F.Y.B.Sc.Comp.Sc. (Electronics)revised 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 2025-2026

as per guidelines of

New NEP structure on 28th March 2024

National Education Policy -2020 (NEP -2020)

Choice Based Credit System (CBCS) Syllabus of an Autonomous college

Semester- I

Course Title: Smart Instrumentation Systems / (Fundamentals of IoT)

Course Code: 24-CELE-11101

Teaching Scheme: 2 Hours / Week

No. of Credits: 2(T)

Examination Scheme :- CIE: 20 Marks , ESE: 30 Marks

Course Outcomes:- On completion of this course, students will be able to :

CO1: Understand the importance of instrumentation systems and learn different sensors and actuators used in it.

CO2: Develop simple instrumentation system for any parameter monitoring purpose.

CO3:Use different combinational and sequential circuits for data acquisition purpose.

Course Contents

Unit 1: Digital Circuits **[12 H]**

Combinational circuits: Half adder and full adder, Multiplexer (4:1) and De- multiplexer, Encoders: Decimal to BCD, Decoder- 3:8 decoder , 4 bit ALU ,

Sequential circuits: Flip flop: clocked RS Flip Flop, D Flip Flop, J K Flip Flop, Shift registers, Counters-Synchronous/Asynchronous Up/Down counter.

Unit 2 : Sensors and Actuators **[8 H]**

Sensors : Working principle and parameters: thermal sensor (LM35,DHT 11) ,optical sensor(LDR),PIR, Ultrasonic,Fingerprint,Gas Sensor , Introduction to Smart sensors

Actuators- Relay, DC Motor and Stepper Motor

Unit 2 : Signal Conditioning **[10 H]**

Block diagram of Smart Instrumentation System, Concept of Signal conditioning, Introduction to Amplifiers (Black Box), voltage gain, current gain and power gain .

Operational Amplifier (OPAMP) :symbol ,basic parameters :common mode and differential mode gain, CMRR, Applications of opamp: comparator,instrumentation amplifier using opamp

Data Converters -Need of data converters, ADC & DAC parameters, Flash ADC, R-2R Ladder DAC

Introduction to IoT: Block diagram and components

Case study: Temperature Monitoring System

Reference Books:

Handbook of Modern Sensors-Physics,Design and Applications -Jacob Fraden (E-Book)

Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education
Digital Electronics: Jain R.P., Tata McGraw Hill
Sensors and Transducers: D. Patranabis, PHI publication, 2nd Edition
Op Amp and Linear Integrated Circuits: Ramakant Gaykwad
Digital Logic and Computer Design: M. Morris Mano, Pearson Education
Computer Organization and Architecture, William Stallings, Pearson, 10th Ed

Course Title: Electronics Practical Course I

Course Code:24-CELE-11102

Teaching Scheme:4 Hours / week

No. of Credits: 2(P)

Examination Scheme: **CIE:** 20 Marks ,ESE:30 Marks

Course Outcomes:- On completion of this course, students will be able

CO1: To understand the working operations of various Electronic Components.
C02:To understand the operation of different sensors and applications .
CO3:To know the basic circuits in instrumentation.
CO4: To understand the working operations of various Electronic Devices and Circuits.

Laboratory Requirements: Experiment Boards, Digital Multimeters, Computers

Course Content

List of Experiments (Minimum 10 Practical)

1. Study of Logic gates, Half adder and Full adder
2. Study of Multiplexer and Demultiplexer
3. Study of Decimal to BCD Encoder
4. Study of 4 bit Adder, Subtractor
5. Study of LM 35 temperature sensor
6. Study use of LDR for room light control.
7. Study of DC motor Drive and speed control using opamp
8. Study of OPAMP based instrumentation amplifier
9. Study of Flash ADC
10. Study of Code converter: 4 bit R-2R DAC
11. Study of clocked RS and D Flip-flop

Practical Activity-

12. Identification of Electronic Components and introduction to laboratory instruments
13. Virtual Lab Experiments -
14. Mini Project
15. Poster Presentation
16. Industry/Field Visit

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Semester- II

Course Title: Computer Organization
(Fundamentals of Embedded Systems)

Course Code: 24-CELE-12101

Teaching Scheme:2 Hours / week

No. of Credits: 2(T)

Examination Scheme: CIE: 20 Marks , ESE: 30 Marks

Course Outcomes :- On completion of this course, students will be able know

CO1: Basic computer and CPU organization and it's operation during program execution.

CO2: Basics of memory organization, types of memories and I/O system organization.

CO3: Know the concept of Microcontroller, Microprocessor and Embedded system with their examples

Course Content

Chapter 1 : CPU Organization **[12 H]**

Block diagram of Computer System, Concept of Address Bus, Data Bus, and Control Bus, Computer Architectures: Von Nueman and Harvard,

CPU organization: General Block Diagram of CPU and explanation of each block,

General instruction format, Instruction Execution and CPU [register based] Organization. Concept of ALU with block diagram

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards

Chapter 2 : Memory Organization and I/O Organization **[8 H]**

Memory Organization-Types of memories, Memory Hierarchy,Memory and data read/ write process, Block diagram of RAM and ROM , introduction of cache memory and virtual memory

I/O organization: Basic I/O devices, Introduction to I/O interface, Explanation of I/O organization with block diagram.

Chapter 3 :Introduction to Embedded Systems **[06 H]**

Block Diagram of Embedded System, Design Parameters ,Introduction to Microcontroller and Microprocessor and difference between them , Concept of Single Board Computer [SBC]& System on Chip [SOC] with Example, Introduction to Arduino Uno board ,Block Diagram.Interfacing of various peripherals ,Applications of Embedded system.

Reference Books:

1.Computer Organization -Morris Mano

2. Computer Organisation : Hayes

3. Embedded Systems: Architecture, Programming and Design by Raj Kamal

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Course Title: Electronics Practical Course II

Course Code: 24-CELE12102

Teaching Scheme:4 Hours / week

No. of Credits: 2(P)

Examination Scheme: **CIE:** 20 Marks , **ESE**: 30 Marks

Course Outcomes:- On completion of this course, students will be able

CO1: Understand the working operations of various digital circuits of computer system
CO2:Learn to use and program single board computers
CO3:Develop mini prototype for smart applications

Laboratory Requirements: Experiment Boards, Digital Multimeters
Arduno Uno and interfacing peripherals
Student :computer raito- 1:1

Course Content

List of Experiments (Minimum 10 Practical)

1. Study of Diode Matrix ROM
2. Study of 4 bit shift register
3. Study of 3 bit Counter/ Decade Counter
4. Read/write action of RAM (IC 7489)
5. Study of 4 bit ALU
6. Arduino Programming with LED and switch
7. Arduino Programming with LCD
7. Arduino Programming with sensors LM35
8. Arduino Programming with ultrasonic sensor
9. Arduino Programming with dc and servo motor
10. Arduino Programming with Gas sensor and relay for safety.
11. Arduino Programming with LDR

Activity practical:

12 ,13,14 – Continuation of Sem-I Activity

15. Project Report Writing and presentation.

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