Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **18EE2001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELECTRICAL CIRCUIT ANALYSIS** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (10X1 = 10 MARKS)** | | | |
| 1. | Find the voltage across a 1.1kW toaster that produces a current of 10A. | CO1 | 1 |
| 2. | Compute the equivalent current source, if a 120 V voltage source has an internal resistance of 60 ῼ. | CO1 | 1 |
| 3. | Superposition Theorem is not valid for \_\_\_\_\_\_\_\_\_\_\_\_.  a) power responses b) voltage responses c)current responses d) all the three | CO2 | 1 |
| 4. | Norton’s theorem is the dual of Thevenin’s theorem \_\_\_\_\_\_\_\_ (True / False) | CO2 | 1 |
| 5. | The time constant of a series RL Circuit is \_\_\_\_\_\_\_\_\_\_. | CO3 | 1 |
| 6. | Draw the phasor diagram of a pure inductive circuit. | CO3 | 1 |
| 7. | Phase voltages of a star connected alternator are ER = 240∠ 0° V, EY = 240∠ -120° V & EB = 240 ∠ -240° V. Write the phase sequence of the system. | CO4 | 1 |
| 8. | In a 3 phase circuit with balanced delta connected load , what will be the phase voltage if the line voltage is 400V? | CO4 | 1 |
| 9. | Calculate the bandwidth, if a resonant circuit has a lower cut-off frequency of 1400 Hz and an upper cut-off frequency of 4800 Hz. | CO5 | 1 |
| 10. | Define Q factor of a coil. | CO5 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | The power supplied by 25V source in the given figure shown below is \_\_\_\_ W. | CO1 | 3 |
| 12. | Find the value of Rout such that maximum power is transferred to the load. | CO2 | 3 |
| 13. | Derive the transient response of an RC circuit when it is switched to a unit step voltage source at time t=0. Assume that the initial voltage across capacitor is zero. | CO3 | 3 |
| 14. | An alternating sinusoidal voltage equation is given by *v* = 200 sin314*t*. Obtain Vavg, Vrms, form factor and peak factor. | CO4 | 3 |
| 15. | Two identical coupled inductors are connected in series. The measured inductances for the two possible series connections are 380 μH and 240 μH. Find their mutual inductance in μH. | CO5 | 3 |
| 16. | Write a performance equation of a two port network in terms of admittance parameters. | CO6 | 3 |

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| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. | a. | Determine the current through R3 using node analysis. | CO1 | 6 |
| b. | Find the load current using mesh analysis | CO1 | 6 |
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| 18. | a. | Find the Thevenin’s equivalent circuit at the terminals *a* and *b.* | CO2 | 6 |
| b. | State and illustrate reciprocity theorem. | CO2 | 6 |
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| 19. | a. | The switch in the RC circuit shown in Fig is closed at t = 0. If there is no charge initially stored on the capacitor, find:  a) VR, the voltage across the resistor at t = 50 micro seconds.  b) Vc, the voltage across the capacitor at t = 100 micro seconds. | CO3 | 6 |
| b. | A series RL circuit with R = 100 Ὼ and L = 10 H has a DC voltage of 150 V applied through a switch at t = 0. (i) Derive the equation for the current and voltages across the different elements. (ii) Find the current value at t= 0.2 seconds. | CO3 | 6 |
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| 20. | a. | A balanced star-connected load of (4 + j3) ῼ per phase is connected to a balanced 3-phase 400V supply. The phase current is 12A.  Find: i) the total active power  ii) reactive power  iii) total apparent power. | CO4 | 8 |
|  | b. | Compute the equivalent inductance with respect to the terminals A and B. | CO4 | 4 |
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| 21. | a. | Determine the Resonant frequency , Band width and Quality factor for the ideal series RLC circuit having R=10ῼ, L = 0.5mH, C = 10 μF and supply voltage V = 10 V. | CO5 | 8 |
| b. | Explain the concept of poles and zeros and their significance. | CO5 | 4 |
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| 22. | a. | Discuss duality in detail. | CO1 | 6 |
| b. | State & explain Kirchhoff’s Voltage Law (KVL) & Kirchhoff’s Current Law (KCL). | CO1 | 6 |
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| 23. | a. | Determine the voltage (*v*) across 4ῼ resistor using superposition theorem. | CO2 | 6 |
| b. | State and explain the “The Maximum Power Transfer Theorem”. Also write the condition for maximum power transfer to the load. | CO2 | 6 |
|  |  | **Compulsory:** |  |  |
| 24. | a. | Obtain the z- parameters for the given two port network. | CO6 | 8 |
| b. | The open circuit impedance parameters of a two port network are z11 = 5 ῼ., z12 = 3ῼ., z21 = 3 ῼ., z22 = 4 ῼ. Determine the ABCD parameters. | CO6 | 4 |