Hall Ticket No | | | | | | | | | | | Question Paper Code:AECC01

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
(Dundigal-500043, Hyderabad)

B.Tech III SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2022
Regulation:UG-20

ELECTRONIC DEVICES AND CIRCUITS

Time: 3 Hours **(ECE)** **Max Marks: 70**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
NOTE: Provision is given to answer TWO questions from among one of the Modules III / IV / V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Draw the full-wave rectifier with center tapped transformer with relevant waveforms and derive expression for its efficiency. **[7M]**

   (b) A full wave rectifier has a center tapped transformer 100-0-100 V. Each one of the diode is rated at Imax of 400mA. Neglecting the voltage drop across the diodes. Solve

   i) Efficiency
   ii) DC output voltage
   iii) DC load current
   iv) PIV of each diode **[7M]**

MODULE – II

2. (a) Describe the working of NPN transistor in common base configuration and draw its input and output characteristics. **[7M]**

   (b) The reverse leakage current of the transistor when connected in CB configuration is 0.2 μA and it is 18 μA when the same transistor is connected in CE configuration. Calculate α_{dc} and β_{dc} of the transistor. (Assume $I_B = 30mA$). **[7M]**

MODULE – III

3. (a) Explain any two bias compensation techniques. Contrast bias stabilization and compensation techniques. **[7M]**

   (b) The h-parameters of a transistor used in a CE circuit are h_{ie} = 1.0 KΩ, h_{re} = 2.0 x 10^{-4}, h_{fe} = 50 and h_{oe} = 25 μmhos. The load resistor for the transistor is 1KΩ and source resistance is 800Ω. Determine the value of $A_V, A_I, R_i, and R_O$. **[7M]**

4. (a) Draw the Self bias circuit and derive the stability factor for it along with explanation. **[7M]**

   (b) The h-parameters of a transistor used in a CB circuit are h_{ib} = 22Ω, h_{rb} = 3.0 x 10^{-4}, h_{fb} = -0.98 and h_{ob} = 0.5 μmhos. The load resistor for the transistor is 1KΩ and source resistance is 1200Ω. Determine the value of $A_V, A_I, R_i,$ *and* R_O, A_{VS}, A_{IS}. **[7M]**

MODULE – IV

5. (a) With a neat constructional diagram explain the operation of n-channel depletion-type MOSFET. **[7M]**

   (b) A JFET amplifier with a voltage-divider biasing circuit has the following parameters: $V_P = -2$V, $I_{DSS} = 4$mA, $R_D = 910\Omega$, $R_S = 3$KΩ, $R_1 = 12$MΩ, $R_2 = 8.57$MΩ and $V_{DD} = 24$ V. Solve the value of drain current I_D at the operating point. Verify whether the FET will operate in the pinch-off region. **[7M]**.

6. (a) Explain the parameters trans-conductance g_m, drain resistance r_d and amplification factor μ of a JFET. Establish a relation between them. **[7M]**

   (b) The device parameters for an n-Channel JFET $I_{DSS} = 10mA$,$V_p = -4V$ Calculate the drain current for i) $V_{GS} = 0$ ii) $V_{GS} = -1.0V$ iii) $V_{GS} = -4V$. **[7M]**

MODULE – V

7. (a) Explain the V-I characteristics of Zener diode and analyse Avalanche and Zener breakdown mechanisms. **[7M]**

   (b) A 5V stabilized power supply is required to be produced from a 12V DC power supply input source. The maximum power rating P_Z of the zener diode is 2W. Solve :

   i) The maximum current flowing through the zener diode.
   ii) The minimum value of the series resistor, R_S.
   iii) The load current I_L if a load resistor of 1kΩ is connected across the zener diode.
   iv) The zener current I_Z at full load. **[7M]**

8. (a) Draw the circuit diagram of SCR and explain its operation along with its characteristics. **[7M]**

   (b) Calculate voltage gain of the CS JFET amplifier given in the Figure 1. $g_m = 4$mA/V and $R_S = 400\Omega$. (Assume necessary data) **[7M]**

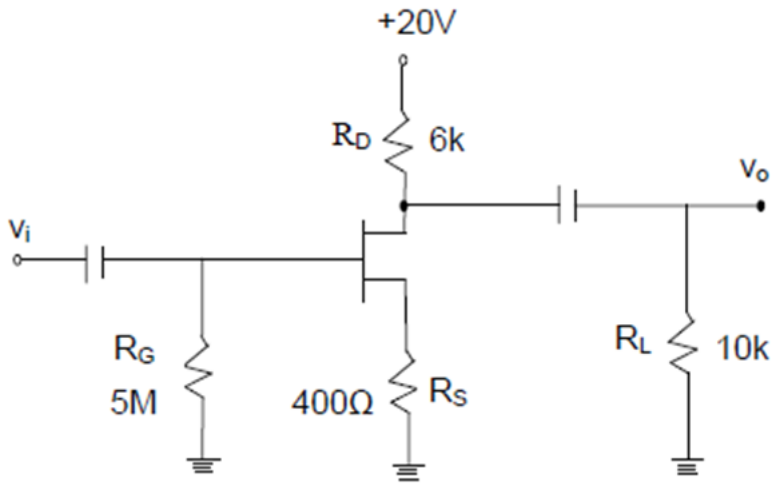

Figure 1