

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: BTECH
BRANCH: EEE**

**SEMESTER : V/ADD
SESSION : MO/2025**

SUBJECT: EE357 ELECTRONIC DEVICES & ANALOG CIRCUITS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a)	Explain the operation of a Zener diode as a voltage regulator with circuit diagram. Draw its V-I characteristics.	[5] 1	2
Q.1(b)	Define PIV and TUF. If a voltage of $200 \cos \omega t$ is applied to a half wave rectifier with load resistance of $5 \text{ K}\Omega$ calculate the maximum dc current and rms current.	[5] 1	1
Q.2(a)	Draw the circuit diagram of a Self-biasing circuit of BJT and describe its operation. Explain how a Q point is selected on the DC load line with neat diagrams.	[5] 2	2,3
Q.2(b)	Explain the characteristics of SCR. What is the difference in construction of the D-MOSFET and the E-MOSFET. Calculate the drain resistance if amplification factor, $\mu = 105$ and transconductance, $g_m = 3.5 \text{ mS}$.	[5] 2	2,3
Q.3(a)	Derive the equations of voltage gain and current gain for a BJT in CE Configuration using h parameter model. A CE amplifier has h parameters given by $h_{ie} = 1000 \Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 50$, and $h_{oe} = 25 \mu \text{ mho}$. If $R_L = R_S = 1 \text{ K}\Omega$, determine current gain and voltage gain.	[5] 3	2,4
Q.3(b)	Draw the hybrid π model of a transistor and explain its associated parameters. Define the α and β cut-off frequencies.	[5] 3	1,2
Q.4(a)	Explain the working of a BJT differential amplifier with required diagrams. Define common mode rejection.	[5] 4	1,2
Q.4(b)	Draw and explain the working of transformer-coupled class B push-pull amplifier. Show that the maximum efficiency of a Class B amplifier is 79%.	[5] 4	4
Q.5(a)	Describe the characteristics of negative feedback. Explain the concept of voltage series feedback.	[5] 5	2
Q.5(b)	Draw the circuit of a transistor Colpitts Oscillator and explain its operation. In a Colpitts Oscillator $C_1 = 40 \text{ pF}$, $C_2 = 10 \text{ pF}$ and $L = 3 \text{ mH}$. Calculate the frequency of Oscillation and feedback factor.	[5] 5	4

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