

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) Define Static and Dynamic Resistances. [2M]
- b) Draw V-I characteristics curve of photo diode. [3M]
- c) Explain how PN junction diode acts as a Rectifier. [2M]
- d) Explain the regulation characteristics of Zener diode. [3M]
- e) What is a transistor? Explain about its operation. [2M]
- f) Explain how transistor works as an amplifier. [3M]
- g) Describe the need of biasing. [2M]
- h) Explain thermal Runaway. [3M]
- i) Differences between FET and MOSFET. [2M]
- j) Why we call FET as a Voltage Controlled Device. [3M]

PART-B**(50 Marks)**

- 2.a) What is Tunnel diode? Explain its characteristics with the help of energy band diagrams. [5+5]
- b) Derive the expression for transition capacitance of a diode. [5+5]

OR

- 3.a) Explain about Avalanche and Zener Breakdowns in PN junction diode. [6+4]
- b) Draw the equivalent circuit of a varactor diode. [6+4]

- 4.a) A sinusoidal voltage whose $V_m = 24V$ is applied to half-wave rectifier. The diode may be considered to be ideal and $R_L = 1.8K\Omega$ is connected as load. Find out peak value of current, RMS value of Current, DC value of current and Ripple factor. [6+4]
- b) Compare HWR, FWR and Bridge rectifier. [6+4]

OR

- 5.a) Explain the operation of Full Wave Rectifier with necessary graphs and calculate the efficiency and Ripple factor of it. [6+4]
- b) Explain the necessity of filter circuit after the rectifier circuit. [6+4]
- 6.a) Compare CB, CE and CC Transistor configurations. [5+5]
- b) Explain the operation of CB Configuration of BJT and its input and output Characteristics briefly. [5+5]

OR

- 7.a) A transistor with $\alpha = 0.985$ has a reverse saturation current of $2\mu A$ in CB configuration. Calculate the value of leakage current in the CE configuration. Also find the collector current and the emitter current if the value of base current is $25\mu A$. [7+3]
- b) Describe about Early Effect. [7+3]

8.a) If the various parameters of a CE amplifier which uses the self bias method are $V_{CC}=12V$, $R_1=10K\Omega$, $R_2=5K\Omega$, $R_C=1K\Omega$, $R_E=2K\Omega$ and $\beta=100$, find:

- i) The coordinates of the operating point and
- ii) The stability factor, assuming the transistor to be of silicon.

b) Explain in brief about Thermal stability. [7+3]

OR

9.a) Draw the circuit diagram of a collector to base bias circuit of CE amplifier and derive expression for Stability factor.

b) Derive the operating point using AC and DC load lines. [5+5]

10.a) Draw the circuit diagram of Common Drain amplifier and derive expressions for voltage gain and input resistance.

b) Derive the relation between g_m , μ and r_d . [5+5]

OR

11.a) Explain the drain and transfer characteristics of N-channel JFET.

b) Explain the operation Enhancement mode MOSFET in detail. [5+5]

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