Sr. No 003105

December 2023

B. Tech (CE/CSE/ECE/ME) Re-Appear 1st Sem.

Basic Electrical Engineering (ESC-101)

Time: 3 Hours **Max. Marks:75**

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART -A

Q1 (a) Distinguish between loop and mesh? (1.5)

(b) State and explain Kirchhoff's current and voltage laws? (1.5)

(c) What do you understand by self induced e.m.f and mutually induced e.m.f? (1.5)

(d) Explain how a sinusoidal e.m.f is generated? (1.5)

(e) Explain with mathematical expression that power consumed in a pure capacitance is zero? (1.5)

(f) Describe the basic features of a balanced 3- phase system? (1.5)

(g) Name the various parts of a D.C machine and give the function of each part? (1.5)

(h) Draw the torque-slip curve of a 3-phase induction motor and mark on it the starting torque, maximum torque and full load torque? (1.5)

(i) Discuss the requirements of a good inverter? (1.5)

(j) What are line-commutated inverters? (1.5)

PART -B

Q2 (a) State the maximum power transfer theorem. Show that for maximum power transfer RL= Rth and explain its importance? (7)

(b) State and explain Superposition theorem how is it applied for solving a network? Illustrate the application of the theorem with reference to an appropriate electric network? (8)

Q3 (a) For a half wave rectified alternating current, find (1) Average value (2). RMS value (3). Form factor (4) Peak Factor (10)

(b) Describe the condition of Series resonance using appropriate circuit diagram and waveforms. (5)

Q4 (a) Explain the principle of working of an auto- transformer. In what ways does an auto-transformer differ from a conventional two-winding transformer? What are its application and disadvantages? (7.5)

b) A parallel circuit consists of a 2.5 μF capacitor and a coil whose resistance and inductance are 15Ω and 260 milli-Henry respectively. Determine (1) the resonant frequency (2) Quality factor of the coil (3) Dynamic impedance of the circuit? (7.5)

Q5 (a) A single phase transformer with a ratio 5:1 has primary resistance of 0.4 ohm and reactance of 1.2 ohm and the secondary resistance of 0.01 ohm and reactance of 0.04 ohm. Determine the percentage regulation when delivering 125 A at 600 V at (1). 0.8 power factor lagging (2). 0.8 power factor lagging? (7.5)

(b) Explain the construction and working principle of a miniature circuit breaker (MCB) (7.5)

Q6 (a) Clearly explain difference between squirrel cage and slip-ring induction motors? (7.5)

(b) Explain the advantages of making field system rotating and armature stationary in case of an synchronous alternator? (7.5)

Q7 (a) Describe the working of a single-phase half- bridge inverter. What is its main drawback? Explain how this drawback is overcome? (8)

(b) What is the objective of Earthing? Explain different methods of earthing? (7)

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