# **20EI304**

**Hall Ticket Number:**

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| **II/IV B.Tech (Regular / Supplementary) DEGREE EXAMINATION** | | | |
| **February, 2023** | **Electronics and Instrumentation Engineering** | | |
| **Third Semester** | **Network Theory** | | |
| **Time:** Three Hours | | **Maximum:7**0 Marks | |
| Answer question 1 compulsory. | | | (1X14 = 14 Marks) |
| Answer one question from each unit. | | | (4X14=56 Marks) |
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| 1. | a) | | | Interpret Active elements. | CO1 | L1 | 1 |
|  | b) | | | List the advantages of Star Delta transformations. | CO1 | L1 |  |
|  | c) | | | What is the difference between the ideal and practical sources? | CO2 | L2 |  |
|  | d) | | | Define the term Phase Difference | CO1 | L1 |  |
|  | e) | | | State the Reciprocity theorem. | CO3 | L1 |  |
|  | f) | | | Why superposition theorem is not applicable for calculating power in electrical circuit? | CO3 | L2 |  |
|  | g) | | | What is the final condition of capacitor? | CO4 | L1 |  |
|  | h) | | | Write the formulae for power factor in terms of active power and reactive power. | CO4 | L1 |  |
|  | i) | | | Define resonance frequency? | CO4 | L1 |  |
|  | j) | | | Draw the phasor diagram for RLC series circuit. | CO4 | L3 |  |
|  | k) | | | Write the equation for the quality factor in terms of bandwidth for parallel R, L & C circuit. | CO5 | L2 |  |
|  | l) | | | What is the Laplace Transform of Unit Step Function? | CO6 | L1 |  |
|  | m) | | | What is the Laplace transform of a function f(t)= t2 | CO6 | L1 |  |
|  | n) | | | Express the Laplace Transform of Function f(t)= Sin ωt | CO6 | L3 |  |
|  | | **Unit-I** | | | | | |
| 2. | a) | | Find the current delivered by the source in the network of fig. 1.    fig.1 | | CO1 | L4 | 7M |
|  | b) | | Determine the power delivered by the voltage source and the current in the 10Ω resistor of the network shown in fig. 2.  fig.2. | | CO1 | L3 | 7M |
|  |  | | **(OR)** | |  |  |  |
| 3. | a) | | Use source transformation to simplify the network until two elements remain to the left of terminals A and B.  fig.3. | | CO1 | L3 | 7M |
|  | b) | | Derive the Energy formula for Capacitor and Inductor. | | CO2 | L2 | 7M |
| **P.T.O** **20EI304** **UNIT - II** | | | | | | | |
| 4. | a) | | Study the behavior of pure resistor R connected in series with a pure capacitor C across a DC Voltage Source. | | CO4 | L3 | 7M |
|  | b) | | Find the current through the 10 Ω resistor by using in Thevenin’s theorem in fig. 4  fig.4 | | CO3 | L4 | 7M |
|  |  | | **(OR)** | |  |  |  |
| 5. | a) | | Draw a vector diagram for the circuit shown in fig.5, indicating terminal voltages V1 and V2 and the current. Find the value of (a) current, (b) V1 and V2, and (c) power factor.  fig.5. | | CO4 | L3 | 7M |
|  | b) | | Find the current I0 in the network of fig.6.  fig.6 | | CO3 | L4 | 7M |
|  |  | | **UNIT-III** | |  |  |  |
| 6. | a) | | An RLC series circuit with a resistance of 10Ω, inductance of 0.2 H and a capacitance of 40μF is supplied with a 100V supply at variable frequency. Find the following w.r.t. the series resonant circuit: (a) frequency of which resonance takes place (b) current (c) power (d) power factor (e) voltage across RLC at that time (f) quality factor (g) resonance and phasor diagrams. | | CO4 | L3 | 7M |
|  | b) | | In the network of fig.7, the switch is initially at the position 1. On the steady state having reached, the switch is changed to the position 2. Find current i(t).  fig.7 | | CO5 | L4 | 7M |
|  |  | | **(OR)** | |  |  |  |
| 7. | a) | | Derive the Bandwidth and Quality factor expression for RLC series circuit. | | CO4 | L3 | 7M |
|  | b) | | In the network of fig.8, the switch K1 has been closed for a long time prior to t=0. At t= 0, the switch K2 is closed. Find *v*C (0+) and *i*C (0+ ).  fig.8 | | CO5 | L2 | 7M |
|  |  | | **UNIT-IV** | |  |  |  |
| 8. | a) | | Explain the initial and final value theorems. | | CO6 | L1 | 7M |
|  | b) | | Find the inverse Laplace transform of | | CO6 | L2 | 7M |
|  |  | | **((OR)** | |  |  |  |
| 9. | a) | | Determine the Laplace transform of the waveform shown in fig.9.  fig.9 | | CO6 | L3 | 7M |
|  | b) | | Find the inverse Laplace transform of | | CO6 | L2 | 7M |

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