

RAMAKRISHNA MISSION VIDYAMANDIRA

CBCS Syllabus B.Sc. Computer Science Honours

Semester-I

Course Code: CMSA CC 2 Credit: 6

Course Type: Core Course

Course Outcome:

- i) Understanding fundamentals of Analog electronics.
- ii) Understanding design and function of diodes.
- iii) Understand the characteristics of transistors.
- iv) Design and analyze various rectifier amplifier circuits.
- v) To impart the basic concepts of digital computers.
- vi) Able to analyze the designing process of combinational and sequential circuits.

CMSA CC 2 T: Analog and Digital Electronics

Credit: 4

Marks: 50

Semiconductor Diode and It's Applications: Intrinsic & Extrinsic semiconductor – N type & P type, Construction of a diode, 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 (i) LED, (ii) Semiconductor LASER, (iii) Photo Diode and (vi) Solar Cell [7 L]

Bipolar Junction Transistor: Physical structure of a BJT, Doping profile, Current Components in a BJT. Characteristics of CB, CE and CC Configurations. Active, Cut-off and Saturation Regions. Current Gains α , β and γ . Relation between current gain parameters. [7 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). [6 L]

Feedback & Oscillators: Concept of Feedback. Effects of Positive and Negative Feedback. Principle of oscillator, Barkhausen criteria, Hartley & Colpitts' oscillator (basic idea) [4 L]

Field Effect Transistors: JFET, MOSFET, I-V characteristics, pinch-off, relation between FET parameters, Basic concept of PMOS, NMOS & CMOS. [4 L]

Combinational Digital Circuits: Universal Gates, Logic Synthesis, Code Converters, Adders, Subtractors, Comparators Decoders/Demultiplexers, Encoders, Multiplexers. [17 L]

Sequential Digital Circuits: Study of Clocked Flip Flops (Characteristic Functions, Preset & Clear, Master-slave): SR, JK, D, T. Sequential Design Procedure, Design with State Equation, Synchronous & Asynchronous Counters (up to 4 bit): Ripple, Mod-n, Ring ,Johnson's Counter. Registers: Shift and Parallel. [15 L]

CMSA CC 2 P: Analog and Digital Electronics Laboratory

Credit: 2

Marks: 25

Analog Electronics Practical:

[10L]

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.

Digital Electronics Practical:

[30L]

Combinational Circuits: Study the functionalities & applications of - IC 7483, (IC 74153 and/or IC 74151) (IC74155 and/or IC 74138), IC 7485. Use of seven segment display unit with driver chip. Study of IC 7489 and applications. Horizontal and Vertical expansion.

Sequential Circuits: Study the functionalities & applications of IC 7476, IC 74194, IC 74193.

Recommended Books:

1. Foundations of Electronics by Chattopadhyay and Rakshit, New Age.
 2. Fundamental Principle of Electronics by B. Ghosh, Books & Allied.
 3. Basic Electronics by Theraja, S. Chand.
 4. Circuit Theory by A. Chakraborty, Dhanpat Rai & Co. (Pvt.) Ltd.
 5. Digital Logic and Computer Design by M.Morris Mano, 1st Edition, Pearson.
 6. Digital Systems Principles and Applications by Ronal J. Tocci and Neal S. Widmer, 8th Edition, PHI.
 7. Digital Circuits and Design by S Salivahanan and S Arivazhogan, 4th Edition, Vikas Publishing House Pvt Ltd.
 8. Fundamentals Of Digital Circuits by A. Anand Kumar, 3rd Edition PHI.
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