

B.Tech II Year I Semester (R13) Supplementary Examinations November/December 2016

**ELECTRICAL TECHNOLOGY**

(Common to ECE and EIE)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Write advantages of three phases over single phase.
  - What is the magnitude of each line current in a Y-connected circuit?
  - What is the function of commutator in a dc machine: (i) in motoring action. (ii) in generating action.
  - What is the purpose of starter in a DC motor?
  - Why SC test is performed on HV side of a transformer? Why is the core loss almost negligible in this test?
  - What is a function of transformer?
  - Define slip of induction motor.
  - What are the applications of three phase Induction motor?
  - Define distribution factor.
  - What type of alternators will be used: (i) for hydraulic turbines. (ii) for steam turbines as prime movers.

**PART – B**

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

**UNIT – I**

- 2 Deduce the relationship between phase and line voltages and currents in a 3-phase star connected circuit. Draw phasor diagram to establish it.

**OR**

- 3 Three loads  $31+j59$ ,  $30-j40$  and  $80+j60$  are connected in delta to a 3-phase, 200 V supply. Find the phase currents, line currents and power.

**UNIT – II**

- 4 Explain with the help of sketches working principle of a DC generator.

**OR**

- 5 (a) Explain the Swinburne's test to determine no load losses of a DC machine.  
(b) When running on No load, a 400 V shunt motor takes 5 A. Armature resistance is 0.5 ohms and field resistance 200 ohms. Find output of the motor and efficiency when running on full load and taking a current of 50 A.

**UNIT – III**

- 6 (a) Derive the emf equation of single phase transformer.  
(b) A single phase 50 Hz transformer has 80 turns on the primary winding and 280 turns on the secondary winding. The voltage across the primary winding is 240 V at 50 Hz. Calculate: (i) The maximum flux density in the core. (ii) Induced emf in secondary. The net cross sectional area of the core be taken as  $200 \text{ cm}^2$ .

**OR**

- 7 (a) Derive the condition for maximum efficiency of the single phase transformer.  
(b) The following test results were obtained on a 4 kVA, 200 V/400 V, 50 Hz single phase transformer. The OC/SC Test results are as follows:
- |          |       |       |                |
|----------|-------|-------|----------------|
| OC Test: | 200 V | 0.8 A | 70 W (LV side) |
| SC Test: | 20 V  | 10 A  | 60 W (HV side) |
- Calculate the efficiency at full load current, 0.8 lagging power factor.

**UNIT – IV**

- 8 Explain the working principle of a three phase induction motor.

**OR**

- 9 (a) Derive the expression for torque developed in a three phase induction motor.  
(b) Draw and explain the slip-torque characteristics of a three phase induction motor.

**UNIT – V**

- 10 Describe with neat sketches, the constructional details of a synchronous machine.

**OR**

- 11 Explain the EMF method for predetermining the voltage regulation of an alternator.

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