RAMAKRISHNA MISSION VIDYAMANDIRA
CBCS Syllabus B.Sc. Computer Science Honours

Semester-V

Course Code: CMSA CC 12 Credit: 6
Course Type: Core Course

Course Outcome:

i)   Understanding fundamentals of Analog electronics.
ii)   Understanding properties and working of processor using 8085.
iii)   Developing knowledge of assembly language programming using microprocessor kit.
iv)   Understanding embedded system through open source microcontroller based kit.
v)   Working with IDE of microcontroller based prototyping platform.

CMSA CC 12 T: Basic Electronics, Microprocessor and Microcontroller

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Credit: 4   **Marks: 50**

Semiconductor Diode and It's Applications: Concept of Barrier Potential, Barrier Width and Current for Step Junction Diode. Characteristic of a Diode. Half-wave Rectifier. Center-tapped and Bridge Full-wave rectifiers. Idea of Ripple Factor and Rectification Efficiency. Zener Diode and Voltage Regulation. Principle, Structure and Application of (1) LED, (ii) Semiconductor LASER, (iii) Photo Diode and (vi) Solar Cell   [4 L]

Bipolar Junction Transistor: Current Components in a BJT. Characteristics of CB, CE and CC Configurations. Active, Cut-off and Saturation Regions. Current Gains α, β and γ.   [4 L]

Amplifiers: DC load-line and Q-point. Transistor Biasing: Fixed Bias, Collector-to-Base Bias and Voltage Divider / Self Bias (Basic Idea). Transistor as 2-port Network. h-parameter Equivalent Circuit. Analysis of a Single-stage CE Amplifier using h-parameters: Input and Output Impedances, Current, Voltage and Power Gains. Classification of Class A, B, AB and C Amplifiers (Basic Idea). Concept of Feedback. Effects of Positive and Negative Feedback. [6 L]

Introduction to Microcomputer based system: Evolution of Microprocessor and Microcontrollers and their advantages and disadvantages, Architecture of 8 bit and 16 bit microprocessor and Preliminary concepts of 32 bit and 64 bit architecture.   [4 L]

Architecture of 8085 Microprocessor: Hardware and Programming Model, Address/data bus DE multiplexing, Status Signals and the control signals.
Instruction format, Instruction set of 8085 microprocessor, Addressing modes, Instruction Cycle and Timing diagram of the instructions.   [8 L]

Interrupts of 8085 processor: Software and Hardware interrupt, I/O Device Interfacing-I/O Mapped I/O and Memory Mapped I/O, Serial I/O using SID and SOD pins and RIM, SIM Instructions and Parallel data transfer. [8 L]

Interfacing concepts: Memory Interfacing, Concept of Foldback Memory.
I/O Interfacing, Peripheral Interfacing, Keyboard Interfacing, Display Interfacing (Case Studies 8155, 8255, 8279), Concepts of DMA (Case Study 8237). [10 L]

8086 Microprocessor: Basic Architecture, Addressing Modes, Register Supports for virtual Memory. [6 L]

Introduction to Microcontroller Based Prototyping Platform: Understanding embedded system, Device platforms and features, working with displays and other sensors, Communication basics, interfacing using high level programming languages. [10 L]

CMSA CC 12 P: Analog Circuit, 8085 Microprocessor and Arduino

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Credit: 2   **Marks: 25**

Analog Circuits and Systems:

1. Verification of Thevenin's theorem, Norton's theorem and Maximum power transfer theorem using a resistive Wheatstone bridge, dc source and dc meters.
2. To study the forward and reverse static characteristics of a Zener diode and to determine the breakdown voltage and dynamic resistance after breakdown.
3. To study the load and line regulation of a voltage regulator constructed using Zener diode.
4. To study and draw the input and output characteristics of a CE mode transistor.
5. To design basic gates (OR, AND & NOT) using discrete analog components such as junction diodes and transistors. [12 L]

Experiment with 8085A based microcomputing kits: Data movement between register – register, register-memory, memory-memory, Arithmetic and logic operations, Jump and Brunch instructions, sorting searching, block transfer. [16 L]

Experiment with Arduino: Installing and configuring Arduino IDE, Working with ports, displays, working with I/O functions, working with DC motor, working with communication sensor. [10 L]

Recommended Books:

1. Circuit Theory by A. Chakraborty, Dhanpat Rai & Co. (Pvt.) Ltd.
2. Foundations of Electronics by Chattopadhyay and Rakshit, New Age.
3. Fundamental Principle of Electronics by B. Ghosh, Books & Allied.
4. Basic Electronics by Theraja, S. Chand.
5. Make: Getting Started With Arduino - The Open Source Electronics Prototyping Platform by Massimo Banzi, SPD.
6. Microprocessor Architecture, Programming and Applications with the 8085 by Gaonkar, 6th Edition, Penram.
7. Fundamentals of Microprocessors and Microcontrollers by B. Ram, Dhanpat Rai & Co. (Pvt.) Ltd.
8. Arduino Tutorial Documentation, https://www.arduino.cc/en/Tutorial/HomePage.