	**Assignment 4.**Functions (User Defined functions, Library functions and Recursion).	2
5	**Assignment 5.**Simple Pointers. a. Pointer initialization and use of pointers. b. Pointer Arithmetic.	1
6	**Assignment 6.** Dynamic Memory Allocation. String handling using standard library functions	2
7	**Assignment 7.** Structure and Unions.	3
8	**Assignment 8.**File Handling Practical using Virtual Lab	2

F.Y.B.Sc. (CS) Semester II

Course Code: COM12101

Subject Name: Data Structures Using C

Total lectures: 48 **Total Credits: 4**

Prerequisites: - Basic knowledge of algorithms and problem-solving
Knowledge of C Programming Language

Course Objectives:

1. To learn the systematic way of solving problem
2. To understand the different methods of organizing large amount of data
3. To efficiently implement the different data structures
4. To efficiently implement solutions for specific problems
5. To apply linear data structures
6. To efficiently implement the non-linear data structures

Course Outcome:- On completion of the course, student will be able to

1. To use well-organized data structures in solving various problems.
2. To differentiate the usage of various structures in problem solution.
3. Implementing algorithms to solve problems using appropriate data structures.
4. Usage of appropriate data structures for problem solving

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to Data Structures and Algorithm Analysis** 1.1 Introduction 1. Need of Data Structure 2. Definitions - Data and information, Data type, Data object, ADT, Data Structure 3. Types of Data Structures 1.2 Algorithm analysis 1. Space and time complexity, Graphical understanding of the relation between different functions of n, examples of linear loop, logarithmic, quadratic loop etc. 2. Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω, Theta θ)	3 Hours
2	**Chapter 2 :- Array as a Data Structure** 2.1 ADT of array, Operations 2.2 Binary Search 2.3 Sorting Terminology- Internal, External, Stable, In-place Sorting 2.4 Comparison Based Sorting - Lower bound on comparison-based sorting, Methods- Bubble Sort, Selection Sort, Algorithm design strategies - Divide and Conquer strategy, Merge Sort, Quick Sort, complexity analysis of sorting methods. 2.5 Non-Comparison Based Sorting: Counting Sort, complexity analysis.Comparison of sorting method.	7 Hours

3	**Chapter 3 :- Link List** 3.1 List as a Data Structure, differences with array. 3.2 Dynamic implementation of Linked List, internal and external pointers 3.3 Types of Linked List – Singly, Doubly 3.4 Operations on Linked List - create, traverse, insert, delete, search, sort, reverse, concatenate, merge, and time complexity of operations. 3.5 Applications of Linked List – polynomial representation 3.6 Generalized linked list – concept, representation.	10 Hours
4	**Chapter 4 :- Stack** 4.1 Introduction 4.2 Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations. 4.3 Implementation- Static and Dynamic with comparison 4.4 Applications of stack 1. Function call and recursion, String reversal, palindrome checking 4.5 Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix)	5 Hours
5	**Chapter 5 :- Queue** 5.1 Introduction 5.2 Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(),time complexity of operations, differences with stack. 5.3 Implementation - Static and Dynamic with comparison 5.4 Types of Queue - Linear Queue, Circular Queue, (with implementation) 5.5 Priority Queue, Double Ended Queue 5.6 Applications – CPU Scheduling in multiprogramming environment, Round robin algorithm,	5 Hours
6	**Chapter 6 :- Tree** 6.1 Concept and Terminologies 6.2 Types of Binary trees - Binary tree, skewed tree, strictly binary tree, full binary tree, complete binary tree, expression tree, binary search tree, Heap 6.3 Representation – Static and Dynamic 6.4 Implementation and Operations on Binary Search Tree - Create, Insert, Delete, Search, Tree traversals– preorder, inorder, postorder (recursive implementation), Level-order traversal using queue, Counting leaf, non-leaf and total nodes, Copy, Mirror. 6.5 Applications of trees 6.6 AVL Tree- concept and rotations, B tree	10 Hours
7	**Chapter 7 :- Graph** 7.1 Concept and terminologies 7.2 Graph Representation –Adjacency matrix, Adjacency list 7.3 Graph Traversals – Breadth First Search and Depth First Search (with implementation) 7.4 Applications of graph 7.5 Topological sorting 7.6 Single source shortest path - Dijkstra's algorithm	8 Hours

Reference Books:

1. Classic Data Structures-D. Samanta, Prentice Hall India Pvt. Ltd.
2. Fundamentals of Data Structures in C- Ellis Horowitz, SartajSahni,Susan Anderson- Freed, 2nd Edition, Universities Press.
3. Data Structures using C and C++-YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education
4. Data Structures: A Pseudocode approach with C, Richard Gilberg ,Behrouz A. Forouzan, Cengage Learning.
5. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education
6. Algorithms and Data Structures, Niklaus Wirth, Pearson Education
7. Introduction to Algorithms—Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein--MIT Press
8. The Algorithm Design Manual - Steven S Skiena, Springer

F.Y.B.Sc. (CS) Semester II

Course Code: COM12102

Subject Name: Data Structure Using 'C' Practical

Total Practicals: 6 **Total Credits: 2 Credits**

Unit	Topic	No of Hours
1	**Assignment 1. Searching Algorithms & Sorting Algorithms -I** Implementation of searching algorithms to search an element using: Linear Search, Binary Search (with time complexity),Practicals using Virtual Lab Implementation of sorting algorithms: Bubble Sort, Selection Sort, Insertion Sort	3
2	**Assignment 2. Link List** Singly link list,Circular link list,Doubly Link List Insertion(At any position),Deletion(At any position),Searching,show.	3
3	**Assignment 3. Stack & Its Applications** 1.Static and Dynamic implementation of Stack to perform following operations: Init, Push, Pop, Peek, Isempty, Isfull 2. Implementation of an algorithm that reverses string of characters using stack and checks whether a string is a palindrome.	2
4	**Assignment 4.Queue & Its Applications** Static and Dynamic implementation of linear Queue to perform following operations: Init, enqueue, dequeue Peek, IsEmpty, IsFull.	2
5	**Assignment 5.Binary Search Tree and Traversals** 1. Implement Binary Search Tree (BST) to perform following operations on BST– Create, Recursive Traversals - Inorder, Preorder, Postorder 2. Perform following operations: insert, delete, copy and mirror image of BST, counting leaf, non-leaf and total nodes	3
6	**Assignment 6. Graph implementation** 1. Implement Graph as adjacency matrix and adjacency list 2. Calculate indegree and outdegree of vertices.	2

F.Y.B.Sc. (CS) Semester II

Course Code: COMCOM12406

Subject Name: DBMS Practical

Total Practicals: 6 **Total Credits: 2 Credits**

Unit	Topic	No of Hours
1	**Assignment 1.** To create simple tables with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types)	2
2	**Assignment 2.** To create more than one table, with referential integrity constraint, PK constraint.	2
3	**Assignment 3** To create one or more tables with following constraints, in addition to the first two constraints (PK & FK) a. Check constraint b. Unique constraint c. Not null constraint	3
4	**Assignment 4** To drop a table, alter schema of a table, insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)	2
5	**Assignment 5** To query tables using nested queries (use of 'Except', exists, not exists, all clauses	4
6	**Assignment 6** To create views.	2

Progressive Education Society's

Modern College of Arts, Science and Commerce,

Ganeshkhind, Pune-411016 India

(Autonomous)

(Affiliated to Savitribai Phule Pune University)

FY B. Sc. (Chemistry) Syllabus

Implemented from

AY 2024-25

Progressive Education Society's

Modern College of Arts, Science and Commerce,

Ganeshkhind, Pune-411016 India

(Autonomous)

(Affiliated to Savitribai Phule Pune University)

DBT STAR Status **NAAC Accredited 'A' Grade**

FY B. Sc.

Syllabus

As per Revised Guidelines of NEP (28.03.24)

Implemented from

Academic Year 2024-25

Board of Studies

Department of Chemistry

Revised NEP Curricular Framework 28 March 2024

V	Vertical 1					Vertical 2	Vertical 3		Vertical 4		Vertical 5			Vertical 6				Total Credits
Sem	V1					V2	OE		VSEC	SEC	AEC	VEC	IKS	CC	FP	CEP	OJT	
Sem 1	Subject 1	Subject 2	Subject 3				OE1	OE 2		SEC1	AEC1	VEC1	IKS Gen	CC 1				22
Credits	2+1=3	2+1=3	2+1=3				2	2		2	2	2	1	2				
Sem 2	Subject 1	Subject 2	Subject 3				OE3	OE4		SEC 2	AEC2	VEC2	IKS Gen	CC 2				22
Credits	2+1=3	2+1=3	2+1=3				2	2		2	2	2	1	2				
																		44
	Major					Minor												
	Core	Core	Major specific IKS	Major	Elective													
Sem 3	Major DSC 1	Major DSC 2				Minor 1	OE 5		VSEC1	SEC3	AEC 3	VEC	IKS	CC 3	FP1	CEP	OJT	22
Credits	4	2	2			2	2		2	2	2			2	2			
Sem 4	Major DSC 3	Major DSC 4				Minor 2	OE 6		VSEC 2	SEC	AEC 4			CC 4		CEP		22
Credits	4	4				2	2		4	0	2			2		2		
																		88
Sem 5	Major DSC 5	Major DSC 6	Major DSC7	Major	DSE 1	Minor 3			VSEC 3						FP2			22
Credits	4	4	2		4	4			2						2			
Sem 6	Major DSC 8	Major DSC 9	Major DSC10		DSE 2	Minor 4											OJT	22
Credits	4	4	2		4	4											4	
																		132
	6+36=42				8	6+12=18	12		VSEC8+SEC6=14		AEC 8+VEC 4 + IKS 2			CC 8 FP 4 CEP 2 OJT 4				
Major credits = 42 DSC+ 8 DSE+ 8 VSEC+4 FP+4 OJT= 66 (50% of 132) Minor credits 18																		

Progressive Education Society's

Modern College of Arts Science and Commerce (Autonomous), Ganeshkhind, Pune-16

Board of Studies (BoS)-Chemistry Meeting Minutes

Date- 28 October 2023, Time-10.30 am, Venue- Department of Chemistry

Agenda 1: Discussion and approval of TY B. Sc. syllabus (Autonomous).

Agenda 2: Discussion and approval of FY B. Sc. syllabus (Autonomous NEP) and changes in course codes and names of Major and Minor.

Agenda 3: Discussion and approval of SY B. Sc. syllabus (Autonomous NEP) and changes in course codes and names.

Agenda 4: Discussion and approval of the Syllabus and change in course codes and names for M. Sc. I (Organic Chemistry) (Autonomous NEP).

Agenda 5: Discussion and approval of the Syllabus and change in course codes and names for M. Sc. II (Organic Chemistry) (Autonomous NEP).

Agenda 6: Introduction of new courses under Vocational Skill Course (VSC), Open Electives Major Specific and Skill Enhancement Course (SEC). Any other topic suggested by chairman.

A meeting of Board of Studies (BoS) committee of department of Chemistry was held on Saturday, 28th Oct 2023 at 10.30 am in department of chemistry.

1) Chairman of BoS welcomed all BoS members including Industry expert, Subject expert, alumnus and all other members.
2) T. Y. B. Sc. Syllabus (autonomous) was presented and discussed in detail and was approved unanimously.
3) Course structure of B. Sc. degree course as per NEP guidelines was presented and discussed in detail.
4) FY and SY and syllabi for NEP of theory and practical were discussed. Modifications were made as per experts' suggestions and were approved unanimously.
5) The syllabi for VSC, SEC and open electives were presented and discussed in detail for the F. Y. B. Sc. Course and approved.
6) As per the suggestion by Dr. Sudhir Dapurkar sir, open elective course "Soaps and Detergents" will be changed to Agro Industry (Dairy industry, cold storage, and sugar industry) in AY 2024-25, will include field visits.
7) Subscription for magazine "Chemical Weekly" (includes recent industrial chemical news) was suggested and Projects from this magazine can be given to students as a part of research methodology practical.
8) M. Sc. I and II syllabi for NEP of theory and practical were discussed. Modifications were made as per experts' suggestions and were approved unanimously.
9) Alumnus Dr. Namita More suggested that information for various government competitive examinations in Chemistry should be made available for students regularly, on a separate departmental notice board.
10) In the next meeting tentatively in **February 2024** further course structure and new courses will be discussed.
11) T. Y. B. Sc. Blended Autonomous structure and syllabus were approved.

Eighteen BoS members were present for the meeting. The attendance is attached.

28-10-2023

Dr. Madhuri Kulkarni
Chairman BoS Chemistry
Head, Department of Chemistry

Modern College (Autonomous) Ganeshkhind, Pune-16

Revised NEP F.Y.B.Sc. Syllabus
2024-25

Semester I

CHE 1 Fundamentals of Chemistry (30 Lectures 2 Credits)

1.CO: Students should understand the atomic spectrum and energy associated with each orbital.
2. CO : Students will understand types of bonds and shapes of atomic orbitals.
3. CO : Students can write electronic configurations of elements.
4. CO : Students will be able to sketch different blocks of periodic table

Unit I - Atomic Structure (10 Lectures)
Introduction, atomic spectrum of hydrogen, Bohr model of hydrogen atom- derivation of atomic radius and energy, energy level diagram of hydrogen atom, photoelectric effect, electron diffraction, atomic spectra. Problems on radius and energy calculation.

References:

1. Principles of Physical Chemistry. By Maron and Pruton 4th Ed. Oxford and IBH Publication.
2. Physical Chemistry. By G.M. Barrow.

Unit II - Periodicity of elements and s - block (10 Lectures)
Introduction to Long form of periodic table - s, p, d and f block elements,Types of elements - Metals non-metals, inert gases, Electronic configurations of atoms - Stability of half filled and fully filled orbitals, Exchange energy, Anomalous electronic configurations, Periodic properties - Atomic and Ionic size, Ionisation energy, Electronegativity, Electron Affinity, Oxidation state, Metallic character. s-block elements, introduction, trends in properties, applications.

References:

1. Concise Inorganic Chemistry by J.D.Lee
2. Inorganic Chemistry by James Huheey

Unit III - Chemical Bonding and Structural effects (10 Lectures)
Types of Chemical, Covalent bond, Ionic and Coordinate bond, Shapes of orbitals, Hybridization-Methane, ethene and acetylene. Structural effects-Inductive effects, Steric effects, Resonance effects, Hyperconjugation and Tautomerism.

CHE 2 : Practicals: Introduction to Practical Chemistry (1 credit)

A] Physical Chemistry

1. Preparation of standard solution of oxalic acid and its dilutions.
2. Preparation of HCl solution of different concentrations.
3. Polar plots

B] Inorganic Chemistry

1. Determination of hardness of water.
2. Determination of gas constant 'R' by eudiometer
3. To identify metals in different ores. (visit to Dept. of Geology, SPPU)

C] Organic Chemistry

1. Introduction to laboratory and Lab safety
2. Organic Qualitative Analysis: Type determination of Any Two Organic compounds.
3. Purification Techniques: Recrystallization, Sublimation, distillation

Semester II

CHE 1 General Chemistry 30 Lectures (2 Credits)

CO1: Students will be able to understand all units of concentration for solution preparation.
CO2: Students will be able to differentiate between types of isomers.
CO3: Students will be able to balance redox reactions.
CO4: Students will know terminology involved in Redox reactions.

Unit I - Stoichiometry (10 Lectures)

Some important units of measurements-SI units, distinction between mass and weight, mole, millimole and calculations and significant figures. Chemical Stoichiometry – Empirical and Molecular Formulae, Stoichiometric Calculations, Problems. Mole concepts and Stoichiometry. Solution and their concentrations- Molar concentrations, molar analytical concentrations, molar equilibrium concentration, percent concentration, part per million, part per billion, part per thousand. Problems based on all topics.

References:

1. Analytical Chemistry by G.D. Christian.
2. Calculation of Analytical Chemistry by Hamilton, Simpson & Ellis 7th Edn.

Unit II - Oxidation and Reduction (10 Lectures)

Definition of oxidation, reduction, oxidizing agent, reducing agent, Balancing of redox reactions using ion electron method and oxidation number method, Rules to find oxidation number, Numericals based on equivalent weight of oxidant and reductants.

Ref: 1. College Chemistry by Linus Pauling

2. Calculations of Analytical Chemistry by Hamilton, Simpson & Ellis

Unit III - 1. Introduction to Biomolecules (10 Lectures)

Unicellular and multicellular organisms, prokaryotes and eukaryotes.List of cell organelles and its functions. Molecules that constitute the organisation of a cell and its organelles. Types of bonds in biomolecules. Types of biomolecules, its functions and their significance.

References:

1. Lehninger's Principles of Biomolecule, Nelson and Cox Macmillan Publisher 4th Edn.
2. Organic Chemistry by Morrison, R.T. and Boyd,R.N.

CHE 2 : Practicals:Techniques in Practical Chemistry (1 credit)

A] Physical Chemistry

1. To determine the strength of HCl.
2. To determine heat of solution.
3. Mixed alkali titration.

B] Inorganic Chemistry

1. To determine strength of H_2O_2 from the given solution.
2. Estimation of Fe from $FeSO_4$ solution.
3. Inorganic Qualitative Analysis of one acidic and one basic radical (Any Two salts).

C] Organic Chemistry

1. Estimation of paracetamol.
2. Paper Chromatography (Amino acids).
3. Bromination of acetanilide using KBr and CAN.

D] Visit to Gargoti museum , Nashik

IKS (Sem III)

Chemistry: Major Specific Course

2 credits (30 L)

Chemistry in Ancient India

Chapter 1: Introduction (4L)

Involvement of chemistry in different area like metallurgy, ayurveda, archeology, numismatics etc…..

Chapter 2: Metallurgy : (10L)

Early Chemical Techniques and Technology

Bronze Age: Tin, lead, and copper smelting

Iron Age: Ferrous metallurgy

Extraction of metals : Copper from the pyrites, Extraction of Zinc from calamine

Visit to Raja Kelkar Museum

Chapter 3: Ayurveda (8 L)

Introduction, preparation of chemical formulations, different chemical processes involved in preparation of medicines

Visit to Rasashala

Chapter 4: Material Chemistry in ancient times (8 L)

Introduction to material chemistry in ancient and its correlation with nano chemistry

Visit to Bhandarkar institute, Archeological institute

SEC Sem 1

Food Safety and Quality Control

Sr. No.	Practical on Food Safety and Quality Control	Practical (30P)
1	Preparation of different types of media (complex, differential and selective)	2P
2	Enumeration of aerial micro flora using PDA	2P
3	Microbiological Examination of different food samples	2P
4	Bacteriological Analysis of Water	2P
5	Assessment of surface sanitation by swab/rinse method	2P
6	Assessment of personal hygiene	2P
7	Biochemical tests for identification of bacteria	2P
8	Scheme for the detection of food borne pathogens	2P
9	Implementation of FSMS – HACCP, ISO : 22000	2P
10	Qualitative tests for fats and oils, spices and condiments	2P
11	Inspection of quality as per National and International standards for various food stuffs- pulses, spices, etc.	2P
12	Analysis of edible common salt for MC, MIW and total chlorides.	2P
13	Detection of adulteration in various foods	2P
14	Study of National and Codex microbial quality standards	2P
15	Activities of Quality Department and Studies on bar codes	2P

Sem II

SEC

Introduction to Forensic Science

(2 Credits, 30 Lectures.)

Course Outcomes (COs)

After studying this paper the students will know –

CO 1: Define the scope of forensic science and evidence in criminal laws.

CO 2: Discuss the uses of physical and biological evidence in criminal proceedings.

CO 3: Distinguish between physical evidence and biological evidence.

CO 4: Justify the physical and biological evidence in criminal proceedings.

Chapter 1: Introduction to Forensic Sciences (6L)

Scope of forensic science, evidence in criminal law (act, case studies).

Learning Outcomes:

1. To get familiarized with different terms in forensic science
2. To understand the laws in forensic.

Chapter 2 : Branches of Forensic Science (12 L)

Forensic law, Forensic biology/ serology, toxicology, ballistics, Forensic psychology,

Cyber forensics, question document analysis.

Learning Outcomes:

1. Students will understand different branches of forensic science

2. Students will become familiar with documentation in forensic science.

Chapter 3: Evidences (12L)

Physical Identification, collection and preservation of sample, physical properties of sample material. Use of physical evidence (Fingerprint) and biological evidence (blood, semen, saliva and DNA) in criminal proceedings

Trace Evidences

Introduction, principle and analysis of trace evidence (hair, fibre and paints)

Learning Outcomes:

1. Students will know the evidences and its classification

References:

1. Suzanne Bell, Forensic Chemistry, 1st edition, Person Education Ltd.

2. http://www.forensicsciencesimplified.org/..

3. B. B. Nanda and R. K. Tiwari, Forensic Science in India: A Vision for the Twenty-First Century, Select Publishers, New Delhi (2001).

4. M. K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, Delhi (2002).

5. S. H. James and J. J. Nord, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

6. Brenner, J. C. (2004). Forensic Science: An Illustrated Dictionary. CRC Press. Eckert, W. G. (1997). Introduction to Forensic Sciences (2nd Edition). CRC Press.

7. S. Nath, R. C. (2013). Forensic Science and Crime Investigation: Abhijeet Publications.

8. Sharma, B. R. (2019). Forensic Science in Criminal Investigation & Trails. Universal Law Publishing Company.

9. Yount, L. (2006). Forensic Science: From Fibers to Fingerprints (Milestones in Discovery and Invention). Chelea House publications.

F.Y.B.Sc.Comp.Sc. (Electronics)revised 2023-24 syllabus for implementation of NEP 2020 for autonomy

Progressive Education Society's Modern College of Arts, Science and Commerce, Ganeshkhind,Pune-411016

F.Y.B.Sc.Comp.Sc. (Electronics)

Revised Syllabus to be implemented from Academic Year 2024-2025

as per guidelins of

National Education Policy -2020 (NEP -2020)

Choice Based Credit System (CBCS) Syllabus of an Autonomous college

Semester- I

Course Title: Analog and Digital Electronics Lab (Practical)

Course Type: SEC **Course Code: CELE 11401**

Teaching Scheme:4 Hours / week

No. of Credits: 2Cr (P)

Examination Scheme: **CIE:** 20 Marks , **ESE**: 30 Marks

Course Objective

- To understand the working operations of various Electronic Devices and Circuits.
- To understand the organization the computer system.

Course Outcomes:- On completion of this course, students will be able

- To understand the working operations of various Electronic Circuits.
- To understand the working operations of various Electronic Components.
- To understand the operation of different Sequential Circuit ICS.
- To know the functional operation of memories.

Course Content

List of Experiments

1. Identification of Electronic Components and introduction to Digital Multimeter
2. Study of Logic gates
3. Study of Half adder/Full adder
4. Study of 4 bit Adder/subtractor
5. Study of Multiplexer / De-multiplexer
6. Study of Flip-flop
7. Study of 3 bit Counter/ Decade Counter
8. Study of Encoder/Decoder
9. Read/write action of RAM (IC 7489)
10. Study of Code converter: 4 bit R-2R DAC
11. Study of 4 bit ALU
12. Virtual Lab Practical- 4 bit Up/Down Counter
13. Virtual Lab Practical- 4 Shift Register
14. Virtual Lab Practical- 4 bit Ring Counter
15. Seat belt Warning System using basic AND and NOT gate :IIT Bombay

https://da-iitb.vlabs.ac.in/exp/seat-belt-warning-system/procedure.html

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Semester- II

Course Title: Smart Instrumentation Systems

Course Type: Minor **Course Code: CELE 12201**

Teaching Scheme: 2 Hours / Week

No. of Credits: 2Cr (T)

Examination Scheme :- CIE: 20 Marks , ESE: 30 Marks

Course Objectives

- To get familiar with concepts of digital electronics and learn basic combinational and sequential circuits
- To understand the importance of instrumentation system
- To study Basic Computer Organization.
- To study Memory Architecture.

Course Outcomes:- On completion of this course, students will be able to :

- To understand how to use Combinational Logic circuits using Logic Gates and using ICs.
- To know the operations of sequential circuits.
- To understand the basic computer system and general organization of different blocks.
- To understand the organization of memory in the computer system and know different types of memories.

Course Contents

Chapter 1 : Digital Circuits **[10 H]**

Introduction to Combinational circuits, Study Half adder and full adder, Multiplexer (4:1) and De- multiplexer, Encoders: Decimal to BCD, Decoder- 3:8 decoder

Introduction to Sequential circuits, Concept of clock signal, Types of Flip flop: clocked RS Flip Flop, D Flip Flop, J K Flip Flop, Concept and types of Shift registers, Counters-3-bit Up/Down counter

Chapter 2 : Sensors and Signal Conditioning **[10 H]**

Block diagram of smart instrumentation system

Sensors : Working principle ,specifications of thermal sensors (LM35),optical sensor(LDR),Motion Sensor(PIR),Ultrasonic ,Image ,Nano sensors

Introduction to Operational Amplifier (OPAMP) :symbol ,basic parameters(input and output impedance ,common mode and differential mode gain, CMRR), opamp as inverting and non-inverting amplifier , opamp as adder subtractor and comparator (Numerical problems)

Chapter 3 : Basics of Computer Organization [10 H]

Block diagram of Computer System, Concept of Address Bus, Data Bus, and Control Bus,

CPU organization: Block Diagram of CPU and explanation of each block,

I/O organization: Basic I/O devices, need of I/O interface,

Memory Organization-Types of memories, memory and data read/ write process, vertical and horizontal memory expansion, introduction of cache memory and virtual memory.

Reference Books:

1. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education
2. Digital Electronics: Jain R.P., Tata McGraw Hill
3. Sensors and Transducers: D. Patranabis, PHI publication, 2nd Edition
4. Op Amp and Linear Integrated Circuits: Ramakant Gaykwad
5. Digital Logic and Computer Design: M. Morris Mano, Pearson Education
6. Computer Organization and Architecture, William Stallings, Pearson, 10th Ed

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Progressive Education Society's

Modern College of Arts, Science & Commerce, Ganeshkhind, Pune-16

(An Autonomous College Affiliated to Savitribai Phule Pune University)

Framework of Syllabus

F.Y.B.Sc. Microbiology

Under NEP

(To be implemented from 2023-2024)

Title of the Course: B. Sc. Honors (Microbiology)

Preamble:

Microbiology is a broad discipline of biology involving study of five types of microorganisms i.e., bacteria, protozoa, algae, fungi and viruses. It deals with the interaction of microorganisms with each other and with plants, animals and the environment. Microorganisms were discovered over three fifty years ago and it is thought that a huge diversity still remains to be explored. Since the inception of microbiology as a branch of science, it has remained an ever-expanding field of active research, broadly categorized as pure and applied science.

Knowledge of different aspects of Microbiology has become crucial and indispensable to society. Microbes can be harnessed for human welfare. They find applications in the fields such as nanotechnology, genetic engineering, pharmaceutical, fermentation, food and agriculture industries and as study models. Some microorganisms cause important diseases of plants and animals including humans. Microbiologists play a significant role in diagnosis, prevention and control of these diseases. There is a continuous demand for microbiologists as a work force in the fields of education, industry and research. Career opportunities for the graduate students are available in industry and research equally.

Introduction:

In the post globalization world higher education has to play a significant role in creation of skilled human resources for the well-being of humanity. The barriers among the academic fields seem to have dissolved. However, the disparities in the field of curriculum aspect, evaluation and mobility exist. With the changing scenario at local and global level, the syllabus restructuring should keep pace with developments in the education sector. The National education policy aims to incorporate interdisciplinary approach to insure overall development of students. NEP is being adopted and implemented to address the issues related to traditional systems and it also aims to maintain the best of earlier curriculum. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs, courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in **B.Sc. (Honours) Microbiology** is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students. The present curriculum focuses on students' needs, skill development, interdisciplinary approach to learning and enhancing employability. The college provides an environment for the overall development of students into responsible citizens with multi-dimensional personalities by inculcating among students a blend of scientific insights, compassionate and progressive attitude, cultural awareness, and time-tested traditional values.

Microbiology curricula are offered at two levels viz. undergraduate and postgraduate. The undergraduate curricula are prepared to impart basic knowledge of the respective subject from all possible angles. In addition, students are to be trained to apply this knowledge in day-to-day applications and to get a glimpse of research.

Objectives to be achieved:

- To enrich students' knowledge and train them in the pure microbial sciences.
- To introduce the concepts of application and research in Microbiology.
- To inculcate a sense of scientific responsibilities and social and environment awareness.
- To help students build-up a progressive and successful career.
- To introduce students of Arts and Commerce faculty to basics of Microbiology.

Course Structure:

The structure of the Three/Four-year bachelor's degree programme allows the opportunity to the students to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per their choices and the feasibility of exploring learning in different institutions. The minimum and maximum credit structure for different levels under the Three/Four -year UG Programme with multiple entry and multiple exit options are as given below:

Levels	**Qualification**	**Credit Requirements**		**Semester**	**Year**
		Minimum	**Maximum**		
4.5	UG certificate	40	44	2	1
5.0	UG Diploma	80	88	4	2
5.5	Three Year Bachelor's Degree	120	132	6	3
6.0	Bachelor's Degree-Honours	160	176	8	4

The programmes are flexible enough to allow liberty to students in designing them according to their requirements. Students may choose a single Major, one Major with a Minor, and one Major with two Minors.

Eligibility for Admission:

First Year B.Sc.:

a. Higher Secondary School Certificate (10+2) or its equivalent Examination with English and Biology; and two of the science subjects such as Physics, Chemistry, Mathematics, Geography, Geology, etc.

OR

b. Three Years Diploma in Pharmacy Course of Board of Technical Education conducted by Government of Maharashtra or its equivalent.

OR

c. Higher Secondary School Certificate (10+2) Examination with English and vocational subject of + 2 level (MCVC) - Medical Lab. Technician (Subject Code = P1/P2/P3)

Admissions will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the University of Pune.

Reservation and relaxation will be as per the Government rules.

Medium of Instruction: English

Award of Credits:

- Each course having 4 credits shall be evaluated out of 100 marks and student should secure at least 40 marks to earn full credits of that course.
- Each course having 2 credits shall be evaluated out of 50 marks and student should secure at least 20 marks to earn full credits of that course.
- GPA shall be calculated based on the marks obtained in the respective subject, provided that student should have obtained credits for that course.

Evaluation Pattern:

- Each course carrying 100 marks shall be evaluated with Continuous Assessment (CA) and End Semester Evaluation (ESE) mechanism.
- Continuous assessment shall be of 40 marks for theory and practical course. The End Semester Evaluation (ESE) shall be of 60 marks for theory and practical course. To pass in a course, a student has to secure a total of minimum 40 marks provided that he should secure minimum 24 marks in (ESE)
- Each course carrying 50 marks shall be evaluated with Continuous Assessment (CA) and End Semester Evaluation (ESE) mechanism.
- Continuous assessment shall be of 20 marks while ESE shall be of 30 marks.
- To pass in a course, a student has to secure a total of minimum 20 marks provided that he/she should secure minimum12 marks in University Evaluation (UE).
- For Internal examination minimum two tests per paper of which one has to be a written test of 10 marks.
- Methods of assessment for Internal exams: Seminars, Viva-voce, Projects, Surveys, Field visits, Tutorials, Assignment, Group Discussion, open book test etc (on approval of the head of the centre)

Department of Microbiology NEP BSc Honours Subject basket

Level	Semester	Disciplinary Major Mandatory	DSE Elective	Minor	OE	VC/SEC	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Total credits
4.5	I	4(Cr)(T) Microbial world and Principles of Microbiology 2(Cr)(P) Practical based on Microbial world and Principles of Microbiology	—		OE-2(Cr)(T) Microbiology in day to day life, OE-2(Cr)(P) Microbiology in day to day life	VC-2 (Cr)(T) Dairy Microbiology, SEC-2(Cr)(P) Microscopy and Special staining techniques	AEC- 2Cr (T) English I, VEC- 2Cr (T) , IKS- 2Cr (T) Foundation course on Indian Knowledge	CC - 2Cr (Yoga education sports, and fitness, Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts)	22
	II	4(Cr)(T) Microbial biochemistry and growth+ 2(Cr)(P) Practical based on Microbial biochemistry and growth	—	2(Cr)(T) Introduction to Microbiology	OE-2(Cr)(T) Human health and diseases+ OE-2(Cr)(P) Human health and diseases	VC-2(Cr) (P) Food and Dairy Microbiology, SEC-2(Cr)(P) Isolation and cultivation of microorganism	AEC- 2Cr (T) English II VEC- 2 Cr	CC - 2Cr (Yoga education sports, and fitness, Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts)	22
		12		2	8	8	10	4	44
5	III	2(Cr)(T) Bacterial Physiology and Fermentation Technology +2(Cr)(T) Environmental Microbiology + 2 (Cr)(T) Food Microbiology+ 2(Cr)(P) Practical based on Bacterial Physiology and Environmental Microbiology	—	2(Cr)(T) Growth and cultivation of bacteria+ 2 (Cr)(P) Practical on Growth and cultivation of bacteria	OE-2 (T) Microbes in agriculture	VC-2(Cr)(T) Industrial Microbiology	AEC 2Cr(T) Modern Indian Language I	2Cr FP, 2CC	22
	IV	2(Cr)(T)Bacterial Genetics+ 2(Cr)(T) IKS+ 2(Cr)(T) Agricultural Microbiology +2(Cr)(P) Practicals based on Bacterial genetics and agricultural Microbiology	—	2(Cr)(T) Industrial Microbiology 2(Cr)(P) Practical on Industrial Microbiology	OE-2 (P) Microbes in agriculture	SEC-2 (T) Microbial nanotechnology	AEC 2Cr(T) Modern Indian Language II	CEP-2Cr, 2CC	22
		28		10	12	12	14	18	44
5.5	V	4(Cr)(T) Medical Microbiology 2(Cr)(T) Enzymology 4(Cr)(P) Practicals based on Medical Microbiology, Enzymology and Molecular biology	2 (T) Genetics + 2 (T) Molecular Biology	2 (Cr)(Th) Medical Microbiology and immunology, 2(Cr)(P) Practical based on Medical Microbiology and immunology		VC-2(Cr)(P) Fermentation technology and applied Microbiology		2Cr FP/CEP	22
	VI	4(Cr)(T) Immunology, 2(Cr)(Th) Metabolism, 4 (Cr)(P) Practicals based on Immunology and Metabolism	2 (T) Microbial biotechnology+ 2 (T/P)Practicals based on Microbial biotechnology and Molecular Biology	2(Cr)(Th) Nanobiotechnology, 2(Cr)(P) Practicals based on nanobiotechnology				4Cr OJT	22
		48	8	18	12	14	14	18	44
6	VII	2(Cr)(T) Microbial systematics+ 4(Cr)(T) Quantitative Biology+ 4(Cr)(T) Biochemistry and Metabolism+ 4(Cr)(P) practicals based on Microbial systematics, Quantitative Biology, Biochemistry and	2(Cr)(T) Bioremediation and biomass utilization+ 2 (Cr)(P) Practical based on Bioremediation and biomass utilization	4(Cr)(T) Research Methodology					22
	VIII	2(Cr)(T) Instrumentation and Molecular biophysics+ 4(Cr)(T) Molecular Biology+ 4(Cr)(T) Cell organization and biochemistry+ 4 (Cr)(P) Practicals based on Instrumentation and Molecular biophysics, Molecular Biology, Cell organization and biochemistry	2(Cr)(Th) Microbial communication, Membrane transport and signal transduction+ 2 (Cr)(P) Practical based on Microbial communication, Membrane transport and signal transduction					4Cr OJT	22
		76	16	22	12	14	14	22	176

F. Y. B.Sc. Microbiology Titles of Papers and Scheme of Study Evaluation

Semester	Code	Course title	Credits	Hours/ week	CIA	ESE	Total
I	**Disciplinary Major Mandatory**						
	MIC11101	4(Cr)(T) Microbial world and Principles of Microbiology	4	04	40	60	100
	MIC11102	2(Cr)(P) Practical based on Microbial world and Principles of Microbiology	2	04	20	30	50
	OE (For Arts and Commerce faculty)						
	MIC11301	2(Cr)(T) Microbiology in day to day life	2	02	20	30	50
	MIC11302	2(Cr)(P) Microbiology in day to day life	2	04	20	30	50
	VSC/SEC						
	MIC11401	VSC-2(Cr)(T) Dairy Microbiology	2	02	20	30	50
	MIC11402	SEC-2(Cr)(P Microscopy and Special staining techniques	2	04	20	30	50

Semester	Code	Course title	Credits	Hours/ week	CIA	ESE	Total
II	**Disciplinary Major Mandatory**						
	MIC12101	4(Cr)(T) Microbial biochemistry and growth	4	04	40	60	100
	MIC12102	2(Cr)(P) Practical based on Microbial biochemistry and growth	2	04	20	30	50
	Minor						
	MIC12201	2(Cr)(T) Introduction to Microbiology	2	02	20	30	50
	OE (For Arts and Commerce faculty)						
	MIC12301	2(Cr)(T) Human health and diseases	2	02	20	30	50
	MIC12302	2 (Cr)(P) Human health and diseases	2	04	20	30	50
	VSC/SEC						
	MIC12401	VSC 2(Cr) (P) Food and Dairy Microbiology	2	04	20	30	50
	MIC12402	SEC-2(Cr)(P)	2	04	20	30	50

		Isolation and cultivation of microorganism					

ATKT rules

Minimum number of credits required to take admission to second year of B.Sc.:31 (70%)

Minimum No. of credits required for take admission to third year of B.Sc.:44 credits (100%) to be completed form first year of B. Sc. And atleast 22 crdits from S. Y. B. Sc.

External Students

There shall be no external students.

University Terms

Dates for commencement and conclusion for the first and second terms will be declared by the University authorities. Terms can be kept by only duly admitted students. The term shall be granted only on minimum 80 percent attendance at theory and practical course and satisfactory performance during the term.

Qualification of Teachers:

He/she should hold a minimum undergraduate and postgraduate degree in Microbiology (B. Sc. and M. Sc. Microbiology) and qualified as per UGC regulations.

Semester I

MIC11101:4(Cr)(T)-Microbial World and Principles of Microbiology

Course outcomes: At the conclusion of this course the students will be able to -

CO 1: Explain the contributions made by prominent scientists in the field of microbiology.

CO2: Describe the characteristic features of different types of microorganisms and methods to organize/classify them

CO3: Explain principles of construction and working of microscopes and various staining techniques.

CO 4: Describe methods of sterilization and disinfection and the principles behind them.

CO 5: Explain the scope of Microbiology.

Unit 1	**History of Microbiology**	**15 Lectures**
	1. Development of Microbiology as a discipline: a. Discovery of microscope and microorganisms (Anton van Leeuwenhouek and Robert Hooke), b. Abiogenesis v/s biogenesis (Aristotle's notion about spontaneous generation, Francesco Redi's experiment, Louis Pasteur's & Tyndall's experiments) 2. **Golden Era of Microbiology:** a. Contributions of - Louis Pasteur (Fermentation, Rabies, Pasteurization and Cholera vaccine-fowl cholera experiment) Robert Koch (Koch's Postulates, Germ theory of disease, Tuberculosis and Cholera-isolation and staining techniques of causative agent) Ferdinand Cohn (Endospore discovery). Isolation techniques of bacteria. (Robert Koch) b. Discovery of viruses (TMV and Bacteriophages), River's Postulates,Contribution of Joseph Lister (antiseptic surgery), Paul Ehrlich (Chemotherapy), Elie Metchnikoff (Phagocytosis), Edward Jenner (Vaccination) and Discovery of antibiotics (Alexander Fleming). c. Contribution of Martinus W. Beijerinck (Enrichment culture technique, *Rhizobium*), Sergei N. Winogradsky (Nitrogen fixation and Chemo-lithotrophy) in the development of the field of soil microbiology.	
Unit 2	**Introduction to the world of microorganisms**	**15 Lecture**
	1. **Nomenclature and Classification of Microorganisms:** a. Binomial Nomenclature b. Whittaker's five kingdom system c. Carl Woese's three domain classification based on 16S rRNA	

	d. Classification of viruses – ICTV nomenclature **2. General characteristics of microorganisms** with emphasis on distribution, occurrence, morphology, mode of reproduction and economic importance: a. Bacteria: Eubacteria (including Actinomycetes) and Archaebacteria b. Protozoa c. Fungi d. Algae e. Viruses, Viroids and Prions	
Unit 3	**Basic Techniques in Microbiology**	**15 Lectures**
	Microscopy **1. Bright field microscopy:** a. Electromagnetic spectrum of light b. Structure, working and ray diagram of a compound light microscope; concepts of magnification, numerical aperture and resolving power. c. Types, ray diagram and functions of – condensers (Abbe and cardioid), eyepieces and objectives d. Concept of aberrations in lenses - spherical, chromatic, comma and astigmatism **2. Principle, working and ray diagram of** a. Phase contrast Microscope b. Fluorescence Microscopy c. Electron Microscopy – TEM, SEM **3. Staining Techniques:** a. Definition of Stain; Types of stains (Basic and Acidic), Properties and role of Fixatives, Mordants, Decolourisers and Accentuators b. Monochrome staining and Negative (Relief) staining c. Differential staining - Gram staining and Acid-fast staining d. Special staining- Capsule, Cell wall, Spore, Flagella, Lipid granules, metachromatic granules	
Unit 4	**Sterilization and Disinfection**	**10 lectures**
	1. Sterilization a. Physical Agents - Heat, Radiation, Filtration b. Checking of efficiency of sterilization (Dry and Moist) – Biological and Chemical Indicators **2. Disinfection:**	

	a. Chemical agents and their mode of action - Aldehydes, Halogens, Quaternary ammonium compounds, Phenol and phenolic compounds, b. Heavy metals, Alcohol, Dyes, Detergents and Ethylene oxide. c. Characteristics of an ideal disinfectant d. Checking efficiency of disinfectant - Phenol Coefficient test (Rideal–Walker method).	
Unit 5	**Scope of Microbiology**	**5 Lectures**
	Medical Microbiology 1. Environmental Microbiology 2. Food and Dairy Microbiology 3. Agricultural Microbiology 4. Industrial Microbiology 5. Genetic Engineering	

References:

1. Bender K. S., Buckley D. H., Stahl D. A., Sattley W. M. And Madigan M. T. (2017). Brock Biology of Microorganisms. E-Book, Global Edition. United Kingdom: Pearson Education.
2. Bergey's Manual of Systematic Bacteriology. (2005). Volume Two: The Proteobacteria, Part A: Introductory Essays. Garrity G. editor. Springer. ISBN 978-0- 387-24143-2
3. Bergey's Manual of Systematic Bacteriology. (2005). Volume Two: The Proteobacteria, Part B: The Gammaproteobacteria. Garrity G. Brenner D. J., Krieg N. R., and Staley J. R. (Eds.). Springer. ISBN 978-0-387-24144-9
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5. Bergey's Manual of Systematic Bacteriology. (2009). Volume Three: The Firmicutes. Part C: The Proteobacteria. Vos, P., Garrity, G., Jones, D., Krieg, N.R., Ludwig, W., Rainey, F.A., Schleifer, K.-H., Whitman, W. (Eds.). Springer. ISBN 978-0-387-
6. Hugo and Russell's Pharmaceutical Microbiology. (2008). Denyer S. P., Hodges N. A., Gorman S. P. and Gilmore B. F. (Editors). Germany: Wiley.
7. Jacquelyn G Black, Laura J. Black ,Microbiology: Principles and Explorations, 10th Edition, Wiley Publications
8. Kanungo R. (2017). Ananthanarayan and Paniker's Textbook of Microbiology. 10th edition. Universities Press, Hyderabad, India
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13. Randhawa V. S. (2009). Practicals and Viva in Medical Microbiology. Second edition. India: Elsevier (A Division of Reed Elsevier India Pvt. Limited).

14. Salle, A. J. (2007). 'Fundamental Principles of Bacteriology'. Dodo Press, Moscow, Russia.
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19. Talaros, Foundations in Microbiology, MacGrew Hill Publication
20. Tortora G. J., Funke B. R. and Case C. L. (2016). Microbiology: an Introduction. Twelfth edition. Pearson, London.
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MIC11102: 2(Cr)(P) Practical based on Microbial World and Principles of Microbiology

Course outcomes: At the conclusion of this course the students will be able to -

CO1: Describe construction and working of common instruments used in Microbiology laboratory.

CO2: Explain use of various glassware used in microbiology experiments.

CO3: Handle and use compound microscope to observe microorganisms.

CO4: Prepare and stain the smear and focus the slide to observe bacterial/ fungal specimens or their specific cellular components.

CO5: Observe bacterial motility.

CO6: Evaluate disinfectant efficiency by determining its Phenol Coefficient.

Expt. No.	Topics	No. of Practicals
1	a. Safety measures and Good Laboratory Practices in Microbiology laboratory. b. Introduction, operation, precautions and use of common microbiology laboratory instruments: Incubator, Hot air oven, Autoclave, Colorimeter, Laminar air flow hood, Clinical Centrifuge.	**2**
2	a. Construction (mechanical and optical), working and care of bright field microscope. b. Permanent slide observation: Algae, Fungi and Protozoa c. Wet mount slide preparation and its observation for: Bacteria, Algae, Fungi and Protozoa.	**3**

3	a. Introduction and use of common laboratory glass wares: Test tubes, screw capped tubes, Petri plates, pipettes (Mohr and serological) micropipettes, Pasteur pipettes, Erlenmeyer flask, volumetric flask, glass spreader, Durham's tube and inoculating needles (wire loop, stab needles). b. Learning basic techniques in Microbiology: Wrapping of glassware, cotton plugging, cleaning and washing of glassware, biological waste disposal.	**2**
4	Basic staining techniques: a. Monochrome staining b. Negative staining c. Gram staining of bacteria	**3**
5	Observation of motility in bacteria using: Hanging drop method and swarming growth method.	**2**
6	Checking of efficacy of chemical disinfectant: Demonstration of Phenol Coefficient by Rideal–Walker method.	**2**
	TOTAL	**14**

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MIC11301: OE-2 (Cr) (T)-Microbiology in day to day life

Course outcomes:

CO1: The students will be able to describe different types of microorganisms.

CO2: The students will be able to explain roles of beneficial and harmful microorganisms.

Unit 1	**Microorganisms and their applications**	**20 lectures**
	Microorganisms: Bacteria, Algae, Fungi, viruses and Protozoa,	
	Beneficial Microorganisms: A. Microbes in Food and fermentation: 1.Bread 2.Fermented foods- Idli, curd 3. SCP *(Spirulina)* 4. Mushrooms B. Microbes in agriculture: Biofertilizers, biopesticides C. Microbes in industrial production of Alcoholic beverages, Organic acids, Vitamins, Antibiotics, Plant growth hormones, Enzymes	
Unit 2	**Harmful microorganisms**	**10 lectures**
	A. Microorganisms as disease causing agents: Plant diseases, animal diseases, human diseases B. Microbes and food spoilage: Shelf life of food, food preservation	

References:

1. Ananthnarayanan, R and Jeyaram Panicker, C. K. 2010.Textbooks of Microbiology, Orient Longman.
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MIC11302: OE-2 (Cr) (P)-Microbiology in day to day life

COURSE OUTCOMES: At the conclusion of this course the students will be able to -

CO1: Understand the safety measures to be followed in a Microbiology laboratory.

CO2: Describe construction and Working of common instruments used in Microbiology laboratory.

CO2: Explain use of various glassware used in microbiology experiments.

CO3: Handle and use compound microscope to observe microorganisms.

CO4: Prepare and stain the smear and focus the slide to observe bacterial/ yeast specimens

CO6: Understand the types and role of microbes in household food preparations, agriculture, disease, industrial production, food spoilage, sewage treatment.

Expt. No.	Topics	No. of Practicals
1	a. Safety measures and Good Laboratory Practices in Microbiology laboratory. b. Introduction, operation, precautions and use of common microbiology laboratory instruments: Incubator, Hot air oven, Autoclave, Laminar air flow hood	**2**
2	a. Construction (mechanical and optical), working and care of bright field microscope. b. Permanent slide observation: Algae, Fungi and Protozoa c. Wet mount slide preparation and its observation: Pond water sample: Algae, Protozoa, Rotifers.	**2**
3	a. Introduction and use of common laboratory glass ware: Test tubes, Petri plates, pipettes, micropipettes, Pasteur pipettes, Erlenmeyer flask, volumetric flask, glass spreader, Durham's tube and inoculating needles (wire loop, stab needles). b. Basic techniques in Microbiology: Wrapping of glassware, cotton plugging, care of glassware, biological waste disposal.	**1**
4	Types and role of microbes in household food preparations: A. Bread making: a. Role of yeast in bread making. b. Microscopic observation of wet mount of Baker's Yeast (*Saccharomyces cerevisiae*). c. Monochrome staining of yeast cells. d. Demonstration of streaking of *Saccharomyces cerevisiae* for isolation of culture.	**2**

	B. Role of lactic acid bacteria in fermented foods-curd, idli batter. a. Microscopic observation of wet mount of microorganisms from curd sample. b. Monochrome Staining of curd/ whey sample	
5	Microbes as source of food: a. SCP Observation of *Spirulina.* b. Mushrooms c. Demonstration of mushroom cultivation. d. Spore print of mushrooms	**2**
6	Microbes in agriculture: a. Biofertilizers: Study effect of *Azotobacter/Rhizobium* fertilizer on germination of seeds. b. Biocontrol agents- Microbial pesticides: Demonstration of *Trichoderma* as antifungal agent.	**1**
7	Microorganisms as disease causing agents: a. Citrus canker: demonstration of symptoms and cultural characteristics of pathogen on Potato Dextrose Agar plate. b. Skin flora and the effect of soap/ sanitizers on skin flora.	**2**
7	Microbes in industrial production a. Ethanol fermentation/ wine making b. Detection of amylase by plate assay c. Demonstration of: Primary screening of antibiotic producing organisms: Giant colony technique.	**2**
8	Microbes in food spoilage a. Effect of microbial load on spoilage of food. b. Wet mount of Bread mould or *Aspergillus* from onion sample.	**2**
	TOTAL	**16**

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2. Aneja K. R. (2007). Experiments in Microbiology, Plant Pathology And Biotechnology. New Age International, New Delhi, India
3. Brown, A., & Smith, H. (2014). Benson's Microbiological Applications, Laboratory Manual in General Microbiology, Short Version. McGraw-Hill Education.
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MIC11401: VSC-2(Cr)(T) Dairy Microbiology

Course Outcome:

At the end of this course student will be able to

- Explain prospects of dairying at commercial marketing.
- Describe steps involved in processing of milk and dairy products.
- Explain quality control tests in dairy industry.
- Describe production of dairy products of commercial significance with emphasis to local and global market demand.

Unit 1	**Physicochemical properties and microbiology of Milk**	**10 lectures**
	1. Definition, types, microflora and pathogens: i. Definition of milk, Composition and physicochemical properties of Milk of different animals. Difference between colostrum and milk. ii. Types of milk: whole, toned, double toned, homogenized, and skimmed milk, dehydrated milk iii. Microflora associated with milk and its importance. iv. Sources of contamination of raw milk and relative importance in influencing quality of milk during production, collection, transportation, and storage, milk borne diseases.	
Unit 2	**Processing Techniques and naturally occurring preservatives**	**5 lectures**
	i. Bacteriological aspects of processing techniques like bactofugation, thermisation, pasteurization (LTH, HTST, UHT), sterilization and boiling. ii. Naturally occurring preservative systems in milk like LP system, immunoglobulins, Lysozyme, Lactoferrin etc.	
Unit 3	**3. Spoilage of Milk**	**10 lectures**
	i. Spoilage of Milk ii. Succession of microorganisms in milk leading to spoilage iii. Stormy fermentation, ropiness, sweet curdling iv. Color and flavor defects	

	v. Preservation of Milk and Milk products by physical (irradiation) and Chemical agents, food grade bio preservatives (GRAS), Bacteriocins of LAB	
Unit 4	**Microbiological aspects of quality control and quality assurance in production of milk and milk products**.	**5 lectures**
	i. Good Manufacturing Practices, ii. Sanitary standard operating procedures, iii. Total quality management and application of HACCP program in dairy industry. iv. Safety concern of biofilm formation on equipment surfaces and their control measures	

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1. Banwart G. J. (1989). Basic Food Microbiology. 2nd edition. Food Science and Nutrition.Springer. ISBN 978-1-4684-6453-5
2. Bullock D. (2019). Dairy Microbiology. ED-Tech Press. E-Book. ISBN:9781788821629
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MIC11402: SEC-2(Cr)(P) Microscopy and Special staining techniques

COURSE OUTCOMES: At the conclusion of this course the students will be able to -

CO1: Describe the growth characteristics of different groups of microorganisms.

CO2: Stain various components of bacterial cells using special staining methods.

CO3: Stain, observe and describe morphological features of fungi in stained preparations.

Expt. No.	Topics	No. of Practicals
1	Observing growth of bacteria, fungi, actinomycetes and algae in liquid culture and solid medium.	**4**
2	Pond water mounting.	**2**
3	Bacterial Cell wall staining	**1**
4	Demonstration of Capsule	**1**
5	Endospore staining.	**1**
6	Flagellar staining	**2**
7	PHB and metachromatic granules.	**2**
8.	Mounting of fungus in lactophenol cotton blue	**1**
	Total	**14**

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1. Aneja K. R. (2007). Experiments in Microbiology, Plant Pathology And Biotechnology. New Age International, New Delhi, India
2. Brown, A., & Smith, H. (2014). Benson's Microbiological Applications, Laboratory Manual in General Microbiology, Short Version. McGraw-Hill Education.
3. Cappuccino J. and Welsh C. (2019). Microbiology: A Laboratory Manual, Loose Leaf Edition. United Kingdom: Pearson Education.
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Semester II

MIC12101: 4 Cr (T) Microbial biochemistry and growth

COURSE OUTCOMES: At the conclusion of this course the students will be able to -

CO 1: Explain the structure and various functions of proteins; lipids and nucleic acids.
CO 2: Describe the structural features of bacterial cells and their appendages.
CO 3: Explain the design of culture media and cultivation of different groups of microorganisms.

CO4: Describe kinetics, different methods of measurement and factors affecting bacterial growth.

Unit	Topic	No. of lectures
Unit 1	**Chemical Basis of life**	**15 lectures**
	1. Atom, Biomolecules, types of bonds (covalent, ionic bond, co-ordinate bond, Electrostatic interaction, H-bonding, Van Der Waals interaction) **2. Chemistry of Biomolecules** **a. Carbohydrates: Definition, classification and function** 1. Monosaccharides: Classification based on aldehyde and ketone groups; structure of Ribose, Deoxyribose, Glucose, Galactose and Fructose. 2. Disaccharides: Glycosidic bond, structure of lactose and sucrose. 3. Polysaccharides: Structure and types Examples-Starch, glycogen, Peptidoglycan, chitin **b. Lipids: Definition, classification and function** 1. Simple lipids – Triglycerides, Fats and oils, waxes. 2. Compound lipids – Phospholipid, Glycolipids 3. Derived lipids – Steroids, Cholesterol **c. Proteins: Definition, classification and function** 1. General structure of amino acids, peptide bond. 2. Types of amino acids based on R group 3. Structural levels of proteins: primary, secondary, tertiary and quaternary 4. Study of flagellin and cytoskeletal proteins. **d. Nucleic acids: Definition, classification and function**	

	1. DNA – structure and composition 2. RNA – Types (m-RNA, t-RNA, r-RNA), structure and functions.	
Unit 2	**Bacterial Cytology**	**15 lectures**
	1. Unit of Measurement-Introduction to SI Units 2. Structure, chemical composition and functions of the following components in bacterial cell a. Cell wall (Gram positive, Gram negative) b. Concept of Mycoplasma, Spheroplast, protoplast, L-form c. Cell membrane d. Endospore (spore formation and stages of sporulation) e. Capsule f. Flagella g. Fimbriae and Pili h. Ribosomes i. Chromosomal & extra-chromosomal material j. Cell inclusions (Gas vesicles, carboxysomes, PHB granules, metachromatic granules, glycogen bodies, starch granules, magnetosomes, sulfur granules, chlorosomes)	
Unit 3	**Cultivation of Microorganisms**	**15 lectures**
	Nutritional requirements and nutritional classification. a. Design and preparation of media: Common ingredients of media and types of media. b. Methods for cultivating photosynthetic, extremophilic and chemo-lithotrophic bacteria, anaerobic bacteria, algae, fungi, actinomycetes and viruses. c. Concept of Enrichment, Pure Culture, Isolation of culture by streak plate, pour plate, spread plate. d. Maintenance of bacterial and fungal cultures using different techniques. e. Culture collection centers and their role. f. Requirements and guidelines of National Biodiversity Authority	

	for culture collection centers.	
Unit 4	Bacterial growth	**15 lectures**
	a. Kinetics of bacterial growth (Exponential growth model) b. Growth curve and Generation time c. Diauxic growth d. Measurement of bacterial growth- Methods of enumeration: i. Microscopic methods (Direct microscopic count, counting cells using improved Neubauer, Petroff-Hausser's chamber) ii. Plate counts (Total viable count) iii. Turbidimetric methods (including Nephelometry) iv. Estimation of biomass (Dry mass, Packed Cell Volume) v. Chemical methods (Cell carbon and nitrogen estimation) e. Factors affecting bacterial growth [pH, Temperature, Solute Concentration (Salt and Sugar) and Heavy metals.]	

References

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2. Bender K. S., Buckley D. H., Stahl D. A., Sattley W. M. And Madigan M. T. (2017). Brock Biology of Microorganisms. E-Book, Global Edition. United Kingdom: Pearson Education.
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MIC12102: 2 Cr (P) Practical based on Microbial biochemistry and growth

Course outcomes:

CO1: Explain nutritional requirements, nutritional classification and cultivation of bacteria and different types of microorganisms

CO2: Explain concept of enrichment, pure culture, isolation and maintenance of microbial cultures and role of culture collection centers

CO3: Describe kinetics, different methods of measurement and factors affecting bacterial growth.

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Expt. No.	Topics	No. of Practicals
1	i. Qualitative Tests for detection of carbohydrates ii. Qualitative Tests for detection of proteins iii. UV Spectrophotometric detection of DNA	**3**
2	Isolation of pure cultures of bacteria by streaking method.	**2**
3	Checking sterilization efficiency of autoclave using a biological indicator *(B. stearothermophilus)*	**1**
4	**Study of normal flora of skin:** i. Cultivating and observing different morpho-forms of bacteria from skin. ii. Study of the effect of washing on skin with soap and disinfectant on it's microflora.	**2**
5	i. Estimation of CFU count by spread plate method from food or soil. ii. Estimation of CFU count by pour plate method from food or soil.	**2**
6	**To study the effect of different parameters on growth of E. coli :** i. pH, temperature, sodium chloride concentration ii. Study of oligodynamic action of heavy metal	**3**
7	**Preservation of cultures on:** Slants, soil and on grain surfaces; revival of these cultures and lyophilized cultures.	**1**
	TOTAL	**14**

References:

1. Atlas R. M. (2005). Handbook of Media for Environmental Microbiology. United States: Taylor and Francis.
2. Jacquelyn G Black, Laura J. Black ,Microbiology: Principles and Explorations, 10th Edition, Wiley Publications
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MIC12201: Minor-2 Cr (T) Introduction to Microbiology

Course outcomes: At the conclusion of this course students will be able to-
CO 1: Explain the characteristic features of different types of microorganisms and methods to organize/classify them as well as the concept of bacterial cultivation.
CO 2: Describe methods of sterilization and bacterial staining techniques along with the general scope of microbiology.

Unit –1	**Introduction to the world of microorganisms**	**15 Lectures**
	1. **Nomenclature and Classification of Microorganisms:** a. Binomial Nomenclature b. Whittaker's five kingdom system c. Carl Woese's three domain classification based on 16S rRNA d. Classification of viruses – ICTV nomenclature **2. General characteristics of microorganisms** with emphasis on distribution, occurrence, morphology, mode of reproduction and economic importance: a. Bacteria: Eubacteria (including Actinomycetes) and Archaebacteria b. Protozoa c. Fungi d. Algae e. Viruses, Viroids and Prions 3. **Cultivation of bacteria** a. Nutritional requirements and nutritional classification b. Design and preparation of media: Common ingredients of media and types of media.	
Unit-2	**Sterilization, Staining techniques and Scope of microbiology**	**15 lectures**
	. Sterilization	

	a. Physical Agents - Heat, Radiation, Filtration b. Checking of efficiency of sterilization (Dry and Moist) – Biological and Chemical Indicators **2. Staining techniques** a. Definition of Stain; Types of stains (Basic and Acidic), Properties and role of Fixatives, Mordants, Decolourisers and Accentuators b. Monochrome staining and Negative (Relief) staining c. Differential staining - Gram staining **3. Scope of microbiology** a. Medical Microbiology b. Environmental Microbiology c. Food and Dairy Microbiology d. Agricultural, Microbiology e. Industrial Microbiology f. Geomicrobiology g. Genetic Engineering	

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MIC12301: OE 2 Cr (T) Human health and diseases

COURSE OUTCOMES: At the conclusion of this course the students will be able to -

CO1: Explain airborne and water borne, and vector borne diseases , MPN and antibiotic sensitivity test.

CO2: Describe physiological metabolic disorders

CO3: Explain types of immunity, disease prevention and treatment

Unit 1	**Health and microbial diseases**	**15 lectures**
	1. Introduction to Health, hygiene and Diseases: Normal flora of human body, pathogens, opportunistic pathogens. 2. Types of Diseases: communicable and non-communicable **3. Air borne diseases** (causative agent and symptoms)**:** a. Viral: Chickenpox, Influenza, Common cold (Adenovirus Rhinovirus), Coronavirus Disease 2019 (COVID-19), Measles, Mumps. b. Bacterial- *Streptococcus pneumoniae*, Tuberculosis, *Bordetella pertussis*, Diptheria. c. Fungal- Aspergillosis. d. Air sanitation 4. **Water/ food borne diseases** (causative agent and symptoms)**:** a. Bacterial- Cholera, diarrhea, typhoid, b. Protozoal- amebiasis, giardiasis c. Viral- Polio, hepatitis, Rotavirus. d. Potable water, water purification **Vector borne diseases** (causative agent and symptoms)**:** a. Viral: Chikungunya, Dengue, Japanese encephalitis b. Protozoal: Lymphatic filariasis, Malaria	
Unit 2	**Physiological and Metabolic disorders and immunity**	**15 lectures**
	1. Physiological/ Metabolic disorders: detection and prevention: diabetes, hypertension, hypotension, anemia. 2. **Health and Immunity:** a. Types of Immunity: 1. Innate and Acquired 2. Concept of antigen and antibody-Formation of Antigen Antibody complex 3. Concept of blood group -antigens on blood cells 3. Treatment and prevention of diseases a. Antibiotics, their mode of action; drug resistance	

	b. Vaccination	

References:

a. Ather B, Mirza TM, Edemekong PF. Airborne Precautions. [Updated 2023 Mar 13]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK531468/
b. Godkar, P. B., & Godkar, D. P. (2003). *Textbook of medical laboratory technology*. Bhalani.
c. https://asm.org/getattachment/2594ce26-bd44-47f6-8287-0657aa9185ad/Kirby-Bauer-Disk-Diffusion-Susceptibility-Test-Protocol-pdf.pdf
d. https://www.biodiamed.gr/wp-content/uploads/2017/06/Manual_on_Antimicrobial_Susceptibility_Testing.pdf
e. https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases
f. Kanungo R. (2017). Ananthanarayan and Paniker's Textbook of Microbiology. 10th edition. Universities Press, Hyderabad, India
g. Salle, A. J. (1948). Fundamental principles of bacteriology. Fundamental Principles of Bacteriology., (Edn 3).
h. Tortora G. J., Funke B. R. and Case C. L. (2016). Microbiology: an Introduction. Twelfth edition. Pearson, London.

MIC12302: OE 2 Cr (P) Human health and diseases

COURSE OUTCOMES: At the conclusion of this course the students will be able to -

CO1: Understand the safety measures to be followed in a Microbiology laboratory.

CO2: Describe construction and working of common instruments used in Microbiology laboratory.

CO3: Explain use of various glassware used in microbiology experiments.

CO4: Handle and use compound microscope to observe microorganisms.

CO4: Explain airborne and water borne, and vector borne diseases , MPN and antibiotic sensitivity test.

CO 5: Identify protozoal pathogens form permanent slides, blood cell types

CO 6: Determine blood pressure and sugar level.

CO7: Determine blood group.

Expt. No.	Topics	No. of Practicals
1	**Introduction to Health, hygiene and Diseases** Importance of normal flora of skin a. Determination of load of microorganisms before and after washing of hands.	**1**
2	Air borne diseasses a. Prevention of spread-Disinfection of air by filtration, uv radiation and chemicals. b. Determination of load and types of microorganisms in the air by settle plate technique.	**2**
3	Water/ food borne diseases: a. Demonstration of Water potability testing: MPN b. Observing permanent slides of protozoa such as *Entamoeba sp., Giardia sp.* c. Prevention of spread: Disinfection of water by filtration, uv radiation and chemicals.	**2**
4	**Vector borne diseases:** a. Prevention of spread. b. Observing permanent slides of malarial parasite.	**2**
5	Physiological/ Metabolic disorders: a. Determination of blood/urine sugar level use of glucometer and Colorimetry. b. Measurement of blood pressure. c. Demonstration of hemoglobin estimation	**3**
6	Study of blood and its components: 1. Types of Blood cells: RBCs, WBCs: Observation of stained blood smear 2. Determination of Blood groups (ABO, Rh) and their inheritance	**3**
7	Antibiotics, their mode of action; drug resistance: 1. Demonstration of Antibiotic sensitivity testing according to CLSI guidelines.	**1**
	TOTAL	**14**

References;

1. Ather B, Mirza TM, Edemekong PF. Airborne Precautions. [Updated 2023 Mar 13]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK531468/
2. Godkar, P. B., & Godkar, D. P. (2003). *Textbook of medical laboratory technology*. Bhalani.
3. https://asm.org/getattachment/2594ce26-bd44-47f6-8287-0657aa9185ad/Kirby-Bauer-Disk-Diffusion-Susceptibility-Test-Protocol-pdf.pdf
4. https://www.biodiamed.gr/wp-content/uploads/2017/06/Manual_on_Antimicrobial_Susceptibility_Testing.pdf
5. https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases
6. Salle, A. J. (1948). Fundamental principles of bacteriology. Fundamental Principles of Bacteriology., (Edn 3).
7. Tortora G. J., Funke B. R. and Case C. L. (2016). Microbiology: an Introduction. Twelfth edition. Pearson, London.

MIC12401: VC 2 (Cr)(P): Food and Dairy Microbiology

Course outcomes: At the conclusion of this course the students will be able to -

CO1: Describe characteristics and types of milk and its microflora.

CO2: Enumerate bacteria from milk and food.

CO3: Perform quality control tests for milk and milk products.

CO4: Carry out detection of food Adulteration

Serial No.	Title	No. of Practicals
1.	1.Food Microbiology a. TVC of food product. b. Detection of food Adulteration. c. Isolation and identification of Probiotic microflora from natural sources or any commercial formulation. d. HACCP guidelines for dairy and food industry (activity based)	**6**
2.	Quality control tests for milk a. Milk fat estimation b. Tests for detecting adulteration.	2
3.	Pasteurization of Milk, Spoilage of milk.	2

4.	Microbiological quality control tests for milk: i. Dye reduction tests (MBRT/Resazurin) ii. ii. Mastitis test iii. Somatic cell count iv. Phosphatase test	2
5.	3. Microbiological quality of indigenous dairy products: (Any two) i. Khoa ii. ii. Kulfi iii. Shrikhand iv. Paneer v. Curd/ Buttermilk	2
	Total	**14**

References:

1. Banwart G. J. (1989). Basic Food Microbiology. 2nd edition. Food Science and Nutrition.Springer ISBN 978-1-4684-6453-5
2. Bullock D. (2019). Dairy Microbiology. ED-Tech Press. E-Book. ISBN:9781788821629
3. De Sukumar. (2001). Outlines of Dairy Technology. Oxford University Press. Delhi. ISBN-13 978-0195611946
4. Frazier W. C., Westhoff D. C. and Vanitha N. M. (2017) Food Microbiology. 5thedition.McGraw Hill education, India. ISBN-10 -9781259062513
5. Marth E. H. and Steele J. (2001) Applied Dairy Microbiology. 2nd Edition. CRC Press.ISBN 9781138367609
6. Mathews G. (2018). Food and Dairy Microbiology. Scientific e-Resources, Scientific e-Resources. ISBN 1839472545, 9781839472541
7. Parihar P. (2008) Dairy Microbiology. Agrobios, AbeBooks Seller, India.ISBN:9788177542738, 8177542737
8. Parihar P. and Parihar L. (2008). Dairy Microbiology. Agrobios, Jodhpur, India. ISBN 13:9788177542738
9. Robinson R. K. (2012). Modern Dairy Technology. Volume 2. Springer. ISBN-13: 978-1468481747
10. Sharma K.S. (2021). Chemistry of Milk. AgriMoon.com. e-Krishi Shiksha. Online Courses.
11. Singh S. (2013) Dairy Technology: Volume -01: Milk and Milk Processing. New India Publishing Agency, India. ISBN-13: 978-9383305087
12. Varnam A. H. and Jane P. (2012). Milk and Milk Products: Technology, Chemistry and Microbiology. Springer. Food Science and Nutrition. ISBN 978-0-8342-1955-7

MIC12402: SEC-2 Cr (P) Isolation and cultivation of microorganism

Course outcomes: At the conclusion of this course the students will be able to -

CO1: Prepare different types of culture media.

CO2: Isolate and Cultivate bacteria, fungi and yeasts and algae.

CO3: Enumerate bacteria from food and soil samples and report CFU.

Expt. No.	Topics	No. of Practicals
1	Preparation of Winogradsky's column and observation of different types of microorganisms using a bright field microscope.	**1**
2	i. Preparation of different types of bacterial culture media-synthetic media, complex media- Nutrient agar, McConkey agar, Ashby's broth. ii. Enrichment of bacteria from environmental sample. iii. Isolation of bacteria on agar medium.	**4**
3	i. Isolation of actinobacteria ii. Morphological characterization of actinobacteria.	**2**
4	i. Preparation of different types of fungal culture media-PDA. ii. Cultivation and monochrome staining of yeasts. iii. Isolation and identification of fungi.	**3**
5	i. Preparation of different types of algal culture media-BG11 ii. Isolation of algae.	**2**
6	Growth curve of ***E. coli*** and determination of generation time.	**1**
7	Estimation of biomass of fungal culture (Dry mass, Packed Cell Volume	**1**
	TOTAL	**14**

Reference Books

1. Brown, A., & Smith, H. (2014). Benson's Microbiological Applications, Laboratory Manual in General Microbiology, Short Version. McGraw-Hill Education.
2. Cappuccino J. and Welsh C. (2019). Microbiology: A Laboratory Manual, Loose Leaf Edition. United Kingdom: Pearson Education.
3. Harley J. P. and Prescott L. (2020). Laboratory Exercises in Microbiology. Independently Published.
4. Prescott, M.J.,Harley, J.P.and Klein,D.A. Microbiology. 5th Edition WCB Mc GrawHill, New York, (2002).
5. Tortora, G.J., Funke ,B.R. and Case, C.L. Microbiology : An Introduction. Pearson Education, Singapore, (2004).
6. Alcomo,I.E. Fundamentals of Microbiology.VI Edition, Jones and Bartlett Publishers.Sudbury.Massachusetts, (2001).
7. Black J.G.Microbiology-Principles And Explorations.John Wiley & Sons Inc.NewYork, (2002).
8. Tom Besty, D.C Jim Koegh.Microbiology Demystified McGRAW-HILL.
9. Atlas R. M. (2005). Handbook of Media for Environmental Microbiology. United States: Taylor and Francis.
10. Goldman, E., & Green, L. H. (Eds.). (2015). Practical handbook of microbiology. CRC press.

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P. E. Society's

Modern College of Arts, Science and Commerce Ganeshkhind, Pune-16 (Autonomous)

F.Y.B.Sc. (Physics)

NEP 2020

Choice Based Credit System Syllabus to be implemented from Academic Year 2023-2024

1) Structure of the Course:

Semester	Course Type	Course Code	Course Name	Credit
I	Minor	PHY11205	Fundamentals of Physics	2
	Skill Enhancement Course		Lasers and its Applications	2
II	Minor	PHY 12204	Astronomy and Astrophysics	2
	Skill Enhancement Course		Basics of Electrical Wiring	2

Semester-I

Minor: 2 Credit (Theory Course)
Course Title: Fundamentals of Physics
Course Code: PHY11205

Lectures: 30 **(Credits-02)**

Learning Outcomes:

1) To know about application of Newton's laws of motion to solve various problems related to day-to-day life.
2) To understand effect of force on various types of bodies.
3) To know about sound and its applications
4) To know about effects of gravity

Unit 1: Measurements **(6 Lectures)**

1.1 Measuring things
1.2 The international system of units
1.3 Changing units
1.4 Length ,Time , mass
1.5 Motion along a straight line : Motion, position and displacement, Average velocity and average speed, instantaneous velocity and speed, Acceleration, Free fall acceleration.

- Problems

Unit 2: Force and motion **(5 Lectures)**

2.1 What causes acceleration, Force
2.2 Explain Newton's First law, second law, third law
2.3 Friction, properties of friction, drag force and Terminal speed

- Problems

Unit 3: Collisions **(4 Lectures)**

3.1 What is collision
3.2 Impulse and linear momentum, Momentum and kinetic energy in collisions, Inelastic collisions in one dimension, velocity of Center of mass, Elastic collisions in one dimension , collisions in two dimensions

- Problems

Unit 4: Gravitation **(5 Lectures)**

4.1 The world and the Gravitational force, Newton's laws of gravitation, gravitation and the principle of superposition,
4.2 Gravitation near earth surface,
4.3 Gravitation inside the earth, gravitational potential energy,
4.4 Kepler's laws

- Problems

Unit 5: Fluids **(6 Lectures)**

5.1 Fluids and world around us
5.2 What is fluid, density and pressure
5.3 Fluid at rest, mercry barometer, the open tube manometer
5.4 Pascals's principal and its demonstration, Archimedes principle
5.5 Ideal fluids in motion, The equation of cotinuity

- Problems

Unit 6: Sound **(4 Lectures)**

6.1 Characteristics of Sound- Frequency, wavelength, Intensity, Pitch, Timbre, loudness
6.2 Doppler Effect in sound
6.3 Reverberation and Sabine equation
6.4 Construction of carbon microphone and loudspeaker

- Problems

Reference Books:

1. Physics: Resnick, Halliday & Walker 9/e, Wiley.
2. Mechanics: D.S.Mathur, S.Chand and Company, NewDelhi.
3. Elements of Properties of Matter: D.S. Mathur, S. Chand, New Delhi.
4. Concepts of Physics: H.C. Verma, Bharati Bhavan Publisher.
5. Applied Fluid Mechanics: Mott Robert, Pearson Benjamin Cummir VI Edition. Pearson Education/Prentice Hall International, New Delhi.
6. Mechanics: D. S. Mathur, Revised by P. S. Hemne, S. Chand and Company, New Delhi.

Skill Enhancement Course: 2 Credit (Practical Course)
Course Title: Lasers and its Applications
Course Code:

Objectives: It helps in understanding the theoretical and mathematical development of the subject and to create interest in the subject. To give the students, information about construction and characteristics of Lasers. To make the students aware of the commercial applications of Lasers.

Course Description: This course gives basic theory about generation of a laser beam, its characteristics and Construction of a commercial laser. Also some demonstration and laboratory experiments can give them idea about uses of laser.

Sr. No.	Topic	Details
1	Laser	Brief History
	Laser Action	Three basic process, Population inversion, Condition for light amplification, Gain coefficient, Active medium, metastable states.
2	Pumping schemes	Three level and four level
3	Properties of Laser	Coherent, High Intensity, High Directionality
4	Types of Lasers	Ruby Laser, Diode Laser, Gas Lasers – He-Ne Laser, CO_2 Laser
5	Applications of Lasers	Industrial: welding, cutting, drilling Nuclear Science: laser isotope separation, laser fusion, Medical: eye surgery
6	Experiments	Bending of Laser Beam
		Refraction of Light through glass slab
		Behaviour of laser beam in different media
		Total Internal Reflection of laser beam
		Laser Cutting
		Beam divergence
		Measurement of diameter of a thin wire
		Measurement of wavelength of Laser beam using plane diffraction grating.
		To study the interference of light using optical fibres
		Determination of Angle of prism (Pin and drawing paper)
		Study of Lissajous figures using diode Laser and mirrors

Reference books:

1. An introduction to Lasers - Theory and applications, M.N. Avadhanulu, S. Chand and Co. New Delhi
2. Experiments with He-Ne Laser by Sirohi
3. Optical fibre and Laser - Principle and applications, Anuradha De, New Age International Publishers,

Semester-II

F.Y.B.Sc. (Sem-II) (Physics)
Minor Subject: Astronomy and Astrophysics
Course Code: PHY 12204

Theory (Credits-02) **Lectures: 30**

1: Fundamentals of Astronomy: (6 L)

- Introduction: Components of the Universe; Stars, Planets, Asteroids, Meteors, Comets, Galaxies.
- Solar System: Age, Origin
- Basic measurements: Planetary orbits, distances, physical size, mass, density, temperature, rotation period determination, Co-ordinate system, Celestial hemisphere

2: Astronomical Instruments: (8 L)

- Optical telescopes, mounts
- Light gathering power, Magnification, Resolution.
- Spectroscopes
- CCD camera
- photometer
- filters
- Radio telescopes
- Interferometry (only introduction)

3: Star Systems and basic observations: (8L)

- Neutron stars
- Pulsars, Dwarfs, Supernova
- black holes
- Chandrasekhar limit
- Observation of Sun: Eclipses, Moon, planets, meteor showers.
- High and low tides

4: Galaxies, Dark Matter and Dark Energy (8 L)

- Galaxies, types and their formation
- Hubble's tuning fork diagram
- Open and Globular clusters
- Dark Matter / Energy (evidence for both)

Reference books:

1. Astronomy structure of the Universe. A.E. Roy and D. Clarke, Adam Hilger Publication.
2. Astrophysics - Stars and Galaxies, K.D. Abhyankar, Tata McGraw Hill Publication.
3. Textbook of Astronomy and Astrophysics with elements of cosmology, V.B. Bhatia, Narosa Publication
4. Structure of the Universe, J.V. Narlikar
5. Astrophysics, Baidyanath Basu.
6. Astrophysical Techniques, third Edition, C. R. Kitchin
7. Fundamentals of Astronomy, Michael Seed
8. Telescopes and techniques, C. R. Kitchin (Springer)

SEC: Basics of Electrical Wiring

Course Code: **(2 Cr Practical Course)**

Course Description: This course will emphasize on basic electrical circuits used for domestic purposes. The students will learn about details like the fundamentals of electricity, tools necessary for electrical connections, types of cables, motors and electrical components.
The course contains practical sessions as well as theory sessions. Students should learn theory and complete at least 10 practical sessions.

Learning Outcomes: On completion of this course, the Students should be able to

1. Identify and understand the basic electrical components and circuits.
2. Understand and explain the materials used for switches and electrical circuits.
3. Know how the household wiring is done and what materials are required for household wiring.
4. Get basic knowledge of electrical circuits and accessories.

Unit 1: Wring materials and types of wires **(5 hours)**

1.1 Conducting materials
1.2 Insulating Materials
1.3 Semiconductor Material
1.4 Basic types of wires: Live, Neutral, Earth wire
1.5 Earthing: Purpose, method of earthing (plate and pipe) and selection of earth wire, Rules for earthing
1.6 Single and multi-strand wires
1.7 Types of cables: Ribbon electric, Shielded, Twisted pair, Fiber Optics and Polyvinyl Chloride cable, Data and Power Cables
1.8 Single phase and Three phase supply
1.9 Colour coding of cables

Unit 2: Tools for electrical wiring and wiring devices (5 hours)

2.1 Wire strippers, Screw drivers, Pliers, Electrical Tape, Hacksaws, Wire Cutters, Spanners
2.2 Voltage tester- Multimeter

2.3 Types of switches and sockets

2.4 Fuse, Miniature Circuit Breaker (MCB)

2.5 Safety Measures

Unit 3: Basic Electrical Components and its circuit (10 hours)

3.1 Resistor, Capacitor, Inductor

3.2 Open, Closed, Series and Parallel circuits

3.3 Ohm's law, Conductivity and Resistivity

3.4 Kirchhoff's Current Law and Kirchhoff's Voltage Law

3.5 Circuit Theorems- Thevenin, Norton and Max. Power transfer

3.5 R-L and R-C Network, R-L-C Series & Parallel circuits Network

3.5 Voltage divider circuits

3.6 Work, energy, power- units

3.7 Semiconductor diodes- Rectifiers and Zener as voltage stabilizer

3.8 Energy Units and Energy Calculations

Unit 4: Electromagnetic Induction (10 hours)

4.1 Introduction of electromagnetic induction

4.2 Electric and magnetic flux, Faraday's and Lenz's law

4.3 Self and Mutual induction

4.4 Transformer – Step up and Step down and its construction and working

4.6 AC and DC circuits

4.7 Single phase and Three phase motors (Fan and Water pump)

Reference Books:

1. A textbook of Electrical Technology volume I, basic electrical engineering by B.L Theraja and A.K. Theraja, S. Chand Publications
2. ITI electrician theory I and II: Priti Agarwal and Rahul Garg (Neelkanth publication)
3. Fundamentals of Electrical Engineering and Electronics by B.L. Theraja, S. Chand Publications
4. Circuits & Networks: Analysis & Synthesis, A Sudhakar, and Shyammohan S. Palli, Tata McGraw Hill publication
5. Concepts of Physics by H. C. Verma
6. Basic Electrical Engineering by Dr. K. Balachander , Notion Press

Progressive Education Society's

Modern College of Arts, Science and Commerce Pune 16

(An Autonomous College Affiliated to Savitribai Phule PuneUniversity)

Three Year B.Sc. Degree Program in

Statistics(Faculty of Science &

Technology)

F. Y. B. Sc. Statistics(Major)

Choice Based Credit System Syllabus (Under NEP(2) Structure)

To be implemented from Academic Year 2024-2025

TITLE OF THE PROGRAM:

F. Y. B. Sc. Statistics/ Statistical Techniques

PREAMBLE OF THE SYLLABUS:

Statistics is used even by common man in everyday life knowingly or unknowingly. In these days the knowledge of Statistics is must because a large amount of data are created because of the use of computers, social media etc. For running any type of business efficiently converting the information in the knowledge is getting more and more important. Personnel at different level can use the data with different context. But condensed data or data converted into better form i.e. valuable information enhances the efficiency of such personnel.

Whenever the variation occurs, Statistical techniques help in drawing valuable conclusions from such information. Statistics consist of various methods of collection, organization and drawing inference of data. Whenever the variability occurs Statistics becomes indispensable tool for converting such huge information into knowledge, and hence used in almost all fields.

There is a continuous demand for statisticians in every field – education, industry, software, insurance, clinical trials data and research. The syllabus of the three Year B. Sc. degree course in Statistics is framed in such a way that the students at the end of the course can apply judiciously the statistical tools to a variety of data sets to arrive at some conclusions.

Statistics can be divided into two broad categories, (1) exploratory statistics or descriptive statistics, which is concerned with summarizing data and describing these data, and (2) confirmatory statistics or inferential statistics, which is concerned with making decisions aboutthe population based on the sample.

B. Sc. in Statistics program is of three years duration, with semester pattern for all the three years. A student of three-year B.Sc. degree program will not be allowed to offer Statistics and Statistical Techniques simultaneously in any of the three years of the course. Students offering

At **first year of under-graduation**, students will be given the basic information that includes different methods of data representation and summarization. Correlation and regression are the forecasting tools that are frequently used in statistical analysis. These topics are studied in one of the papers in each semester. Further they are introduced to probability and different discrete probability distributions along with applications in the

other paper. Relevant experiments on these topics will be included in practical course. Further the students are expected start using some statistical software and verify the computations during practical. It is a skill oriented part of the course.

At **second year of under-graduation,** students are expected to study various probability distributions and its applications to real life situations. It is a foundation for further theory. An important branch of Statistics, viz. testing of hypotheses related to mean, variance, proportion, correlation etc. will be introduced. Some topics related to applications of Statistics will be also introduced. Further the students are expected start using some statistical software and verify the computations during practical. It is a skill oriented part of the course.

At **third year of under-graduation**, six theory papers deal with theoretical as well as applied aspect of statistics. Some papers such as distribution theory and parametric inference are core and mathematical in nature. Some papers such as sampling methods and Design of Experiments are core and applied but less mathematical. In Design of Experiments paper, various designs used in agriculture and industry are studied agriculture, clinical trials. Papers of applied nature, like medical statistics, actuarial statistics, time series, and optimization techniques (operations research), statistical quality control. There are some skill oriented courses C programming and R software. There are three practical courses based on core courses. In one of

the practical courses, project component will be introduced to get hands on training or experientiallearning.

Evaluation Scheme:

A. Theory paper:

a) End semester examination (ESE): 30 marks
(At the end of each semester)

b) Continuous Internal Assessment (CIA): 20 marks

Total: **50 marks**

B. **Practical paper:**

a) End semester examination (ESE): **30 mar**
(At the end of each semester)

b) **Continuous Internal Assessment (CIA)**

1. Journal day to day work : 5 Marks
2. Viva based on day to day experiments: 5 Marks
3. Small project in a group: 10 Marks

Total: 30 + 20 Marks

Total : **50 marks**

STRUCTURE OF THE COURSE:

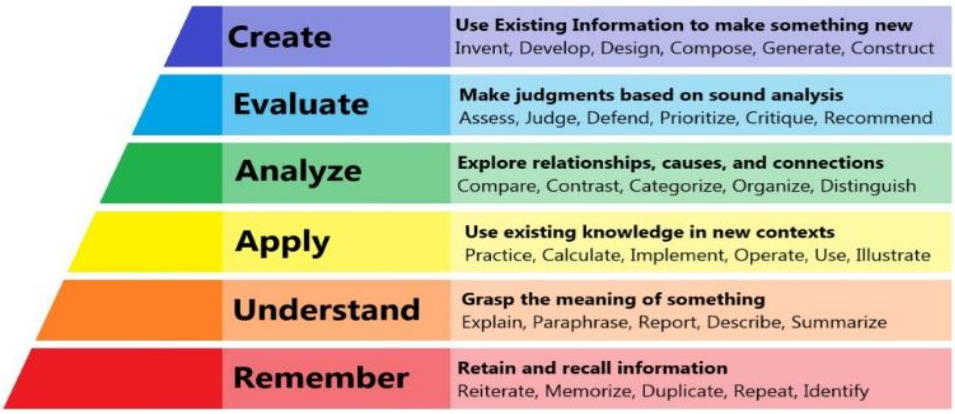
Structure of the course for the first year and the pattern of examination and question papers areas specified below:

Structure of F. Y. B. Sc. Statistics

Level	Sem	Paper Code	Paper	Paper title	No. of credits	Marks		
						CIA	ESE	Total
4.5	I	STA11101	I	Descriptive Statistics	2	20	30	50
		STA11102	II	Practical based on Descriptive statistics (Manual and using MS-Excel)	2	20	30	50
	II	STA12101	I	Discrete Probability and Discrete Probability Distributions	2	20	30	50
		STA12102	II	Practical based on Discrete Probability and Discrete Probability Distributions (Manual and using MS-Excel)	2	20	30	50

Bloom's Taxonomy:

Sr. No.	Particular
B6	Create
B5	Evaluate
B4	Analyze
B3	Apply
B2	Understand
B1	Remember



SEMESTER – I

PAPER -I

STA11101: DESCRIPTIVE STATISTICS

NO. OF CREDITS=02 **NO. OF HOURS = 30**

OBJECTIVE:

The main objective of this course is to acquaint students with some basic concepts in Statistics. They will be introduced to some elementary statistical methods for data analysis. Objective of this course is to acquaint students with bivariate data. They willbe introduced to some methods of analysis of bivariate data.

COURSE OUTCOMES (COS):

At the end of the course student will be able to:

CO1) Students should be able to recall basic concepts like mean, median, mode which they have learned in school and Junior college.

CO2) Students will understand the concept of population and sample, various statistical measures such as measures of central tendency, dispersion, skewness and kurtosis.

CO3) Students will be able to describe the association between interrelated qualitative variables.

CO4) Students will be able to create a survey design and to collect data with proper insights.

COURSE CONTENT:

UNIT 1. INTRODUCTION TO STATISTICS [01HOUR]

- Meaning of Statistics as a Science, Importance of Statistics.
- Scope of Statistics: In the field of Industry, Biological sciences, Medical sciences,Economics, Social Sciences, Management sciences, Agriculture, Insurance, Information technology, Education and Psychology.
- Statistical organizations in India and their functions: CSO, ISI, NSSO, IIPS Devnar,Mumbai, Bureau of Economics and statistics.
- Statistical Heritage (Indian Perspective: i) Dr. V. S. Huzurbazar, ii) Dr. P.C. Mahalnobis iii) Dr. P. V. Sukhatme, iv) Dr. C. R. Rao.

UNIT 2. POPULATION AND SAMPLE [03 HOURS]

- Types of characteristics and their scale:
  - Attributes: Nominal scale, ordinal scale,
  - Variables: discrete and continuous variables, interval scale, ratio scale,
- Types of data:
  - Primary data, Secondary data, Cross-sectional data,
  - time series data, directional data.

- Notion of a statistical population and sample:
  - Finite population, infinite population, homogeneous population and heterogeneous population.
  - Random sample. Methods of sampling (Description only): Simple random sampling with and
  - without replacement(SRSWR and SRSWOR) stratified random sampling, systematic

sampling,
- cluster sampling and two-stage sampling

UNIT 3. SUMMARY STATISTICS: [06 HOURS]

- **Presentation of Data, Interpretation of Data from table and graph, Data validation**
- **Frequency Classification: Raw data and its classification, ungrouped frequency distribution, Sturges' rule, grouped frequency distribution, inclusive and exclusive methods of classification, Open end classes, and relative frequency distribution, cumulative frequency distribution. Histogram and cumulative frequency curves.**
- **MEASURES OF CENTRAL TENDENCY:**
  - **Concept of central tendency, characteristics of a good statistical average. (Mathematical Measures: A. M., G.M.,H.M. Positinal Measures: Median, Mode, Percentiles)(Definition, Properties, Merits, Demerits)**
- **MEASURES OF DISPERSION:**
  - **Concept of dispersion, characteristics of good measure of dispersion. (Mathematical Measures: Mean deviation, variance, standard deviaition, Positional Measures: Range, Semi-Range, Semi-interquartile range, Relative Measures: Coefficient of range, coefficient of variation)(Definition, Properties, Merits, Demerits)**

UNIT 4. MOMENTS, SKEWNESS AND KURTOSIS: [04 HOURS]

- **MOMENTS:**
  - **Raw moments (m'_r), Central moments (m_r)for ungrouped and grouped data, Effect of change of origin and scale. Relations between central moments and raw moments, up to 4-th order.**
- **SKEWNESS AND ITS MEASURES:**
  - **Concept of symmetry/skewness, types of skewness,**
  - **Karl Pearson's. Bowley's, Pearsonian measure of skewness**
- **KURTOSIS AND ITS MEASURES**
  - **Concepts of kurtosis, types of kurtosis**
  - **Pearsonian measures of kurtosis**

UNIT 5: CORRELATION: [07 HOURS]

- Concept of bivariate data
- Scatter diagram and interpretation, correlogram.
- Concept of correlation between two variables, types of correlation
- Measrures of correlation: Covariance between two variables (m_{11}): Pearson's correlation coefficient, Spearman's correlation coefficient,
- PropertiesDefinition, computation, effect of changeof origin and scale.

UNIT 6: FITTING OF LINE (REGRESSION LINE): [05 HOURS]

- **Concept of dependent and independent variables.**
- **Identification of response and predictor variables and relation between them.**
- **Meaning of regression, connection between correlation and regression,**
- **Simple linear regression model: $Y=a+bX+\in$ .Fitting of line Y= a + bX. Estimation of 'a'**

and 'b' using least square method and interpretation of 'b' as regression coefficient. Explained and unexplained variation, coefficient of determination, standard error of an estimate of line of regression, relation betweenregression coefficients and correlation coefficient. Residual plots and its interpretation.

UNIT 7 : CURVE FITTING: [04 HOURS]

- Necessity and importance of drawing curves Fitting of second degree curve $Y = a + b X + cX^2$,
- Fitting of exponential curves of the type $Y = a\, b^X$ and $Y = aX^b$.

(In all these curves constants a, b, c are found out by the method of least squares.(Justification via determinant of matrix of second derivative/second derivative test).

RECOMMENDED BOOKS:

Sr. No.	Title of the book	Name of Author	Publication
1	Programmed Statistics	Agarwal B. L.	Second Edition, New Age International Publishers, New Delhi.(2003)
2	Glimpses of India's Statistics Heritage	Ghosh, J. K., Mitra, S. K., Parthsarthi, K. R. Vol.1,(1993)Sixth Revised Edition	Wiley publishing Co.
3	Fundamentals of Statistics	Goon, A. M., Gupta M. K. and Dasgupta, B .(1983).	The World Press Pvt. Ltd. Calcutta.
4	Fundamentals of Mathematical Statistics	Gupta, S. C. and Kapoor, V. K.(1983) Eighth Edition	, Sultan Chand and Sons Publishers, New Delhi
5	Fundamentals of Applied Statistics	Gupta, S. C. and Kapoor, V. K.(1997) Third Edition	Sultan Chand and Sons Publishers, NewDelhi
6	Introductory Statistics	Neil A. Weiss(2016) Tenth Edition,	Pearson.
7	Statistics Made it Simple: Do it yourself on PC	Sarma, K. V. S.(2001)	Prentce Hall of India, New Delhi
8	Statistical Methods	Snedecor G.W.and Cochran W. G (1989) Eighth Ed.	East WestPress.
9	Probability and Statistics for Engineers and Scientists	Raymond Myers and Ronald E. Walpole (2007)	Pearson Education

SEMESTER – I
PAPER -II
STA11102: Practical based on Descriptive statistics (Manual and using MS-Excel)

PRE-REQUISITES: Knowledge of the topics in theory paper I.

At the end of this course students will be able to:

CO1) Use the various graphical and diagrammatic techniques and their interpretation.

CO2) Analyze and interpret the data.

CO3) Compute various measures of central tendency, dispersion, skewness and kurtosis.

CO4) Summarize and analyze the data using use different functions available in MS-Excel

Sr. No.	Title of the experiment	No. of Practical
1	Measures of central tendency (Ungrouped data, Grouped data)	1
2	Measures of dispersion (Ungrouped data, Grouped data)	1
3	Measures of skewness and kurtosis (Ungrouped data, Grouped data)	1
4	Scatter diagram, linear correlation coefficient and fitting of regression line	1
5	Fitting of Non-linear regression	1
6	Diagrammatic representation of statistical data: simple and subdivided bar diagrams, multiple bar diagram, percentage bar diagram, piediagram using MS-Excel.	1
7	Graphical representation and interpretation of statistical data: Histogram, frequency curve and ogive curves. Determination of mode and median graphically using Ms-Excel and manually.	1
8	Use of random number tables to draw SRSWOR, SRSWR, stratified sample and systematic sample using MS-Excel and manually.	1
9	Computation of measures of central tendency and dispersion (ungrouped data and grouped data)using Ms-Excel.	1
10	Measures of skewness and kurtosis, Box plot using Ms-Excel.	1
	Total	**10**

SEMESTER – II

STA12101: Discrete Probability and Discrete Probability Distributions

No. of Credits=02 No. of hours = 30

Objectives:

The main objective of this course is to introduce to the students the basic concepts of probability, axiomatic theory of probability, concept of random variable, probability distribution (univariate and bivariate) discrete random variables, expectation and moments of probability distributionThe objective of this course is to introduce to the students some discrete Distributionsand its application in real life..

Course Outcomes (COs):

CO1) Students can recall basic concepts of Probability.
CO2) Students will understand the concept of probability distribution of random variable (oneor two dimensional) in the given situation.
CO3) Students will be able to distinguish between random and non-random experiments.
CO4) They will learn various Discrete Probability Distributions and will apply standard discrete probability distribution to different situations.

Course Content:

UNIT 1: BASICS OF PROBABILITY [04 HOURS]

- Experiments/Models, classification of experiment as deterministic and non-deterministic/random experiment.
- Concept of statistical regularity.
- Definitions of - Sample space, event, elementary event, complement of an event, certainevent, impossible event
- Types of sample space: finite sample space, countably infinite sample space, equi-probableand non-equiprobable sample space
- Concept of occurrence of an event.
- Algebra of events and its representation in set theory notation. Occurrence of followingevents.
- at least one of the given events, none of the given events,all of the given events,
- mutually exclusive events,mutually exhaustive events,
- exactly one event out of the given events.
- Classical definition of probability and its limitations.
- Probability model, probability of an event.
- Axiomatic definition of probability.
- Theorems and results on probability with proofs based on axiomatic definition such as
  (i) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.
  (ii)Generalization $P(A \cup B \cup C)$
  (iii) $0 \leq P(A) \leq 1$
  (iv) $P(A) + P(A') = 1$
  (v) $P(\Phi) = 0$
  (vi) $P(A) \leq P(B)$ when $A \subset B$

(vii) Boole's inequality.

UNIT 2: CONDITIONAL PROBABILITY AND BAYES' THEOREM [04 HOURS]

- Definition of conditional probability of an event. Results on conditional probability.
- Definition of independence of two events $P(A \cap B) = P(A) \cdot P(B)$
  - (i) Pairwise independence
  - (ii) Mutual independence for three events
- Multiplication theorem
- $P(A \cap B) = P(A) \cdot P(B|A)$.
- Generalization to $P(A \cap B \cap C)$.
- Partition of the sample space, prior and posterior probabilities. Proof of Bayes' theorem. Applications of Bayes' theorem in real life. True positive, false positive and sensitivity of test as application of Bayes' theorem.

UNIT 3: UNI-VARIATE PROBABILITY DISTRIBUTIONS (DEFINED ON DISCRETE SAMPLE SPACE) [04 HOURS]

- Concept and definition of a discrete random variable.
- Probability mass function (p. m. f.)
- Cumulative distribution function (c. d. f.), $F(\cdot)$ of discrete random variable, properties of
- c. d. f.
- Mode and median of a univariate discrete probability distribution.
- Definition of expectation (Mean) of a random variable, expectation of a function of a random variable, m. g. f. and c. g. f. Properties of m. g. f. and c. g. f.
- Definitions of variance, standard deviation (s. d.) and Coefficient of variation (C.V.) of univariate probability distribution, effect of change of origin and scale on mean, varianceand s. d.
- Definition of raw, central and factorial raw moments of univariate probability distributionsand their interrelations (without proof).
- Coefficients of skew-ness and kurtosis based on moments.

UNIT 4: SOME STANDARD DISCRETE PROBABILITY DISTRIBUTIONS (WITH FINITE VARIABLE RANGE) [07 HOURS]

- Degenerate distribution (one point distribution): $P(X=c) = 1$, mean and variance.
- Uniform discrete distribution on integers 1 to n: p. m. f., c. d. f., mean, variance, real life situations, comments on mode and median.
- Bernoulli distribution: p. m. f., mean, variance.
- Binomial Distribution: p. m. f., Notation: $X \sim B(n, p)$.
- Recurrence relation for successive probabilities, computation of probabilities of different events, mode of the distribution, mean, variance, m.g.f. and c.g.f. moments, skewness (comments when $p = 0.5$, $p > 0.5$, $p < 0.5$). Situations where this distribution is applicable. Additive property for binomial distribution. Conditional distribution of Xgiven (X+Y) for binomial distribution.

- Hypergeometric distribution:

Necessity and importance of Hyper-geometric distribution, capture- recapture method, p. m. f., Notation: X ~ H (N, M, n).

Computation of probability, situations where this distribution is applicable, binomial approximation to hyper-geometric probabilities, statement of mean and variance of the distribution (Derivation is not expected).

UNIT 5: SOME STANDARD DISCRETE PROBABILITY DISTRIBUTIONS (WITH COUNTABLE VARIABLE RANGE) [05 HOURS]

- Poisson distribution: p. m. f. of the distribution. Notation: X ~ P (m). Mean, variance, m. g. f. , and c. g. applicable. Additive property for Poisson distribution.
Conditional distribution of X given (X+Y).
- Geometric distribution : p. m. f. of the distribution with support (0, 1, 2…) and with support (1, 2…) Notation: X ~G (p), Mean, variance, m. g. f. and c. g. f., Situations where this distribution is applicable. Lack of memory property.
- Negative binomial distribution : p. m. f. of the distribution with support (0, 1, 2…) Notation: X ~NB (k,p), Mean, variance, m. g. f. and c. g. f., Situations where this distribution is applicable.

UNIT 6: BIVARIATE DISCRETE PROBABILITY DISTRIBUTION: [06 HOURS]

- Definition of two-dimensional discrete random variable, joint p. m. f. distribution function andtheir properties.
- **C**oncept of identically distributed r. v s.
- Computation of probabilities of events in bivariate probability distribution.
- Concepts of marginal and conditional probability distributions.
- Independence of two discrete random variables based on joint and marginal p. m. f.
- Definition of raw (μ'_r) and central moments (μ_r), m. g. f., c. g. f.
- Theorems on expectations of sum and product of two jointly distributed random variables.
- Conditional expectation, conditional variance
- Definition of covariance, coefficient of correlation, independence and uncorrelatedness of two variables.
- Expectation and Variance of linear combination of variables: aX +bY+ c.

RECOMMENDED BOOKS:

Sr. No.	Title of the book	Name of Author	Publication
1	Programmed Statistics	Agarwal B. L. (2003), secondedition	New Age InternationalPublishers, New Delhi
2	Fundamentals of MathematicalStatistics	Gupta, S.C. andKapoor, V. K. (1983), Eighth Edition	Sultan Chand and SonsPublishers, New Delhi.
3	Introduction to MathematicalStatistics	Hoel P. G. (1971)	John Wiley and Sons,New York
4	Introduction to MathematicalStatistics	Hogg, R. V. and Craig R.G. (1989).	MacMillan publishing Co.,New York.
5	Introductory Probability and Statistical Applications	Mayer, P. (1972)	Addison Wesley Publishing Co., London
6	Introduction to the Theory ofStatistics,	Mood, A. M. and Graybill, F. A. andBoes D.C. (1974), Ed 3	McGraw Hill BookCompany.
7	A First Course in Probability	Ross S. (2002)., Sixth Edition	Pearson Education, Inc.& Dorling Kindersley Publishing, Inc.

Reference Websites:

1. www.stats.unipune.ac.in (100 Data sets for Statistics Education by Dr. Anil P. Gore,Dr. Mrs. S. A. Paranjape and Madhav B. Kulkarni available in ISPS folder).
2. www.freestatistics.tk(National Statistical Agencies)
3. www.psychstat.smsu.edu/sbk00.htm(Onlinebook)
4. www.bmj.bmjournals.com/collections/statsbk/index.shtml
5. www.statweb.calpoly.edu/bchance/stat-stuff.html
6. www.amstat.org/publications/jse/jse-data-archive.html(International journal onteaching and learning of statistics)
7. www.amstat.org/publications/chance(Chancemagazine)
8. www.statsci.org/datasets.html(Datasets)
9. www.math.uah.edu/stat(Virtual laboratories in Statistics)
10. www.amstat.org/publications/stats(STATS : the magazine for students of Statistics)
11. www.stat.ucla.edu/cases(Case studies in Statistics).
12. www.statsoft.com
13. www.statistics.com
14. www.indiastat.com
15. www.unstat.un.org
16. www.stat.stanford.edu
17. www.statpages.net
18. www.wto.org
19. www.censusindia.gov.in
20. www.mospi.nic.in
21. www.statisticsofindia.in

SEMESTER – II

PAPER -II

STA12102:PRACTICAL BASED ON DISCRETE PROBABILITY DISTRIBUTIONS (MANUAL AND USING MS EXCEL)

NO. OF CREDITS=02 **NO. OF HOURS = 30**

PRE-REQUISITES: Knowledge of the topics in theory paper I

At the end of this course students will be able:

CO1) to use R software

CO2) to compute probabilities of univariate and bivariate distributions.

CO3) to fit different discrete distributions.

CO4) to draw random samples from different discrete distributions.

Sr. No.	Title of the Practical	No. of Practicals
1	Introduction to R: 1. c function, scan 2. data Frame, edit () 3. Matrix form 4.importing data file, accessing the data from R library 5.seq() , rep() functions 6.subset and transform	1
2	Representation of data using R commands: 1. Diagrams (Simple, multiple, subdivided bar diagram,pie chart) 2. Graphs (Histogram, ogive curves, boxplot diagram)	1
3.	Calculations of measures of 1. Central tendency 2. Dispersion 3. Skewness 4. Kurtosis for raw data. 5.Basic commands (summary(), fivenum(), length())	1
4.	Calculations using R of : 1. Probabilities 2. Quantiles	1

5	Fitting of binomial distribution and computation of expected frequencies and testing the goodness of fit (Manual and R)	1
6.	Fitting of Poisson distribution and computation of expected frequencies and testing the goodness of fit(Manual and R)	1
7	Fitting of negative binomial and distribution and computation of expected frequencies and testing the goodness of fit (Manual and R).	1
8	Model sampling from binomial and poisson distribution (Manual)	1
9	Model sampling from different discrete distributions (using R)	1
10	Fitting of regression lines and forecasting (using R)	1
Total		10

Notes:

1. For project, a group of maximum 8 students will be allowed.
2. All the students in a group should be given equal marks for project.
3. Different data sets from newspapers, internet, and magazines may be collected and students will be asked to use Statistical techniques/tools which they have learnt.
4. Students must produce at the time of practical examination, the laboratory journal alongwith the completion certificate signed by the Head of the Department.

Progressive Education Society's

Modern College Of Arts, Science and Commerce, Ganeshkhind, Pune – 411 016

(Autonomous)

Syllabus for

F. Y. B.S.c

Introduction:

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honours) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages.

Programme Objectives:

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion

9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

Eligibility:

1 First Year B.Sc. : A student who has passed the Higher Secondary School Certificate (10+2) Science stream with Biology or its equivalent examination as per the University of Pune eligibility norms.

2 Second Year B.Sc. : Keeping terms of First Year of B. Sc. with zoology as one of the subjects. Other students if they fulfill the conditions approved by the equivalence committee of Faculty of Science of the University of Pune are also eligible.

3 Third Year B.Sc.: Student shall pass all First Year B. Sc. courses and satisfactorily keeping terms of Second Year of B. Sc. with zoology as one of the subjects.

Subject List

FYBsc Zoology Sem I

Course Type	Sr. No.	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
Mandatory Major	1	Systematics and Diversity of life- Non-Chordates (2C) (T)	ZOO11101	2C	20	30		**50**
Mandatory Major	2	Fundamentals of Cytology and Genetics (2C) (T)	ZOO11102	2C	20	30		**50**
Mandatory Major	**3**	Zoology Major Practical 1 (2C) (P)	ZOO11103	2C	20	30	**50**	
Open Elective	**4**	Bioeconomics (2C) (T)	ZOO11301	2C	20	30		**50**
Open Elective	**5**	Public Health and hygiene (2C) (T)	ZOO11302	2C	20	30		**50**
VSC	**6**	Ornamental Fishery (2C) (T)	ZOO11401	2C	20	30		**50**
IKS	**7**	Indian Natural History- Animal Kingdom (2C) (T)	ZOO11503	2C				

FYBsc Zoology Sem II

Course Type	Sr. No.	Course (Subject) Title	Course (Subject) code	Credits	Weightage for Internal Marks	Weightage For External Marks	Weightage for practical	Total Marks
Mandatory Major	1	Systematics and Diversity of life-Chordates (2C) (T)	ZOO12101	2C	20	30		**50**
Mandatory Major	2	Animal Behaviour (2C) (T)	ZOO12102	2C	20	30		**50**
Mandatory Major	**3**	Zoology Major Practical 2 (2C) (P)	ZOO12103	2C	20	30	**50**	
Open Elective	**4**	Food and Healthy lifestyle	ZOO12301	2C				
Open Elective	**5**	-						
VSC	**6**	Biofloc technology (2C) (T)	ZOO12401	2C	20	30		**50**
IKS								

Credit Allocation: - CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses, SEC-Skill Enhancement Courses.

Total - Credits for First years Programme.

F.Y.B.S.C Zoology Semester I

Course Code: ZOO11101

Subject Name: **Systematics and Diversity of Life-Non Chordates**

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

CO1: To understand the diversity of life.

CO2: To understand the various life forms of non-chordates.

CO3: Students will be able to explain the representative members of phylum of Non-chordates.

CO4: Students will be able to explain economic importance of non-chordates.

Unit	Topic	No of lectures
1	**Chapter 1:- Principles of Classification:** Taxonomy & Systematics 1.1 Taxonomy : Basic terminology and Introduction • Alpha, Beta and Gamma levels of taxonomy, Microtaxonomy • Macro taxonomy: Phenetics (numerical taxonomy, Cladistics (Phylogenetic systematics), Evolutionary taxonomy (evolutionary systematics) • Classical taxonomy and experimental or neo taxonomy (biochemical taxonomy and Cytotaxonomy) • Significance of Taxonomy 1.2. Systematics: Definition and introduction 1.3. Linnaean system of classification (Six levels of classification: Phylum, class, order, family, genus, species) 1.4. Concept of Species: Biological & Evolutionary 1.5. Nomenclature: Introduction to Binomial, Trinomial Nomenclature and rules of Zoological nomenclature.	06
2	**Chapter 2 :- Introduction to Five Kingdom System** 2**.1** Introduction to Five Kingdom System 2.2. General characters of Kingdom Animalia 2.3 Classification- Protozoa and Metazoa	04
3	**Chapter 3 :- Kingdom Protista (Phylum: Protozoa)** 3.1. Salient features of Phylum Protozoa 3.2. Classification of Phylum Protozoa up to classes with one examples of each class • Class Rhizopoda • Class Mastigophora	02

	• Class Ciliata • Class Sporozoa 3.4. Locomotion in Protozoa: Amoeboid, Ciliary and Flagellar with examples 3.5 Economic importance of Protozoa – Harmful and Useful.	
4	**Chapter 4 :- Phylum Porifera** 4.1 Salient features of Phylum Porifera. 4.2 Classification of Phylum Porifera up to classes with anyOne examples of each class • Class Calcarea • Class Hexactinellida • Class Demospongiae 4.3 Canal system in sponges: Ascon, Sycon, Leucon and Rhagon type. 4.4 Regeneration in sponges. 4.5 Economic importance of Phylum Porifera.	02
5	**Chapter 5 :- Phylum: Cnidaria** 5.1 Salient features of Phylum Cnidaria 5.2 Classification of Phylum Cnidaria up to class level with any onegiven examples each class • Class Hydrozoa • Class Scyphozoa • Class Anthozoa 5.3 Polymorphism in Hydrozoa 5.4 Regeneration *Hydra* 5.5 Economic importance of Cnidarians	02
6	**Chapter 6 :- Phylum Platyhelminthes** 6.1 Salient features of Phylum Platyhelminthes 6.2 Classification of Phylum Platyhelminthes up to classesWith one examples of each class • Class: Turbellaria • Class: Trematoda • Class Cestoda: 6.3 Parasitic adaptations in Platyhelminthes 6.4 Medical importance of Platyhelminthes	02
7	**Chapter 7 :- Phylum Aschelminthes** 7.1 Salient features of Phylum Aschelminthes 7.2 Classification of Phylum Aschelminthes with any one exampleof each class. 7.3 Economic importance of Aschelminthes	02
8	**Chapter 8 :- Phylum Annelida** 8.1 Salient features of Phylum Annelida. 8.2 Classification of Phylum Annelida up to classes with any one example of each class Class Polychaeta	02

	• Class Oligochaeta • Class Hirudinea 8.3 Economic importance of Annelida	
	Chapter 9:- Phylum Arthropoda 9.1 Salient features of Phylum Arthropoda 9.2 Classification of Phylum Arthropoda with any one exampleof each class • Class: Crustacea • Class: Chilopoda • Class: Diplopoda • Class Insecta • Class: Arachnida 9.3 Economic importance of Arthropoda	03
	Chapter-10 Phylum Mollusca 10.1Salient features of Phylum Mollusca 10.2Classification of Phylum Mollusca with any one example of each class. • Class Gastropoda • Class Pelecypoda • Class Polyplacophora • Class: Cephalopoda 10.3 Economic importance of Mollusca.	03
	Chapter:- 11 Phylum Echinodermata 11.1Salient features of Phylum Echinodermata. 11.2Classification of Phylum Echinodermata with any one example from each class • Class Asteroidea • Class: Holothuroidea. • Class: Echinoidea • Class: Crinoidea 11.3 Pedicillaria in Echinodermata: straight, crossed, valvate, tridactylous, globigerous. 11.4 Economic importance of Echinodermata	02

Reference Books:

1. Barnes, R. S. K.; Calow, P.; Olive, P. J. W.; Golding, D. W.; Spicer, J. I. (2002) The Invertebrates: a Synthesis, Blackwell Publishing.
2. Hickman, C.; Roberts, L.S.; Keen, S.L.; Larson, A. and Eisenhour, D. (2018) Animal Diversity, McGraw-Hill.
3. Holland, P. (2011) The Animal Kingdom: A Very Short Introduction, Oxford University Press.
4. Kardong, K.V. (2006) Vertebrates: Comparative Anatomy, Function, Evolution (4th edition), McGraw- Hill.
5. Barrington, E.J.W. (1979) Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
6. Boradale, L.A. and Potts, E.A. (1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.

7. Bushbaum, R. (1964) Animals without Backbones. University of Chicago Press.

Course Code: ZOO11102

Subject Name: Fundamentals of Cytology and Genetics (T)

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an
4. Organism and also reproduces to form a new organism.
5. How a cell communicates with its neighboring cells?
6. The principles of inheritance, Mendel‘s laws and the deviations.
7. How environment plays an important role by interacting with genetic factors.
8. Detect chromosomal aberrations in humans and study of pedigree analysis

Unit	Topic	No of lectures
1	**Chapter 1:- Plasma Membrane:** • Structure of plasma membrane: Fluid mosaic model. • Transport across membranes: Active and Passive transport, Facilitated transport, exocytosis, endocytosis, phagocytosis – vesicles and their importance in transport. • functions of Cell membrane in brief • To study the Human blood group system (ABO and Rh)	03
2	**Chapter 2:- Cell as Basic unit of Life** • Introduction to Prokaryotic and Eukaryotic cells. • Structure of Prokaryotic (E. coli) Structure Eukaryotic cells (Animal and Plant cell)z of bleeding time and clotting time.	03
3	**Chapter** 3:- **Structure and Function of Cell Organelles II in Animal Cell** • Cytoskeleton: microtubules, microfilaments, intermediate filaments • Mitochondria: Structure, oxidative phosphorylation; electron transport system. Endoplasmic reticulum: Structure, and function. • Peroxisome and Ribosome: structure and function	03

4	**Chapter 4 :- Nucleus: Structure and function** • Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleoplasm, Nucleolus • Chromatin: Eu-chromatin and Hetro-chromatin, nature and differences. • Functions of nucleus	05
5	**Chapter 5 :- Cell cycle, Cell Division and Cell Signaling** • Cell division: mitosis and meiosis • Introduction to Cell cycle and its regulation, apoptosis • Signal transduction: intracellular signaling and cell surface receptors,via G-protein linked receptors. • Cell-cell interaction: -autocrine, paracrine and endocrine types.	05
6	**Chapter 6 :- Mendelism and Sex Determination** • Basic principles of heredity: Mendel ‘s laws- monohybrid cross and dihybrid cross • Incomplete Dominance • Genetic Sex-Determining Systems, Environmental Sex Determination, • Chromosomal Sex Determination and mechanism in *Drosophila melanogaster.* • Sex-linked characteristics in humans and dosage compensation.	05
7	**Chapter 7 :- Human Chromosomes and Patterns of Inheritance** • Patterns of inheritance: autosomal dominance, autosomal recessive,X-linked recessive, X-linked dominant. • Chromosomal anomalies: Structural and numerical aberrations with examples. • Human karyotyping and Pedigree analysis.	04
8	**Chapter 8 :- Importance of cytology and Genetics and its industrial applications.**	02

Reference Books:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt‘s Essential Immunology, 13th Edition. Wiley Blackwell (2017).
9. Principles of Genetics by B. D. Singh
10. Cell-Biology by C. B. Pawar, Kalyani Publications
11. Economic Zoology by Shukla and Upadhyaya

Course Code: ZOO111023
Subject Name: Zoology Practical Paper 1 (P)

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

1. Students will understand diversity of life forms.
2. Students will identify various representative members of each phylum.
3. Students will learn to use taxonomic key for identification.
4. Students will be able to perform prepare blood smear slides and observe blood cells.
5. Students will understand mitosis stages of cell division.
6. Student will understand karyotyping and related disorders.

Unit	Topic	No of practical
1	Museum Study of phylum Protozoa: *Euglena, Paramecium, Amoeba, Plasmodium* sp. Museum study of Phylum Porifera: *Sycon, Euplectella, Chalina,* Spongilla.	1P
2	Museum study of phylum Cnidaria: *Hydra, Physalia, Aurelia, Metridium*. Museum Study of phylum Platyhelminthes: *Planaria, Faciola hepatica, Taeniasolium*	1P
3	• Identification of any three museum specimen with help of taxonomic identificationkey.	1P
4	• Museum study of Phylum Aschelminthes: *Ascaris lumbricoides*, Museum study of phylum Annelida: *Neries*, Earthworm, Leech.	1P
5	Museum study of phylum Arthropoda: Prawn, Cockroach, Centipede, Millipede,Crab • Museum study of phylum Mollusca: *Pila*, *Chiton*, Bivalve, Octopus.	1P
6	Museum study of phylum Echinodermata: Sea Star, Sea urchin,Brittle Star, sea cucumber. • Identification of any three museum specimen with help of taxonomic identificationkey.	1P

7	Identification of any three museum specimen with help of taxonomic identification key.	1P
8	Study of Microscope: Simple and Compound electron microscope	1P
9	Micrometry: Measurement of microscopic objects	1P
10	Preparation of temporary mount of human buccal epithelial cells	1P
11	Preparation of blood smears to observe the blood cells	1P
12	Temporary preparation of mitotic cell from onion roots	1P
13	Detection of Mitochondria by Janus Green B	1P
14	Preparation of human karyotype and study the chromosomal structural and numericalaberrations from the pictures provided. (Virtual/optional	1P
15	Visit to Zoological survey of India/ Museum/National Park. Visit to NCCS/IISER/SPPU for study of Cytotechniques.	1P

Course Code: ZOO11301
Subject Name: **Bioeconomics**

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

1. Gain knowledge about silkworms rearing and their products.
2. Gain knowledge in Bee keeping equipment and apiary management.
3. Acquaint knowledge on dairy animal management, the breeds and diseases of cattle and learn the testing of egg and milk quality.
4. Acquaint knowledge about the culture techniques of fish and poultry.
5. Acquaint the knowledge about basic procedure and methodology of Vermiculture.
6. Learn various concepts of lac cultivation.
7. Students can start their own business i.e. self-employments.
8. Get employment in different applied sectors

Unit	Topic	No of lectures
1	**Chapter 1:- Sericulture:** • History and present status of sericulture in India • Mulberry and non-mulberry species in Karnataka and India.	07

	• Mulberry cultivation • Morphology and life cycle of *Bombyx mori* • Silkworm rearing techniques: Processing of cocoon, reeling • Silkworm diseases-pests and their control	
2	**Chapter 2:-** Introduction and present status of apiculture • Species of honey bees in India, life cycle of *Apis indica* • Colony organization, division of labour and communication • Bee keeping as an agro based industry; methods and equipments: indigenous methods, extraction appliances, extraction of honey from the comb and processing • Bee pasturage, honey and bees wax and their uses Pests and diseases of bees and their management	07
3	**Chapter** 3:- **Fish culture:** • Common fishes used for culture. • Fishing crafts and gears. • Ornamental fish culture: Fresh water ornamental fishes-biology, breeding techniques • Construction and maintenance of aquarium: Construction of home aquarium, materials used, setting up of freshwater aquaria, aquarium plants, ornamental objects, cleaning the aquarium, maintenance of water quality. Control of snail and algal growth. • Modern techniques of fish seed production	07
4	**Chapter 4 :- Prawn culture:** • Culture of fresh and marine water prawns. • Preparation of farm. • Preservation and processing of prawn, export of prawn	03
5	**Chapter 5 :- Vermiculture:** • Scope of Vermiculture. • Types of earthworms. • Habit categories - epigeic, endogeic and anecic; indigenous and exotic species. • Methodology of vermicomposting: containers for culturing, raw materials required, preparation of bed, environmental pre-requisites, feeding, harvesting and storage of Vermicompost. • Advantages of vermicomposting. Diseases and pests ofearthworms.	03
6	• **Chapter 6 :- Lac Culture** • History of lac and its organization, lac production in India. Lifecycle, host plants and strains of lac insect. • Lac cultivation: Local practice, improved practice, propagationof lac insect, inoculation period, harvesting of lac. • Lac composition, processing, products, uses and their pests	03

Reference Books:

1. Eikichi, H. (1999). Silkworm Breeding (Translated from Japanese). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

2. Ganga, G. (2003). Comprehensive Sericulture Vol-II: Silkworm Rearing and Silk Reeling.
3. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Mahadevappa, D., Halliyal, V.G., Shankar, D.G. and Bhandiwad, R., (2000). Mulberry Silk
5. Reeling Technology Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Roger, M (1990). The ABC and Xyz of Bee Culture: An Encyclopedia of Beekeeping, Kindle Edition.
7. Shukla and Upadhyaya (2002). Economic Zoology, Rastogi Publishers
8. YadavManju (2003). Economic Zoology, Discovery Publishing House.
9. JabdePradip V (2005). Textbook of applied Zoology, Discovery Publishing House, New Delhi.
10. Cherian &Ramachandran Bee keeping in-South Indian Govt. Press, Madras.

Course Code: ZOO11302
Subject Name: **Public Health and hygiene**

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

- To learn the principles of nutrition and dietetics
- To understand the ill effects of modern lifestyle
- To understand and apply the emerging concepts and issues to health, hygiene and sanitation
- To critically understand the present scenario of health hygiene
- To apply and design hygiene promotion and education programmes for development.

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to Health and Hygiene** 1.1: Definition of Health, the need for health education and health goal. 1.2: Physical, psychological and Social health issues. 1.3: WHO and its programmes	04
2	**Chapter 2:- Introduction to Sanitation and Hygiene for Health** 2.1 Definitions and Concepts 2.2 Global, national and regional perspective 2.3 Relation between health , hygiene &sanitation 2.4 Relevance & importance of health, hygiene in the contemporarytimes	05

3	**Chapter** 3:- **Health Hazards:** 3.1 Health dynamicity – definition, factors influencing health, health as a medium ofsocio-economic development. **3.2** Diseases – Common food borne and water borne diseases (gastroenteritis,jaundice, cholera, salmonellosis, travellers' diarrhoea and *Escherichia coli* infection,typhoid) – mode of transmission, causative agents, symptoms, prevention andcontrol. Sexually transmitted infections– AIDS, genital herpes, hepatitis B, syphilis,gonorrhoea – causative agents, symptoms,modes of transmission and prevention. Dengue, chikunguniya, rat fever (general methods of mosquito control and the needto prevent mosquito breeding in and around our homes).	10
4	**Chapter 4 :- Occupational Health and Hygiene** 4.1 Concept, definition and its role 4.2 Link between occupational hygiene, risk assessment & riskmanagement. 4.3 Sanitation problems of the workplace: industries,academic institutions, corporate, hospitals, Public spaces etc.	06
5	**Chapter 5 :- Health HygienePromotion & Education:** 5.1 Hygiene Behavior promotion & education- conceptand its importance 5.2 Hygiene promotion & education in children &adolescence. 5.3 Government initiatives & policies in rural & urbanarea	03

Reference Books:

- Jatin V. Modi and Renjith S. Chawan. Essentials of Public Health and Sanitation –Part I- IV
- Murray, C. J. L. and A.D. Lopez. (1996). The Global Burden Of Disease.World Health Organization.
- Park, J.E. and Park, K. Textbook of Community Health for Nurses.
  Swaminathan S. Principles of Nutrition and Dietetics.
- A. Jiménez et al. infrastructure function and hygiene. Journal of Epidemiology and Community Health, 65, 432– 437. doi:10.1136/jech.2009.091637
- Bailie, R. S. *et al.* (2011). Evaluation of an Australian indigenous housing programme: Community level impact on crowding, 288
- Collard, K. S. *et at.* (2005). Mutual"obligation in indigenous health: Can shared responsibility agreements be truly mutual? Medical Journal of Australia, 182, 502–504
- Craps, M., Dewulf, A., Mancero, M., Santos, E., & Bouwen, R. (2004). Constructing common ground and re-creating differences between professional and indigenous communities in the Andes. Journal of Community and Applied Social Psychology, 14, 378–393. doi:10.1002/casp.796

Course Code: ZOO11401
Subject Name: **Ornamental Fishery**

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

- To give practical knowledge to set up an aquarium.
- To learn to handle different aquarium equipments.
- To have knowledge about the Decorations of aquarium
- To familiarize the students with the Breeding of Aquarium Fishes.
- To equip the students about various techniques of ornamental fish breeding, rearing
- and its marketing.

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to Aquaculture and Ornamental Fishes Trading.** 1.1 Present global and national scenario. 1.2 Different varieties of exotic and indigenous fishes. 1.3 Nutritional Value of Fish 1.4 Scope of Aquarium Fish Industry as a Cottage Industry and its rules and regulations.	04
2	**Chapter 2:- Physio-chemical properties of water** 2.1 Acidity, Alkalinity, Calcium, Nitrates, Ammonia, Total hardness	04
3	**Chapter 3:- Introduction to Ornamental fishes** 3.1 Introduction to aquarium and aquarium accessories. 3.2 Basic knowledge on types of ornamental fishes in world	04
4	**Chapter 4 :- Engineering Aspect and construction of aquarium** 4.1 Design and construction of public fresh water and marine aquaria and oceanarium. 4.2 Aerators, filters and lighting. 4.3 Maintenance of Aquarium	06
5	**Chapter 5 :- Fish Transportation and Preservation** 5.1 Fish Packing 5.2 Causes of Mortality in transportation 5.3 Fish diseases	06

	5.4 Fish Preservation and its Processing and Techniques	
6	**Chapter 6:- Fish Breeding-** 6.1 Fish Breeding and rearing in Live Bearers- Breeding of ornamental fish with reference to live bearer species- Breeding of ornamental fish with reference to selected egg layer species 6.2 Fish Breeding and rearing in Egg layers	06

Reference Books:

1. Hawlins, A.D. (Ed). Aquarium Systems. Academic Press.
2. Hunnam, P. Ward Lock, Living Aquarium.
3. Ratjak, K. and Zukal, R., Aquarium Fishes and Plants.
4. Dick Mills, 1987. Illustrated Guide to Aquarium Fishes. Published by Galley and Price, an imprint of W.H. Smith and Sons Limited, England.
5. Dick Mills and Gwynne Vevere. Tropical Aquarium Fishes. Published by Salamander Books Limited. London.
6. Carcacson, R.H. A field guide to the Coral Reef Fishes of the Indian and West Pacific Oceans.
7. Guy N. Smith. Profitable Fish Keeping.
8. Maurice Melzak. Marine Aquarium Manual. B.T. Balsford Ltd., London.
9. Ornamental aquarium fishes of India- 1999- K.L.Tekrival and A.A. Rao.- TFH United Kingdom.

F.Y.B.Sc Zoology Semester II

Course Code: ZO12101

Subject Name: Systematics and Diversity of life-chordates (T)

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

1. The students will be able to understand, classify and identify the diversity of higher vertebrates.

2. The students will able to understand the complexity of higher vertebrates

3. The students will be able to understand different life functions of higher vertebrates.

4. The students will be able to understand the linkage among different groups of higher vertebrates.

5. The student will become aware regarding his role and responsibility towards nature as a protector, to understand his role as a trustee and conservator of life which he has achieved by learning, observing and understanding life.

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to Phylum Chordata –** • Origin & Ancestry of Chordates. • Comparative account of fundamental characters of Chordateswith Non Chordates. • Salient features of Phylum Chordata. • Classification of Phylum Chordata upto classes – Pisces,Amphibia, Reptilia, Aves, Mammalia.	04
2	**Chapter 2:- Introduction to Group – Protochordata.** • Salient features of Protochordata. • Salient features of subphylumswith two example each – Namesonly. • Hemichordata – *Balanoglossus*and*Rhabdopleura*, Urochordata – *Herdmania*and*Salpa*, Cephalochordata – *Branchiostoma*(Amphioxus) and*Asymmetron*	03
3	**Chapter 3:-Introduction to subphylum – Vertebrata** • Salient features of Vertebrata. • Introduction and General characters of sections with two examples – Names only. Agnatha– *Petromyzon&Myxine*&Gnathostomata–Frog&*Labeo*	03

4	**Chapter 4:-Introduction to Class – Pisces** • Salient features of Class – Pisces. • Introductaionand Salient features of sections with two examples – Names only. • Class – Chondrichthyes–*Scoliodon*and *Chimaera*&Osteichthyes – *Labeo*and*Catla* • Types of Scales in Fishes. Types of Fins in Fishes.	04
5	**Chapter 5:- Introduction to Class – Amphibia** • Salient features of Class – Amphibia. • Introduction to order – Apoda–*Ichthyophis*,Urodela–*Salamandra*(Salamander) and& • Annura – *Rana*. • Parental care in Amphibia.	04
6	**Chapter 6:- Introduction to class –Reptilia** • Salient features of class Reptilia with one example (name only) – *Chelone*, *Calotes*. • Venomous and Non-venomous snakes – Cobra, Russell's viper,Rat snake, Grass snake. Snake venom, symptoms, effect and cure of snake bite, first aid treatment of snakebite. • Desert adaptations in reptiles in brief.	04
7	**Chapter 7:- Introduction to class –Aves** • Salient features of class Aves with two examples (names only) – Sparrow, Parrot. • Flight adaptations in birds. • Types of Beaks and feet in birds. Migration in birds – Altitudinal, Latitudinal.	04
8	**Chapter 8:- Introduction to class – Mammalia**. • Salient features of class Mammalia with two examples (namesonly) – Rat, Rabbit. • Egg laying mammals. • Aquatic adaptations in mammals. • Flying adaptations in mammals. • Cursorial and fossorial adaptation in mammals	04

Reference Books:

Text Books of Zoology, Invertebrates Vol- II, 1992, T.J.Parker and W.A. Haswel,Edited by Marshall and Williams,CBS publications and distribution, New Delhi.

2. Integrated Principles of Zoology, Eleventh Edition, Hickman CP, Roberts LS & Larson A. International Edition ISBN 0–07–118077–X, The McGraw-Hill Companies, Inc.,

3. Modern Text Book of Zoology, Vertebrates. R. L. Kotpal, 3rd edn. Rastogi Publications,

Meerut.

4. Chordate Zoology, 1982, P.S.Dhami and J.K.Dhami, R. Chand and Co., New Delhi.

5. Biology, Campbell nand Reece. 7th Edn. Pearson Education in South Asia, Delhi.

6. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

7. Pough H. Vertebrate life, VIII Edition, Pearson International.

8. Integrated Principles of Zoology, Eleventh Edition, Hickman C. P., Roberts L. S.& Larson A. International Edition ISBN 0–07–118077–X, The McGraw-Hill Companies, Inc.,

9. Arora M.P. Chordates I. Himalya Publications

Course Code: ZO12101
Subject Name: Animal Behaviour (T)

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

- Exhibit critical and integrative thinking skills
- Demonstrate ability to communicate scientific information in both oral and writtenformats
- Demonstrate knowledge of key concepts in animal behavior
- Exhibit quantitative research skills (or demonstrate ability to perform all parts of thescientific method)
- Demonstrate ability to think flexibly and apply knowledge to new problems

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to the study of Animal Behaviour-** Meaning, Branches of Ethology and Scope of Ethology	02
2	**Chapter 2:- Concepts of Ethology-** Concept of Motivation; Concept of Fixed Action Patterns (FAP); Concept of Sign or key stimulus or Releasers; Concept of Innate Releasing Mechanism (IRM); Concept of Physiological basis; Conceptof Imprinting; Concept of Evolution of behaviour	05
3	**Chapter 3:- Methods of studying Behaviour-** Introduction; Studies in Laboratory; Studies in Wild; Identificationand Naming of Individuals; Locating Individuals in Wild.	05
4	**Chapter 4:- Learning and Memory-** Introduction; types of learning; theories and laws of learning	06
5	**Chapter 5:- Hormones and behavior-** Introduction: Hormones of Gonads; Hormones of adrenal gland; Hormones of Pituitary; Effects of hormones on different behaviouralpatterns; Maternal behavior.	04
6	**Chapter 6:- Social Organisation, Social behavior and Communication-** Introduction; Social organization in Honey bees, termites, monkeysand Lions.	04

7	**Chapter 7:- Biological rhythms-** Biological clocks, circadian rhythms, circumlunar rhythms, circannual rhythms	04

Reference Books:

Mathur Reena 2007: Animal Behaviour, Rastogi Publication, Meerut.

Course Code: ZO12103

Subject Name: Zoology Major Practical 2

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

- Exhibit critical and integrative thinking skills
- Demonstrate ability to communicate scientific information in both oral and writtenformats
- Demonstrate knowledge of key concepts in animal behavior
- Exhibit quantitative research skills (or demonstrate ability to perform all parts of thescientific method)
- Demonstrate ability to think flexibly and apply knowledge to new problems

Unit	Topic	No of lectures
1	Museum study of Group Protochordata : Balanoglossus, Herdmania, Petromyzon. (D)	
2	Museum study of Class Pisces: Labeo, *Scoliodon, Hippocampus.* (D)	
3	Study of types of scales in fishes: Placoid scale, Cycloid scale, Ctenoidscale & Ganoid scale. (D) . Study of types of tail fins in fishes: Homocercal, Heterocercal &Diphycercal. (D	
4	Museum study of Class Reptilia: *Chelone*, *Calotes*, *snake*	
5	Identification of Venomous & Non-venomous snakes with the help of pictorial taxonomic keys.	

6	Museum study of Class Aves: Crow, *Kingfisher*& Duck.	
7	Museum study of Class Mammalia: Rat, Shrew & Bat	
8	To study the responses of insects to hygrostimuli.	
9	To study the geotaxis behaviour of earthworm.	
10	To study the orientational responses of insect larvae to photo stimuli	
11	To study the effect of concentration of sucrose solution in elicitingfeeding responses of housefly.	
12	Study of social organization in any one social insect and submission of report	
13	Study of reptilian / avian diversity in and around the campus (2 P) – € -Compulsory Compulsory visit to Zoo / Wildlife sanctuary / Bird sanctuary, report writing and submission.	

Reference Books:

Course Code: ZO12101
Subject Name: Animal Behaviour (T)

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

- Understand the role of food and nutrients in health and disease.

- Provide culturally competent nutrition services for diverse individuals.
- Implement strategies for food access, procurement, preparation and safety that are relevant for culture, age, literacy level and socio-economic status of clients and groups.
- Perform food system management and leadership functions that consider sustainability in business, healthcare, community and institutional arenas.

Unit	Topic	No of lectures
1	**Chapter 1:- Nutrition and dietary nutrients** Basic concept of Food: Components and nutrients. Concept of balanced diet, nutrient requirements and dietary pattern for differentgroups viz., adults, pregnant and nursing mothers, infants, school children, adolescentsand elderly people.	06
2	**Chapter 2:- Macro nutrients and micronutrients** Nutritional Biochemistry: Macronutrients. Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role. Micronutrients. Vitamins- Water-soluble andFat-soluble vitamins- their sources and importance. Important minerals *viz*., Iron, Calcium, Phosphorus, Iodine, Selenium and Zinc: their biological functions.	08
	Chapter 3:- Malnutrition and nutrient deficiency diseases Nutritional Biochemistry: Macronutrients.Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role. Micronutrients. Vitamins- Water-soluble and Fat-soluble vitamins- their sources and importance. Important minerals *viz*., Iron, Calcium, Phosphorus, Iodine, Selenium and Zinc: their biological functions.	08
	Chapter 4:- Diseases caused by microorganisms Food hygiene: Potable water- sources andmethods of purification at domestic level. Food and Water-borne infections: Bacterial diseases: cholera, dysentery; typhoid fever, viral diseases:Hepatitis, Poliomyelitis etc., Protozoan diseases:amoebiasis, giardiasis; Parasitic diseases: taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention. Causes of food spoilage and its prevention.	08

Reference Books:

1. Mudambi, S.R. and Rajagopal, M.V. (2007). Fundamentals of Foods, Nutrition andDiet Therapy; Fifth Ed;; New Age International Publishers

2. Srilakshmi, B. (2002). Nutrition Science; New Age International (P) Ltd.

3. Srilakshmi, B. (2007). Food Science; Fourth Ed; New Age International (P) Ltd.

4. Swaminathan, M. (1986). Handbook of Foods and Nutrition; Fifth Ed; BAPPCO.

5. Bamji, M.S.; Rao, N.P. and Reddy, V. (2009). Text Book of Human Nutrition;Oxford & IBH Publishing Co. Pvt Ltd.

6. Wardlaw, G.M. and Hampl, J.S. (2007). Perspectives in Nutrition; Seventh Ed;McGraw Hill.

7. Lakra, P. and Singh M.D. (2008). Textbook of Nutrition and Health; First Ed;Academic Excellence.

8. Manay, M.S. and Shadaksharaswamy, M. (1998). Food-Facts and Principles; NewAgeInternational (P) Ltd.

Course Code: ZO12401
Subject Name: Biofloc technology (T)

Total lectures: 30 **Total Credits: 2**

Prerequisites: -

Course Objectives:

Course Outcome:-

1. **Describe the process of preparing the pond for aquaculture.**
2. Demonstrate the process of carrying out aquaculture operations.
3. Demonstrate various practices to ensure health, hygiene and safety during culture operations.
4. Explain the basic entrepreneurial activities for small enterprise.
5. Describe the process of undertaking employability and entrepreneurial practices.
6. 5Demonstrate the process of using the biofloc technology to culture fish.
7. Demonstrate the process of setting up and using the recirculating aquaculture system

Unit	Topic	No of lectures
1	**Chapter 1:- Introduction to Aquaculture** Aquaculture: Basic Concept ; Types of Aquaculture , Culture of freshwater fish/ prawn, Culture of marine fish/prawn, Pearl Culture, Rearing ponds for aquaculture; Composite Fish farming, Breeding Ponds, Fish Seeds, Harvesting.	05
2	**Chapter 2:- Introduction to Biofloc Culture**	02

	Chapter 3:- Definition and Application of Biofloc Technology	02
	Chapter 4:- Layout and Design of tanks	04
	Chapter 5:- Composition and Nutritional Value of Biofloc Culture	02
	Chapter 6:- Water Quality Parameters in Biofloc Technology Dissolved oxygen (DO) Temperature, pH, Salinity, TAN, Nitrite, Nitrate, Orthophosphate, Alkalinity, Setting Solids and Total Suspended Solids	05
	Chapter 7:- Biological rhythms- Biological clocks, circadian rhythms, circumlunar rhythms, circannual rhythms	02
	Chapter 8:- Role of Microorganisms in Biofloc Technology	02
	Chapter 9:- Benefits of Biofloc Culture	02
	Chapter 10:- Species suitable for Biofloc Culture	02
	Chapter 11:- Biofloc Technology- A tool for Management of Water Quality in Aquaculture	04

Chairman,

Board of Studies in Zoology

Progressive Education Society's

Modern College of Arts, Science and Commerce

Ganeshkhind, Pune – 411 016

(Autonomous)

Syllabus for

F. Y. B. Voc. Food Processing Technology

Introduction:

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college education, leading to Bachelor of Vocation (B. Voc.) degree with multiple exits such as Diploma/Advanced Diploma under the National Skill Qualification framework (NSQF). The B. Voc. Programme is focused on providing undergraduate studies which would also incorporate specific jobs and their NOSs (National Occupational standards) along with broad based general education. This would enable the graduates completing B. Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

Under National Skills Development Corporation, many Sector Skill Council representing respective industries have/are being established. One of the mandates of Sector Skill Councils is to develop National Occupational Standards (NOSs) for various jobs in their respective industries. It is important to embed the competencies required for specific jobs roles in the higher education system for creating employable graduates.

This course will identify and fill the skill gaps. The mandate of this program is to create a course with industry-academia collaboration that will produce skilled workforce satisfying specific needs of the industry. This course will offer multiple needs of the industry. The structure will allow offer multiple needs of the industry. The structure will allow students to have thorough theoretical knowledge coupled with rigorous hands on training in both laboratory and industry.

Unique Features of the Course:

- The skill development component is to equip students with appropriate knowledge, practice and attitude, so they are ready to work.
- The skill development components will be relevant to the industries as per their requirements.
- The curriculum is embed with National Occupational Standards (NOSs) of specific job roles within the industry sector(s).
- The overall design of the skill development component along with technologies in food process engineering.
- The curriculum should also focus on work-readiness skills in each of the three years. Curriculum should also focus on work-readiness skills in each of the three years. Curriculum is designed to match industrial needs with greater emphasis on pratical work, on the job training and industrial internship.

Program Objectives:

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are ready to work at each exit point of the programme.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

Program Specific Outcomes (PSOs):

Program Outcomes:

After successful completion of B.Voc (Food Processing Technology) program, the students should be able:

PO1: to have competencies in the area of basic and applied food processing technology.
PO2: to explore and have in depth knowledge of all food processing technology related sectors.
PO3: to set up their own processing unit or should engage in research.
PO4: to develop new products.

Program-specific / Course outcomes

Course Outcomes for BVO11101: Food Science (2 Credits)

CO1: Students will understand the basic concepts in food science and will get knowledge of the different food preparation methods.

CO2: They will understand the requirement of food with respect to energy, food and consumer safety, nutrients and their impact on health.

CO3: They will get the knowledge of nutritive value of cereals, pulses, nuts, fruits and vegetables, ant nutritional factors, germination of pulses, factors affecting cooking,

CO4: They will understand the processing of oilseeds, protein isolates, Texturized vegetable protein

CO5: Students will acquire the knowledge of structure and nutritive value and chemical composition of eggs, fish and meat.

Course Outcomes for BVO11102 Food Biochemistry (2 Credits)

CO1: Students will get knowledge of functional carbohydrates:

CO2: The will get knowledge regarding properties of fats and oil:

CO3: They will understand the concept of rancidity of oils and its importance in food industry,

CO4: They will be acquire knowledge of important protein sources in food:

CO5: Students will get knowledge regarding role of fibers in disease prevention:

CO6: They will have knowledge about different test used for estimation of protein in food industry

Course Outcomes for BVO11407: Cereal Technology (2 Credits)

CO1: Students will learn about different cereals.

CO2: They will acquire knowledge regarding processing methods of cereals.

CO3: They will acquire knowledge about processed products of cereals.

CO4: They will learn about milling and equipments required for it.

Course Outcomes for BVO1406: Pr. On Food Science (2 Credits)

CO1 : Students will understand the structure of starches, gelatinization of starches.

CO2: They will understand the processes like roasting, tenderization, caremalisation, inversion.

CO3: They will acquire the knowledge about handling different instruments used in food.

CO4: They will understand different changes occurred during frying of oil and smoke point of oil.

CO5: They will understand the importance of egg white foam and their different stages used in food industry.

Course Outcomes for BVO11103: Pr. On Food Biochemistry (2 Credits)

CO1: Students will get introduction different types of chemical reactions used for identification of carbohydrates

CO2. They will be able to estimate FFA content in given oil sample.

CO3. They will be able to perform estimation of ascorbic acid, protein and reducing sugar from food sample.

CO4. Students will learn how to write prepare different types of solutions.

CO5. Students learn about different methods of protein estimation.

CO6. Students learn about different methods of carbohydrate estimation.

CO7. They will learn different types of adulteration test used for fats and oils

Course Outcomes for BVO 12101 Food Processing Operations (2 Credits)

CO1: Students will understand the basic concepts in food processing and engineering and will get knowledge of the different instruments used in food processing and engineering.

CO2: They will understand different unit operations used in food processing.

CO3: They will understand the basic of heat transfer and energy requirement in food industry,physical properties of water, water activity.

CO4: They will understand different preservation methods used in food processing

CO5: They will learn different drying method and types of dryers.

CO6: They will acquire knowledge about freezing theory, different food freezers and quality of frozen food.

CO7: They will learn different designs and drawing of agitators, heat exchangers, evaporators and crystallizers.

Course Outcomes for BVO 12102 Food Microbiology (2 Credits)

CO1: Students will understand the basic concepts in microbiology, principle and working of different instruments used in lab along with its application.

CO2:They will get the knowledge about the how bacteria grows, different factors which affect their growth, different requirements for bacterial growth, different isolation and purification methods used for bacteria

CO3: They will understand the principle and importance of different staining methods used for bacteria.

CO4: They will gain knowledge on different sources, types of bacteria that cause spoilage in food,various changes that occur during spoilage in food depending on their nutrient content.

CO5: Students will understand different methods that can be used to prevent and detect bacterial spoilage of food.

CO6: They will understand importance of fermentation and preservatives different methods and its importance.

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Course Outcomes for BVO 12103 Practical on Food Processing Operations (2 Credits)

CO1: Students will understand the physical, mechanical, textural and biochemical properties of foods.

CO2: They will understand the working of centrifugal separation and oil extraction method.

CO3: They will acquire the knowledge about microwave heating of food materials and effect ofmicrowave on food material.

CO4: They will acquire the knowledge about drying of food materials.

CO5: They will understand freezing of food and effect of freezing on food.

CO6: They will understand the determination of firmness of foods.

Course Outcomes for BVO 12204 Dairy Technology (2Credits)

CO1: Students will understand composition of milk.

CO2: Students will get awareness regarding milk properties and microbial flora.

CO3: Students will be aware regarding processing technologies used in Dairy Industry

CO4: Student will be well versed with the milk and milk products

Course Outcomes for BVO 12408 Food Safety (2 Credits)

CO1: Students will understand about food safety and its importance.

CO2: Students will get knowledge of different types of hazards and how to prevent it.

CO3: The will get knowledge regarding sources of food contamination, food infection and food poisoning.

CO4: They will understand about pest control and different methods for food storage.

CO5: They will be acquiring knowledge regarding temperature control and its importance in food industry.

CO6: Students will get knowledge regarding importance of personal hygiene and management of hazards.

Course Outcomes for BVO12407 Practical on Microbiology (2 Credit)

CO1: Students will understand the basic concepts in microbiology and they will understand the principle and working of different instruments used in microbiology lab along with its application.They will learn about different equipment's used in lab.

CO2: They will learn how to clean equipment's and sterilize them.

CO3: They will learn about handling of compound microscope.

CO4: They will understand different staining methods for bacteria and its importance.

CO5: They will understand difference between bacteria and fungi.

CO6: They will learn different methods used for isolation and enumeration of bacteria from food sample.

Examination Pattern:

40:60 [Continuous Internal Evaluation: Formative, Summative and End semester exam (ESE)]

Evaluation of Students:

1) The Internal evaluation will be in form of continuous assessment format of 20 marks and End-Semester examinations will be of 30 marks making total to 50 (2CREDIT).
2) Student has to obtain 40% marks in the examination of In-Semester and End-Semester assessment. Separate passing is mandatory and total passing marks is 40%.

In-semester Examination: Internal assessment for each course would be continuous and dates for each tutorials/practical tests etc. will be pre-notified in the time table for teaching or placed separately as a part of time table. Department/ College Internal Assessment Committee will coordinate this activity.

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Short Quizzes / MCQ Test
2. Term Paper
3. Lecture/ Library Notes
4. Home Assignments
5. Group Discussion
6. Open Book Test
7. Written Test
8. PPT presentation
9. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Institutions / Industries
7. E-content

Subject List

SEMESTER I

F.Y.B.Voc (food Processing Technology) Minor –BVO 12204 Dairy Technology Semester I						
	Subject Code	**Subject Name**	**Credits**		**Evaluation**	
			Th	**Pr**	**CIE**	**SEE**
Major	BVO11101	Food Science	2	-	25	25
	BVO11102	Food Biochemistry	2	-	25	25
	BVO11407	Cereals Processing Technology	2	-	25	25
SEC	BVO1406	Pr. On Food Science	-	2	25	25
VSC	BVO11103	Pr. On Food Biochemistry	-	2	25	25
AEC	ENG11505	Soft skills and Personality Development	2	-	25	25
VEC	VEC 11506	Value Education	2	-	25	25
IKS	IKS11501	Foundation Course on Indian Knowledge system	2	-	25	25
CC	PE	Physical Education (Yoga)	2	-	25	25

SEMESTER II

F.Y.B.Voc (Food Processing Technology) Minor (Dairy Technology) Semester II					
Major	BVO 12101 Food Processing Operations	2	-	25	25
	BVO 12102 Food Microbiology	2	-	25	25
	BVO 12103 Practical on Food Processing Operations	2	-	25	25
Minor	BVO 12204 Dairy Technology	2	-	25	25
Open Electives for Arts, Commerce students	Equipments used in food Industry	2	-	25	25
	Processing of Dehydrated Products	-	2	25	25
VSC, SEC (VSEC) Skill Based	BVO 12408 Food Safety	-	2	25	25
	BVO12407 Practical on Microbiology	-	2	25	25
AEC, VEC, IKS	ENG12508 Corporate Communication	2	-	25	25
	VEC 12507 Democracy, Election and Governance	2	-	25	25
CC	Yoga & fitness/ Stress Management	2	-	25	25

Syllabus

Subject Code: BVO11101

Subject: Food Science (2 credits)

Total Lectures=30

Chapter No	Content	Lectures (30L)
1.	**Introduction of Food Science**	**8**
	Introduction & Definition Of Food Science; Factors Affecting Food Consumption And Taste, Energy Requirement In Human Body, Five Food Groups And Food Guide, Functions Of Food, Classification Of Nutrients, Food Constituents - Carbohydrates, Protein, Fat, Vitamins and minerals. Food Preparation- Reasons For Cooking, Pre-Preparation Of Foods, Methods Of Cooking, Medium Of Cooking, Changes During Cooking.	
2.	**Composition And Nutritive Value Of Plant Foods**	**8**
	Cereals And Pulses: Structure, Composition, Nutritive Value, Sources	
	Fruits And Vegetables: Composition, Nutritive Value, Fruit Ripening, Climacteric And Non - Climacteric Fruits, Sources	
	Oilseeds: Composition, Nutritive Value, Sources	
	Spices: Definition, Classification, Applications	
3.	**Composition And Nutritive Value Of Animal Foods**	**8**
	Eggs: Structure, Composition, Nutritive Value, Grading Changes During Storage, Quality Of Eggs	
	Fish: Composition, Nutritive Value	
	Meat: Structure, Classification, Composition, Nutritive Value	
	Milk : Composition, Nutritive Value, Properties	
4.	**Color, Flavor And Additives**	**3**
	Natural Food Flavours, Pigments In Food And Their Industrial Applications. Color And Flavor Additives And Application In Food	
5.	**Health Foods**	**3**
	Probiotics, Prebiotics, Synbiotics, GM Foods, Nutraceuticals, Functional Foods,	

REFERENCES BOOKS

1. Potter, N. N. And Joseph, H. Hotchkiss, "Food Science", CBS Publishers And Distributors, New, Delhi, 1996.
2. Fox, B. A. And Cameron, A.G., "Food Science, Nutrition And Health", 5th Ed., Edward
3. Arnold, London, Charley, H., Food Science, John Wiley And Sons Inc., New York, 1982.
4. Foods: Facts And Principles - N Shakuntalamanay M Shadakshara Swamy
5. Food Science - B Srilakshmi
6. Food Science, Chemistry & Experimental Foods - M Swaminathan, Kukude, S And Others.
7. Food Science, Sheth Publications.
8. Mudambi And Sheela Rao: Food Science
9. Srilaxmi: Food Science, New Age International
10. Shakuntala Manay: Foods Facts And Principles, Wiley Eastern
11. Food Chemistry. Meyer, L.H. 1973East-West Press Pvt. Ltd., New Delhi

Subject Code BVO11102

Subject: Food Biochemistry (2 Credit)

Total Lectures=30

Chapter No	Content	Lectures (30L)
1.	**Carbodydrates:** Monosaccharides: **C**lassification and properties - Glucose, Fructose, ribulose, ribose Disaccharides: Maltose, Lactose, Sucrose Polysacharides: Starch, Cellulose, Glycogen, Gums, Pectin Dietary fiber Dietary sources – Functional properties of dietary carbohydrates	**6**
2.	**Amino acids and Protein**	**8**
	Amino acids - Classification , properties and identification techniques, Formation of peptide linkages, biological activity	
	Protein: Classification and Structure of protein Functions of proteins in foods – physical and chemical properties of proteins. Important protein sources– Milk, Meat, Fish, Egg and Cereal proteins Qualitative analysis of protein, Protein estimation-Kjeldahl's method	
4.	**Lipids:** Definition and classification –biological role and uses of lipids, Fat group. classification – Dietary sources Fatty acids in foods nomenclature – Triglycerides – composition and functions. Physical properties of triglycerides – Polymorphism of triglycerides. Properties of fats – Rancidity and reversion of fats. Effect of frying on fats, Technology of edible fats and oils- Refining, Hydrogenation and Interesterification	**8**
5.	**Vitamins:** Definition –Classification, general sources, properties, functions and dietary requirements Deficiency symptoms of vitamins A,D,E,K,C thiamins, riboflavin, niacin and biotin.	**8**
	Minerals: Definition –Classification, general sources, properties, functions and dietary requirements Role of minerals in nutrition Vitamins and minerals general causes of loss in food. Fortifications, Enrichment and Restoration	

References:

1. Food and Nutrition M. Swaminathan
2. Fundamentals of Food & Nutrition S R. Mudambi, M.V. Rajagopal
3. A text book of foods, Nutrition and Dietetics M. Raheena Begum
4. Handbook of Food and Nutrition M Swaminathan
5. Food Chemistry O R. Fennema
6. Food Chemistry L H Meyer
7. Foods Facts and Principles N. Shakuntalamanay & M. Shadaksharaswamy
8. Food Science Norman N. Potter
9. Hand book of Analysis and Quality Control of Fruits & Vegetable Products S. Ranganna
10. Fats in Food Technology K K Rajah

Subject Code: BVO11407

Subject Cereals Processing Technology (2 Credit)

Total Lectures=30

Sr. No.	Topics	Lectures (30L)
1.	**Introduction** 1. Present status and future prospects of cereals and millets; 2. Morphology: physicochemical properties; chemical composition and nutritive value	8
2.	**Major Cereals** **Rice:** 1. Rice: Paddy processing and rice milling: conventional milling, modern milling operations, milling machines, milling efficiency, by products of rice milling. Quality characteristics influencing final milled products. Parboiling: rice bran stabilization and its methods; Aging of rice; Enrichment – need, methods; processed foods from rice – breakfast cereals, flakes, puffing, canning and instant rice.	8
3.	**Wheat:** 1. Wheat: break system, purification system and reduction system; extraction rate and its effect on flour composition; 2. Wheat milling 3. Quality characteristics of flour and their suitability for baking.	5
4.	**Sorghum:** 1. Milling, Malting, Pearling and industrial utilization **Corn:** 1. Corn milling – dry and wet milling, starch and gluten separation, milling fractions ad modified starches. **Barley:** 1. Malting and milling	5
5.	**Products and Byproduct of cereal and millets:** 1. infant foods from cereals and millets, cereal based fermented products, 2. breakfast cereal foods – flaked, puffed, expanded, extruded and shredded products, etc. 3. Products of all cereals	4

References:

Sr. No.	Name of book	Publisher	Author
1.	Technology of Cereals	Kent NL	Woodhead Publishing1983 ISBN: 9780080408347
2.	Post Harvest Technology of Cereals, Pulses and Oil seeds	A. Chakravarthy	Oxford and IBH Publishing Company, 2014
3.	Modern Cereal Science & Technology	Y. Pomeranz	VCH Publishing, 1987 ISBN: 9780895733269
4.	Handbook of Post Harvest and Technology; Cereals, Fruit and Vegetables tea and spices.	Chakraverty A., Mujumdar A.S. Hosahalli S.R.	CRC Press

Subject Code: BVO11406

Subject: Pr. on Food Science (2 Credit)

Total Practical =11

Sr. No.	Practical of Food Science (2 Credits)	Lectures (10L)
1.	Gelatinization Properties of Food Starches	1
2.	Determination of Relative Density of Milk at Different Temperatures	1
3.	Effect of Salt, Acid, Sugar and Fat on the Stability of Egg White Foam	1
4.	Effect of Preparation Techniques on Meat Tenderization	1
5.	Effect of Roasting on Nuts And Oilseeds	1
6.	Inversion, Melting and Caramalization of Sugar	1
7.	Determination of Smoking Point, Absorption of Oil and Changes in Physical Parameters of Fats and Oils	1
8.	Preparation of Brix/ Brine Solution and Checking by Hand Refractometer/ Salinometer	1
9.	Determination of Gluten Content	1
10.	Determination of Moisture Using Hot Air Oven / IR	1
11.	Study of Different Types of Blanching	1

Subject Code: BVO 11103

Subject: Pr. on Food Biochemistry (2 credit course)

Total Practical =10

Sr. No.	Practical on Food Biochemistry (2 Credits)	Practical
1.	Preparation Of Solutions - Normal, Molar And Per Cent Solutions And Preparation Of Buffers	1
2.	Qualitative and Quantitative Tests For Protein	1
3.	Qualitative and Quantitative For Carbohydrates	1
4.	Determination Of pH And Acidity	1
5.	Estimation Of Ash Content In Food	1
6.	Estimation Of Iodine Value, Acid Value, Saponification Value Of Oils	1
7.	Study Of Enzymatic Browning In Fruits And Vegetables	1
8.	Estimation Of Fibre Content In Food	1
9.	Detection Of Adulteration In Fats And Oils	1
10.	Measurement Of Food Color By Spectrophotometer/ Tintometer	1

Semester II

Subject Code: BVO 12101

Subject: Food Processing Operations (2 Credit Course)

Total Lecture:30

Chapter No	Content 2 Credit	Lectures (30L)
1.	**Material Handling And Transportation** - Selection Of Material Handling Machines And Conveyors, Belt Conveyor; Belt Conveyor Idlers, Idler Spacing, Belt Tension, Bucket Elevator, Screw Conveyor, Pneumatic Conveyor,	**06**
2.	**Unit Operations** : Review To Heat And Mass Transfer Cleaning (Dry And Wet Cleaning Methods), Sorting And Its Types , Grading, Peeling, Dehulling, Dehusking	**06**
3.	**Mixing And Moulding:** Mixer For Solid: Equipment- Ribbon Blender, Kneader, Double Cone Mixer, Tumbling Mixers, Dough And Paste Mixers Bread Moulders, Pie And Biscuit Formers, Confectionery Moulders	**06**
4.	**Evaporators:** Boiling Point Elevation, Types Of Evaporators, Batch Type Pan Evaporator, Natural Circulation Evaporators, Rising Film Evaporator, Falling Film Evaporator, Forced-Circulation Evaporator, Plate Evaporator.	**04**
5.	**Separation**: Principle and Application: Centrifugation, Filtration, Expression, Extraction Using Solvents. **Size Reduction:** Cutters & Grinders, Crushers, Gyratory Crusher, Hammer Mill, Ball Mill, Tumbling Mill	**04**
6.	**Refrigeration and Freezing**: Refrigeration, refrigeration cycle, refrigeration load, Freezing methods -direct and indirect, still air sharp freezer, blast freezer, fluidized freezer, plate freezer, spiral freezer and cryogenic freezing**.**	**04**

References

1. Cabe Mc., Smith J.C and Harriot P. Unit operations of Chemical Engineering. Mc Graw Hill Publishers. New Delhi.
2. Stanley E.C. Fundamentals of Food Engineering. AVI Publishers. Westport. USA.
3. Sahay K.M and Singh K.K. Unit operations of Agricultural Processing. Vikas Publishing House Pvt. Ltd. New Delhi.
4. Earle R.L. Unit operations in Food Engineering.

Subject Code: BVO 12102

Subject: Food Microbiology

Total Lecture: 30

Chapter No.	Content 2 Credit	Lectures (30L)
1.	**Introduction To Microbiology**	
	Introduction, History And Development Of Microbiology, Definition And Scope Of BVO 12102 Food Microbiology, Introduction To Instruments And Equipments Needed In Microbial Studies. Inter-Relationship Of Microbiology With Food Sciences	**08**
2.	**Microbial Growth**	
	Growth Curve, Growth Of Microorganisms In Laboratory, Design Of Media: Composition, Factors Affecting Microbial Growth, Isolation Characterization And Purification Of Microorganisms, Concept Of Pure Culture, Co-Culture And Mixed, Culture, Preservation And Maintenance, Methods For Microbial Cultures, Staining Techniques(Monochrome, Negative, Differential, Special Staining), Cultivation – *In Vitro And In Vivo*, Bioflim Formation	**08**
3.	**Fermentation**	
	Fermentation–Definition And Types, Design Of Fermenter Microorganisms Used In Food Fermentations, Dairy Fermentations-Starter Cultures ,Types And Methods Of Preservation And Propagation, Lactic Acid And Aroma Compounds Production, Health Benefits Of LAB, Fermented Foods-Types, Methods Of Manufacture For Vinegar, Sauerkraut, Tempeh, Miso, Soya Sauce ,Beer, Wine And Traditional Indian Foods	**08**
4.	**Control Of Microbial Growth In Food**	
	Principles And Methods Of Preservation, Physical Methods Of Food Preservation- Dehydration, Freezing, Cool Storage, Heat Treatment (Esp. Thermobacteriology), Irradiation, Chemical Preservatives, Biopreservatives Esp. Bacteriocins, New Non Thermal Methods, Introduction To Hurdle Concept And Predictive Microbiology	**06**

REFERENCE BOOKS

1. General Microbiology - Stanier, 5th Ed.
2. Introduction to Microbiology - Ingraham, 2th Ed.
3. Industrial Microbiology - An Introduction, Waites, M.J.
4. Principles of Fermentation Technology- Whitaker. A
5. Industrial Microbiology- A. H. Patel
6. Industrial Microbiology- Lester Earl Casida

Subject Code: BVO 12408
Subject: Food Safety (2 credit)
Total Lectures=30

Sr. No	Content (2 Credits)	Lectures (30L)
1.	**Introduction to Food Safety** • Definition • Types of hazards, biological, chemical, physical hazards • Factors affecting BVO 12408 Food Safety • Importance of Safe Foods	**03**
2.	**Food Hazards of Physical and Chemical Origin** • Introduction • Physical Hazards with common examples • Chemical Hazards (naturally occurring ,environmental and intentionally added) • Impact on health • Control measures	**05**
3.	**. Food Hazards of Biological Origin** • Introduction • Indicator Organisms • Food borne pathogens: bacteria • Food borne pathogens: viruses • Food borne pathogens: eukaryotes • Seafood and Shell fish poisoning • Mycotoxins	**05**
4.	**Microbial Food Spoilage** Sources Of Microorganisms In Foods Some Important Food Spoilage Bacteria Changes Caused By Micro-Organisms During Spoilage (Breakdown Of Proteins, Carbohydrates, Fats And Other Constituents) Spoilage Of Specific Food Groups- Milk And Dairy Products, Meat, Poultry And Seafoods, Cereal And Cereal Products, Fruits And Vegetables And Canned Products.	**04**
5.	**. Management of hazards** • Need • Control of parameters • Temperature control • Food storage	**05**

References:

1. Handbook of food toxicology by S. S. Deshpande
2. The BVO 12408 Food Safety information handbook by Cynthia A. Robert, 2009
3. Nutritional and safety aspects of food processing by Tannenbaum SR
4. Microbiological safety of food by Hobbs BC, 1973
5. BVO 12408 Food Safety Handbook by Ronald H. Schmidt, Gary E. Rodrick
6. 1. Lawley, R., Curtis L. and Davis,J. The BVO 12408 Food Safety Hazard Guidebook , RSC publishing, 2004
7. De Vries. BVO 12408 Food Safety and Toxicity, CRC, New York, 1997
8. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
9. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 &Sons; USA, 1987

Subject Code: BVO 12204

Subject: Dairy Technology (2 Credits)

Total Lecture: 30

Chapter No	Content	Lectures (30L)
1.	**Introduction:** Present status of dairy industry in India; Definition of milk **Composition of milk:** Carbohydrates, proteins and fat content of milk from different sources. Factors affecting milk composition, nutritive value	**06**
2.	**Physical properties of milk:** Colour, taste,, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, electrical conductivity. **Dairy Microbiology:** Normal and abnormal flora of milk. Spoilage of milk. Preservation techniques of milk	**06**
3.	**Market milk industry: Milk definition,** Systems of collection of milk, Reception, Stages in reception, sampling **Platform testing**	**6**
4.	**Stages of processing:** Filtration, Clarification, Homogenization, Pasteurization, packaging judging and grading of milk, different types of heat exchangers	**14**
5.	**Dried milk and milk products:** objects of production, definition, standards, composition, role of constituents, milk dryers(cold and hot), production of SMP and WMP, Packaging, storage, judging and grading, defects (causes and prevention) **Milk products:** butter milk powder, whey powder, cream powder, butter powder, ice cream mix powder, cheese powder, srikhand powder, khoa powder, channa powder.	**10**

References:

1. De Sukumar, "Outlines of BVO 12204 Dairy Technology", Oxford University Press, New Delhi, 999.
2. Modern BVO 12204 Dairy Technology I: Advances in Milk Processing. R.K. Robinson (Ed.). 1986. Elsevier Applied Science Publishers, Ltd., London,
3. Modern BVO 12204 Dairy Technology II: Advances in Milk Products. R.K. Robinson (Ed.). 1986.
   Elsevier Applied Science Publishers, Ltd., London,
4. BVO 12204 Dairy Technology _ P Walstra & T. J Geurts

Subject Code: BVO 12103

Subject : Practical on Food Processing Operations (2 Credits)

Total Practical =10

Sr. No.	Food Processing Operations (2 credits)	Practical (10)
1.	Determination of Physical, mechanical and textural properties of foods	1
2.	Preservation of food by the process of freezing	1
3.	Comparison of conventional and microwave processing of food	1
4.	Cut-out analysis of canned food	1
5.	Drying of food using Tray dryer/other dryers	1
6.	Osmotic dehydration	2
7.	Minimal Processing	1
8.	Practical on Thermal processing : Thermal process Calculations	1
9.	Practical on Separation processes : Principles and methods of: distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation	1
10	Experiments on hygroscopic properties of food materials	1

Subject Code: BVO 12102

Subject : Practical on Food Microbiology (2 Credits)

Total Practical =10

Sr. No.	Food Microbiology (2 Credits)	Practical (10P)
1	Introduction to the Basic Microbiology Laboratory Practises and Equipments	1
2	Fuctioning and use of compound microscope	
3	Cleaning and sterilization of glassware	1
4	Preparation and sterilization of nutrient broth	1
5	Preparation of slant, stab and plates using nutrient agar	1
6	Cultivation and sub-culturing of microbes	1
7	Morphological study of bacteria and fungi using permanent slides	1
8	Simple staining, Gram's staining, Negative staining, Endospore staining, Standard Plate Count Method	1
9	Microbial examination of curd, Microbial examination of processed fruit and vegetable products, Microbial examination of canned foods, Microbial examination of egg	1
10	Assay of quality of milk by methylene blue reduction test.	1
11	Control of microbial growth by physical methods-heat	1