Code: 13A02303 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017

ELECTRICAL TECHNOLOGY

(Common to ECE & EIE)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Write the advantages of polyphase system over single phase system.
(b) Explain applications of Millman's theorem.
(c) Explain the function of yoke and commutator of DC generator.
(d) Derive torque equation of DC motor.
(e) Explain constructional details of single phase transformer.
(f) Define different losses in single phase transformer.
(g) Define slip and explain significance of slip in three phase induction motor.
(h) Draw torque-slip characteristics of three phase induction motor.
(i) Explain constructional features of smooth cylindrical type synchronous machines.
(j) Define pitch factor.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 (a) Explain measurement of $3-\phi$ power by two wattmeter method.

(b) A star connected $3-\phi$ load has a resistance of 8 Ω and a capacitive reactance of 10 Ω in each phase. It is fed from a 400 V, $3-\phi$ balanced supply.
(i) Find the line current, total volt-amperes, active and reactive powers.
(ii) Draw the phasor diagram showing phase voltages, line voltages and currents.

OR

3 (a) Derive the relation between phase and line values in a 3-phase balanced delta connected system.

(b) Three impedances each of (3-j4) ohm are connected its delta to a 230 V, 3-phase, 50 Hz balanced supply. Calculate the line and phase currents in delta connected load and the power delivered to the load.

UNIT - II

4 (a) Explain working principles of DC generator.

(b) A 6 pole lap wound shunt generator supplies to 100 lamps of 100 watts, 200 V each. The field and armature resistances are 500 ohms and 0.2 ohm respectively. Allowing a brush drop of 1V each brush, calculate the following: (i) Armature current.
(ii) Generated emf
(iii) Power output of D.C generator.

OR

5 (a) Explain Swinburne's test on DC motors.

(b) Explain different characteristics of DC series motors.

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UNIT - III

6 (a) Explain principle of operation of transformer and derive the EMF equation of transformer.

(b) Draw the phasor diagrams of the single phase transformer under no-load condition.

OR

7 A 4 kVA, 200/400 V, 50 Hz, transformer gave the following test figures:

No load: Low voltage data: 200 V, 0.7 A, 60 W;

Short circuit: High voltage data: 9 V, 6 A, 21.6 W.

Calculate the magnetizing current and component corresponding to iron loss at normal voltage and frequency. Find the efficiency on full load at unity power factor. Also determine the regulation at half-full load 0.707 leading power factor.

UNIT - IV

8 (a) Discuss the production of rotating magnetic field in induction motors with neat diagram.

(b) A 3-phase induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate: (i) Synchronous speed. (ii) Rotor speed when slip is 3%. (iii) Rotor frequency when rotor runs at 500 rpm.

OR

9 The power input to a 3-phase induction motor is 60 kW. The stator losses total 1 kW. Find the total mechanical power developed and the rotor copper loss per phase, if the motor is running at 3% slip.

UNIT - V

10 (a) Explain the principle of working of synchronous motor.

(b) Briefly describe the coil span factor in synchronous motor.

OR

11 Explain voltage regulation of alternator by EMF method.

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