**20EE302**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular\Supplementary) DEGREE EXAMINATION** | | | |
| **January, 2024** | **Electrical and Electronics Engineering** | | |
| **Third Semester** | **Network Analysis** | | |
| **Time:** Three Hours | | **Maximum:**70 Marks | |
| *Answer Question No.1 compulsorily.* | | | (1X14 = 14 Marks) |
| *Answer ONE question from each unit.* | | | (4X14=56 Marks) |

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| 1. | | Answer all questions. | | |  | CO | BL | | | Marks | | |
|  | | a) | | Write down the expressions for current through the capacitor and voltage across the inductor. | | CO1 | L1 | | | 1M | | |
|  | | b) | | An RC circuit has R = 20 Ω and C = 400 µF. What is its time constant? | | CO2 | L2 | | | 1M | | |
|  | | c) | | What is the condition for transient current is oscillatory for a series RLC circuit with an AC excitation? | | CO1 | L1 | | | 1M | | |
|  | | d) | | Draw the interconnection between a three phase delta connected source and a star connected load. | | CO3 | L2 | | | 1M | | |
|  | | e) | | In a three phase unbalanced star connected system, what is the vector sum of the currents in the three lines? | | CO3 | L1 | | | 1M | | |
|  | | f) | | What is the behaviour of Inductor in Initial and Steady state conditions? | | CO3 | L1 | | | 1M | | |
|  | | g) | | Define Two-port network. | | CO4 | L2 | | | 1M | | |
|  | | h) | | Draw the equivalent circuit of Z-parameters. | | CO4 | L2 | | | 1M | | |
|  | | i) | | What is the condition for Symmetry in Z and Y parameters? | | CO4 | L1 | | | 1M | | |
|  | | j) | | Write the equations for Z-parameters in terms of Y-parameters. | | CO4 | L1 | | | 1M | | |
|  | | k) | | Draw the characteristics of Low-pass and High-pass filters. | | CO6 | L2 | | | 1M | | |
|  | | l) | | Draw the block diagram of band-pass and band-elimination filters. | | CO6 | L2 | | | 1M | | |
|  | | m) | | Define mutual inductance. | | CO5 | L2 | | | 1M | | |
|  | | n) | | List-out the merits of m-filters. | | CO6 | L1 | | | 1M | | |
| **UNIT I** | | | | | | | | | | | | |
| 2. | a) | | Derive the expression for current i(t) for DC transient in RC series circuit | | | CO1 | | | L2 | | 7M | |
|  | b) | | With suitable example explain how the Laplace transform is useful in obtaining the transient response of a second order system. | | | CO2 | | | L2 | | 7M | |
| **(OR)** | | | | | | | | | | | | |
| 3. | a) | | Derive the expression for current i(t) for AC transient in RC series circuit | | | CO2 | | L1 | | | | 7M |
|  | b) | | A capacitor in an RC circuit with R = 25 Ω and C = 50 µF is being charged with initial zero voltage. What is the time taken for the capacitor voltage to reach 40 % of its steady state value? | | | CO1 | | L2 | | | | 7M |
| **UNIT II** | | | | | | | | | | | | |
| 4. | a) | | Derive the expressions for voltage, current and power in 3 phase balanced star connection system with the help of phasor diagram. | | | CO3 | | L3 | | | | 8M |
|  | b) | | Two wattmeter’s are connected to measure power in a three phase circuit. The reading of one of the meters is 5KW when the load power factor is unity. If the power factor of the load is changed to 0.707 lagging, without changing the total input power, calculate the readings of the two wattmeter’s. | | | CO3 | | L3 | | | | 6M |
| **(OR)** | | | | | | | | | | | | |
| 5. | a) | | A three phase, four wire, 380Vsupply is connected to an unbalanced load having phase impedances of ZR=(4+j3)Ω, ZB=(4-j3)Ω and ZB=2Ω.Impedance of neutral wire is Zn=(1+j2)Ω.Find the phase currents and voltages of the load using Millman’s theorem. | | | CO3 | | L2 | | | | 7M |
|  | b) | | Derive the expressions for voltage, current and power in 3 phase balanced delta connection system with the help of phasor diagram. | | | CO3 | | L3 | | | | 7M |
| **UNIT III** | | | | | | | | | | | | |
| 6. | a) | | Write down the performance equations of two port network parameters Z, Y, ABCD, h and draw the equivalent networks for Z,Y and h parameters. | | | CO4 | | L1 | | | | 7M |
|  | b) | | Explain all network functions with expressions from basic concepts. | | | CO4 | | L2 | | | | 7M |
| **(OR)** | | | | | | | | | | | | |
| 7. | a) | | Find the Z-parameters of the network shown in below figure. | | | CO4 | | L2 | | | | 7M |
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|  | b) | | Determine the current ‘i’ for t ≥ 0 , if VC(0)= 4 V for the circuit shown in figure below. | | | CO4 | | L2 | | | | 7M |
| **UNIT IV** | | | | | | | | | | | | |
| 8. | a) | | Design a constant-K high pass filter having a cut-off frequency of 1 kHz with a load resistance of 600Ω. | | | CO6 | | L3 | | | | 7M |
|  | b) | | Design a band elimination filter(both T and π sections) having a design impedance of 600Ω and cut-off frequencies f1=2 kHz and f2=6 kHz. | | | CO6 | | L3 | | | | 7M |
| **(OR)** | | | | | | | | | | | | |
| 9. | a) | | Explain with diagrams and equations series aiding and opposition of coupled inductors. | | | CO5 | | L2 | | | | 7M |
|  | b) | | The resonant frequency of the tuned circuit shown in figure below is 1000 rad/sec. Calculate the self-inductances of the two coils and the optimum value of the mutual inductance. | | | CO5 | | L2 | | | | 7M |

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