

64. ELECTRONICS**Part-A (40 Marks)**

Digital Electronics and Microprocessor: 1. Introduction to number systems, Logic gates OR, AND, NOT, XOR, NAND, NOR gates-Truth tables-Positive and negative logic-Logic families and their characteristics-RTL, DTL, ECL, TTL and CMOS.-Universal building blocks NAND and NOR gates. Laws of Boolean algebra De Morgan's Theorems-Boolean identities-Simplification of Boolean expressions-Karnaugh Maps-Sum of Products (SOP) and Product of sums (POS). **2. Combinational and Sequential circuits:** Multiplexer and De-Multiplexer-Decoder, Half adder, Full adder and Parallel adder circuits. Flip flops-Rs, D, JK and JK Master-Slave (working and truth tables) – Registers, Shift registers, Serial in Serial out, Serial in –parallel out, Parallel in-Serial out and Parallel in Parallel out registers, -Synchronous and asynchronous binary counters, Up/Down counters-Decade counter(7490)-working, truth tables and timing diagrams. Semiconductor memories-RAM, ROM, PROM, EPROM, EEPROM. **3. Introduction to Microcomputer and Microprocessor:** Intel 8085 Microprocessor-central processing unit CPU-arithmetic and logic unit ALU-timing and control unit-register organization-address, data and control buses-pin configuration of 8085 and its description. Timing diagrams-Instruction cycle, machine cycle, fetch and execute cycles. **4. Instruction set of 8085,** instruction and data formats – classification of instructions-addressing modes. Assembly language programming examples of 8 and 16-bit addition, subtraction, multiplication and division. Finding the largest and smallest in a data array. Programming examples using stacks and subroutines. **5. Interfacing Peripherals and applications:** Organization of memory and its working-memory interfacing concepts-keyboard interfacing(8279)- Programmable peripheral interface (8255) – D/A and A/D converters and their interfacing to the microprocessor. Stepper motor control-seven segment LED.

Part-B (60 Marks):

Circuit Analysis and Electronic Devices: 1. AC Fundamentals: The sine wave-Average and RMS values, the Operator J, Phasor diagram- Phasor representation of sinusoidal currents and voltages, Complex impedance and admittance, Polar and rectangular forms of complex numbers, Circuit analysis using complex number representation. **2. Passive networks:** Concept of voltage and current sources-Kirchoffs Voltage Law(KVL) and Kirchoff's Current Law (KCL)-Applications to simple networks consisting of resistors with AC and DC sources-Solution of networks using node and mesh analysis. **3. Network theorems (DC and AC):** Superposition Theorem-Thevenin's Theorem-Norton's Theorem-Maximum power transfer Theorem-Milliman's Theorem-Reciprocity Theorem-Applications to simple networks. **4. Cathode Ray Oscilloscope:** Cathode Ray Tube (CRT) and its working, electron gun, focusing, deflection sensitivity, fluorescent screen. **5. RC and RL Circuits:** Transient response of RL and RC circuits with step input-time constants. Frequency response of RC and RL Circuits- Types of Filters: Low pass filter-High pass filter-Frequency response-Passive differentiating and integrating circuits. **6. Resonance:** Series resonance and parallel resonance RLC Circuits-Resonant Frequency- Q factor-Band width-Selectivity. **7. PN Junction:** Depletion region-Junction capacitance- Diode equation (no derivation) – Effect of temperature on reverse saturation current-V-I Characteristics and simple applications of (i)junction diode (ii) Zener diode (iii) Tunnel diode and (iv) Varactor diode. **8. Bipolar Junction Transistor (BJT):** PNP and NPN transistors-current components in BJT-BJT static characteristics(Input and Output)-Early effect-CB, CC, CE configurations (cutoff, active, and saturation regions) CE configuration as two port network-h-parameters-h-parameter equivalent circuit. Determination of h-parameters from the characteristics. Load line analysis. Transistor Biasing-Fixed and self bias. **9. Field Effect Transistor (FET):** Construction and working of JFET and MOSFET- output and transfer characteristics-Determination of FET Parameters. Application of FET as voltage variable resistor and MOSFET as a switch-Advantages of FET over BJT. **10. Uni Junction Transistor (UJT):** Construction and working of UJT – Characteristics. Application of UJT as a relaxation oscillator. **11. Silicon Controlled Rectifier (SCR):** Construction and working of SCR. Two transistor representation, Characteristics of SCR.

Application of SCR for power control. **12. Photo Electronic Devices:** Construction and characteristics of Light Dependent Resistor (LDR), Photo voltaic cell, Photo diode, Photo transistor and Light Emitting Diode (LED).

Analog Circuits and Communications: **1. Power Supplies:** Rectifiers-Halfwave, fullwave and bridge rectifiers-Efficiency-Ripple factor-Regulation – Harmonic components in rectified output – Types of filters- Choke input (inductor) filter- Shunt capacitor filter-L section and π section filters- Block diagram of regulated power supply – Series and shunt regulated power supplies – Three terminal regulators (78XX and 79XX) – Principle and working of switch mode power supply (SMPS). **2. RC Coupled Amplifier:** Analysis and frequency response of single stage RC coupled CE amplifier. **3. Feedback:** Positive and negative feedback – Effect of feedback on gain, band width, noise, input and output impedances. **4. Operational Amplifiers:** Differential amplifier Block diagram of Op-Amp-Ideal characteristics of Op-Amp- Op- Amp parameters- Input resistance- Output resistance- Common mode rejection ratio (CMMR)-Slew rate- Offset voltages- Input bias current-Basic Op-Amp circuits- Inverting Op-Amp- Virtual ground-Non-inverting Op-Amp-Frequency response of Op-Amp. Interpretation of Op-Amp data Sheets. **5. Applications of Op-Amps:** Summing amplifier- subtractor- Voltage follower- Integrator-Differentiator – Comparator- Logarithmic amplifier- Sine wave [Wein Bridge] and square wave [Astable] generators- Triangular wave generator- Monostable multivibrator- Solving simple second order differential equation. Basic Op-Amp series regulator and shunt regulator – IC 555 Timer [Block diagram and its working] – IC 555 as monostable and astable multivibrators. **6. Communications:** Need for modulation-Types of modulation- Amplitude, Frequency and Phase modulation. Amplitude modulation-side bands-modulation index- square law diode modulator-Demodulation- diode detector. Frequency modulation working of simple frequency modulator-Ratio detection of FM waves- Advantages of frequency modulation. AM and FM radio receivers [block diagram approach]. PAM, PCM, PWM and Delta modulations.