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

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

Time: 3 Hours　　　　　　　　　　　　　(EEE)　　　　　　　　　　　　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) In a series RL circuit, the inductance being 20mH, the impedance is 17.85Ω. The angle of lag of the input current from the applied voltage being 63.5^0 find the values of angular frequency and resistance of the circuit. **[7M]**

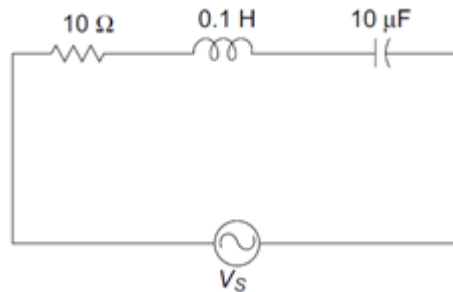   (b) For the circuit shown in Figure 1, determine resonant frequency and the impedance at resonant frequency. **[7M]**

Figure 1

MODULE – II

2. (a) Derive an expression for the current response in R-L series circuit with DC source. **[7M]**

    (b) In the circuit shown in Figure 2, obtain the equations for $I_1(t)$ and $I_2(t)$ when the switch is closed at $t = 0$. **[7M]**
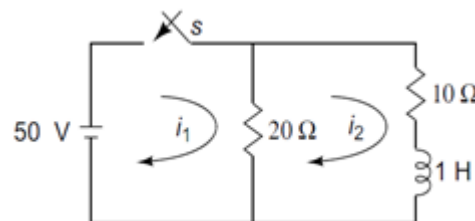

Figure 2

MODULE – III

3. (a) What is locus diagram and show that the locus diagram of series RL circuit with variable R and fixed value of L is a semi-circle? **[7M]**

   (b) For a series RL circuit with variable R, plot the locus of the current, mark the range of I for maximum and minimum values of R, and maximum power consumed in the circuit. Assume X_L=25Ω and R=50Ω. The voltage is 200V, 50 Hz. **[7M]**

4. (a) State and explain the significance of poles and zeros in network function. **[7M]**

   (b) A network function is given by $P(s) = \dfrac{2s}{(s+2)(s^2+2s+2)}$. Obtain the pole-zero plot and determine the stability of the network. **[7M]**

MODULE – IV

5. (a) Obtain the relation between line and phase current in a three-phase balanced star connected system. **[7M]**

   (b) The three RMS phase voltages of a balanced three phase supply are $V_{RN} = 100\angle 0^0$, $V_{YN} = 100\angle -120^0$ and $V_{BN} = 100\angle -240^0$. What are the magnitudes of line voltages? **[7M]**.

6. (a) With the help of connection diagram and phasor diagram, show that two wattmeters are sufficient to measure active power in a three phase three wire system with balanced star connected load. **[7M]**

   (b) Two wattmeters are used to measure power in a 3-phase three wire load. Determine the total power, power factor and reactive power, if two wattmeter read 5000W each, both positive. **[7M]**

MODULE – V

7. (a) What is a filter and classify filters based on frequency characteristics and relation between series and shunt arm impedances. **[7M]**

   (b) Design a constant K-low pass filter to match with a line having characteristic impedance of 500 Ω and to pass frequency upto 5 kHz. **[7M]**

8. (a) With T and π configuration, explain constant K low pass filter and constant K high pass filter. **[7M]**

   (b) Design a proto type section of band pass filter having cut-off frequencies of 12KHz and 16 KHz and a design impedance of 600 ohm. **[7M]**

$$- \circ \circ \bigcirc \circ \circ -$$