INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal-500043, Hyderabad

B.TECH I SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2024
Regulation: BT23
ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING
(COMMON TO CSE (AI & ML) | IT | AE | ME | CE)

Time: 3 Hours   **Max Marks: 60**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) State ohm's law. Determine the expression resonant frequency and bandwidth of RLC series circuit   [BL: Understand| CO: 1|Marks: 6]

    (b) Find the equivalent resistance between B and C of the circuit shown in the Figure 1 using star delta conversion.   [BL: Apply| CO: 1|Marks: 6]
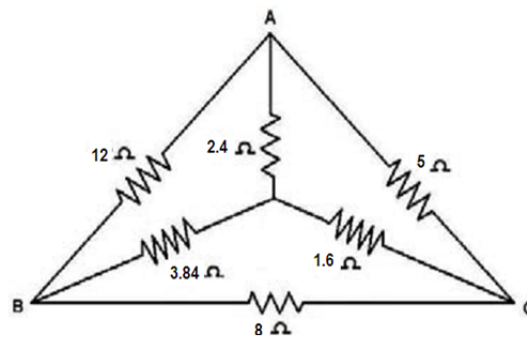

Figure 1

MODULE – II

2. (a) State and prove the maximum power transfer theorem for variable pure resistance load.
         [BL: Understand| CO: 2|Marks: 6]

    (b) Find the value of R_L for the circuit shown in Figure 2 so that maximum power is delivered to it
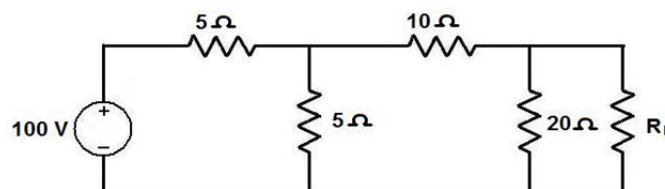   [BL: Apply| CO: 2|Marks: 6]

Figure 2

MODULE – III

3. (a) Classify various types of DC generators. Develop the equation of EMF generated by a DC generator. [BL: Understand| CO: 3|Marks: 6]

   (b) A DC series generator has armature resistance of 0.5ohm and series field resistance of 0.03ohm. It drives a load of 50A.If it has 6 turns/coil and total 540 coils on the armature are driven at 1500 RPM, calculate the terminal voltage at the load. Assume 4 poles, lap winding, flux per pole as 2mwb and total brush drop as 2V. [BL: Apply| CO: 3|Marks: 6]

4. (a) With a neat diagram explain the principle of operation and working of full wave rectifier. [BL: Understand| CO: 4|Marks: 6]

   (b) Determine the output waveform V_o of the Figures 3(i) and 3(ii) shown below. [BL: Apply| CO: 4|Marks: 6]
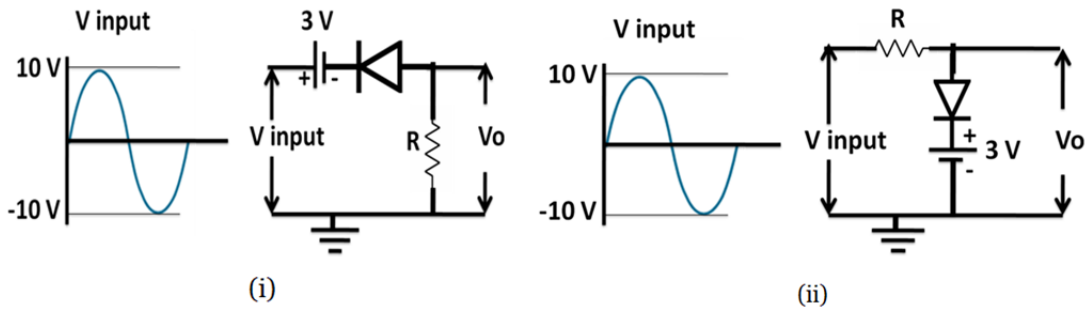

Figure 3

MODULE – IV

5. (a) Compare CC, CB, and CE mode with basic circuit, input & output characteristics, gain and input resistance & output resistance of different BJT configuration. [BL: Understand| CO: 5|Marks: 6]

   (b) A common base transistor amplifier has an input resistance of 20 Ω and output resistance of 100 kΩ. The collector load is 1 kΩ. If a signal of 500 mV is applied between emitter and base, find the voltage amplification factor. Assume α to be nearly one. [BL: Apply| CO: 5|Marks: 6]

6. (a) With a circuit diagram, explain the input and output characteristics of BJT in common collector configuration. [BL: Understand| CO: 5|Marks: 6]

   (b) Determine Vo for the circuit shown in the Figure 4. Also find the mode of operation for the given pulse input. [BL: Apply| CO: 5|Marks: 6]
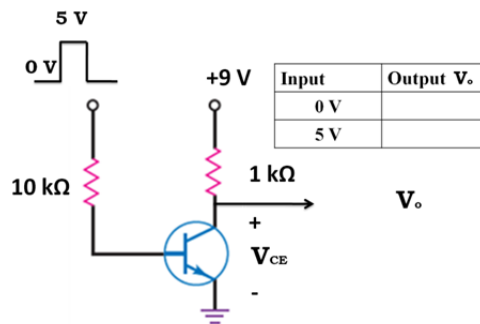

Input	Output V_o
0 V	
5 V	

Figure 4

7. (a) Obtain the expressions for current gain, voltage gain, input impedance and output impedance of CB amplifier using simplified hybrid model. [BL: Understand| CO: 6|Marks: 6]

(b) A voltage source of internal resistance R_s=900Ω drives a CC amplifier using a load resistance R_l=2000Ω. The common-emitter h –parameters are given by $h_{ie} = 1200Ω$, $h_{fe} = 60$, $h_{re} = 2$ x 10^{-4} and $h_{oe} = 25$ x 10^{-6} μA/V. Compute the current gain A_i, input resistance R_i, voltage gain A_v, and output resistance R_o using exact and approximate analysis. [BL: Apply| CO: 6|Marks: 6]

8. (a) List the two port devices of amplifier network with suitable diagrams. Write the limitations of h parameters. [BL: Understand| CO: 6|Marks: 6]

(b) The common emitter amplifier is drawn by a voltage source of internal resistance R_s =800Ω and the load resistance is $R_l = 1000Ω$. The h-parameters are $h_{ie} = 1KΩ$, $h_{re} = 2*10^{-4}$, h_{fe}=50 and $h_{oe} = 25\mu$A/V, compute the current gain A_i, input resistance R_i, Voltage gain A_v, and output resistance R_o using exact analysis. [BL: Apply| CO: 6|Marks: 6]

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