

SYLLABUS FOR GSAT-2020
For Admission to M.Sc. ELECTRONICS
Test Code: 101 E

AC Fundamentals: The Sine wave –Average and RMS values–The J operator – Polar and rectangular forms of complex numbers – Phasor diagram – Complex impedance and admittance. **Network theorems (DC and AC):** Superposition Theorem–Thevenin’s Theorem– Norton’s Theorem–Maximum power transfer Theorem–Millman Theorem- Reciprocity Theorem Application to simple networks.

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. **Resonance:** Series resonance and parallel resonance RLC circuits – Resonant frequency – Q factor – Band width – Selectivity.

PN Junction: Depletion region – Junction capacitance – Diode equation– Effect of temperature on reverse saturation current – construction, working, V-I characteristics and simple applications of i) Junction diode ii) Zener diode iii) Tunnel diode and iv) Varactor diode. **Bipolar Junction Transistor (BJT):** PNP and NPN transistors–current components in BJT – BJT static characteristics (Input and Output) – Early effect- CB, CC, CE configurations (cut off, active and saturation regions) **Field Effect Transistor (FET):** Structure and working of JFET and MOSFET output and transfer characteristics. Advantages of FET over transistor.

RC Coupled Amplifier: Analysis and frequency response of single stage RC coupled CE amplifier. **Feedback:** Positive and negative feedback- Effect of feedback on gain, band width, noise, input and output impedances.

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 (CMRR)- 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. **Applications of Op-Amps:** Summing amplifier- subtractor- Voltage follower- Integrator-Differentiator - Comparator- Logarithmic amplifier.

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.

Power Supplies: Rectifiers– Half wave, full wave 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.

Digital Electronics: Introduction to number systems, Logic gates OR, AND, NOT, X-OR, 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).

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) - Semiconductor memories – Organization and working- Synchronous and asynchronous binary counters, Up/Down counters- Decade counter (7490) - working, truth tables and timing diagrams.

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. Instruction set of 8085, instruction and data formats- classification of instructions–addressing modes.

MODEL QUESTIONS

1. In an RL circuit the current and voltage relationship of phase []
a) lead b) lag c) in phase d) none
2. CMRR of ideal Op-Amp is []
a) zero b) infinite c) one d) none of these
