



ACE
Engineering College
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An AUTONOMOUS Institution

Question Paper Code:

EC301PC

ACE-R20

Semester Supplementary Examination
II B. Tech- I Semester- SEPTEMBER-2022
ELECTRONIC DEVICES AND CIRCUITS
(Electronics & Communication Engineering)

Time: 3 Hours

Max. Marks: 70

H. T. No

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks
1. a)	Derive the equation for capacitance exhibited by space charge region of a reverse biased PN diode.	10
b)	For a germanium diode operating at a reverse voltage of 0.26V, calculate dynamic resistance. Assume $I_0 = 2 \mu A$ & $T = 300K$.	4
2. a)	Explain the operation of bridge rectifier with necessary graphs and derive the equations for DC & AC output current, DC & AC output voltage, ripple factor, ratio of rectification and transformer utilization factor.	10
b)	A bridge rectifier uses a load resistor of $2.4K\Omega$. Each PN diode has forward resistance & reverse resistance of 5Ω & ∞ respectively. A 30V, 50 Hz signal is supplied as input to rectifier. Calculate 1) peak current 2) DC current 3) rms current & 4) Peak inverse/ reverse voltage.	4
3. a)	Define maximum voltage rating of a BJT based on Avalanche multiplication process & punch through effect. Write the equations for break down voltage in CB & CE configurations.	7
b)	Explain how BJT acts as amplifier in CB configuration.	4
C)	A transistor in CB configuration has a gain of 0.985 & reverse saturation current of $2 \mu A$. Calculate value of leakage current in CE configuration also calculate collector & emitter current if base current is $25 \mu A$.	3
4. a)	Derive the condition for thermal stability of a self-biased circuit.	7
b)	For a CE mode silicon BJT amplifier which uses self bias various parameters are $V_{CC} = 12V$, $R_1 = 10K\Omega$, $R_2 = 5K\Omega$, $R_C = 1K\Omega$, $R_E = 2K\Omega$ & current gain = 100. Calculate operating point & stability factor.	7
5. a)	Define h-parameters and draw hybrid equivalent circuit of a BJT. Draw a table which gives typical values of h-parameters in CB, CE & CC configurations.	8
b)	A voltage source with internal resistance $R_S = 1000\Omega$ is used as input for a CE amplifier which has a load resistance of $2K\Omega$ in collector circuit. Given $R_E = 200\Omega$, $h_{ie} = 1300\Omega$, $h_{fe} = 55$ & $h_{oe} = 22\mu mhos$. Verify whether approximate model can be used or not for doing analysis and calculate A_i , R_i , A_v , R_o & R_o .	6

	neglecting bias resistors.	
6. a)	Draw and analyze common gate FET amplifier circuit using small signal model. Derive the equations for A_i , A_v , R_i , & R_o .	8
6.b)	Explain the construction and working of P- Channel JFET.	6
7. a)	Draw drain & transfer characteristics of depletion MOSFET and explain the operation	8
b)	Draw reverse characteristics of Zener diode and explain breakdown mechanisms.	6
8. a)	Explain V-I characteristics of Tunnel diode with the help of energy diagrams.	10
b)	Draw circuit symbol, equivalent circuit & characteristics of varactor diode and explain its operation.	4

