MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : ES-EE101/ESEE101 Basic Electrical Engineering
UNID : 001609

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]
   (i) Define time constant for a R-L series circuit.
   (ii) What is the effect of frequency on capacitive reactance?
   (iii) Which material is used in core of transformer?
   (iv) What is the condition for maximum starting torque of an induction motor?
   (v) What is the need of controlling the output voltage of an inverter?
   (vi) What is fuse link?
   (vii) Convert 4A source with its parallel resistance of 15Ω into its equivalent voltage source
   (viii) In series circuit analysis, why is current taken as reference phasor?
   (ix) In a transformer, maximum voltage regulation occurs at _____.
   (x) What is meant by rotor frequency in 3 phase induction motor?
   (xi) When is steady-state ripple maximum for chopper?
   (xii) What is current that is considered safe for human body?

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. What are the different kind of battery? What is the important characteristics of battery? [5]
3. Discuss the phase relation between applied voltage and line current when ac flows through RC circuit. [5]
4. Draw a neat phasor diagram of a transformer with the load having lagging power factor. [5]
5. Derive the torque equation of 3-phase induction motor. [5]
6. A single phase, 50Hz transformer has 80 turns on the primary winding and 280 turns in the secondary winding.The voltage applied across the primary winding is 240 volts.The net cross-sectional area of the core can be taken 200 cm^2. Calculate: [5]
   (i)The maximum flux density in the core
   (ii) Induced emf in the secondary winding.

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. (a) Draw and explain phasor diagram of R-L-C series circuit and give the condition for resonance in this circuit. [5]
   (b) Define the Bandwidth of a resonant circuit. Give the relationship of quality factor in terms of bandwidth and resonant frequency. [5]
   (c) Why is the series resonance called the voltage resonance? [2]
8. (a) Discuss in brief about auto-transformer. [5]
   (b) The "voltage regulation" of a transformer will be zero for a leading pf load.Justify the Statement. [7]
   (c) What do you understand by the term "Ideal Transformer"? [3]
9. a) Describe any two techniques of speed control of 3-phase induction motor. [3+3]
   (b) The input power to a 6 pole, 3 phase, 50Hz induction motor is 42kW, the speed is 970 rpm. The stator losses are 1.2kW and friction and windage losses 1.8kW. Find [3+3+3]
   i) the slip
   ii) the rotor copper losses
   iii) efficiency of motor
10. (a) Describe the working of a single phase full bridge inverter with the help of voltage waveform. [8]

(b) Discuss how output power in single phase full bridge inverter becomes 4 times the power supplied by a single phase half bridge inverter. [7]

11. (a) In what way a practical transformer differs from an ideal transformer? [3]

(b) Develop an equivalent circuit for the Practical Transformer. [6]

(c) A 10 KVA ,single phase transformer with 2000/400 V at no load, has resistance and leakage reactance of primary winding 5.5 ohm and 12 ohm respectively,the corresponding values of secondary winding being 0.2 ohm and 0.45 ohm.Determine the value of secondary voltage at full load,0.8 pf lagging,when the primary applied voltage is 2000V. [6]

*** END OF PAPER ***