

**B. Tech Degree III Semester Examination, November 2008****IT/EC/EI/ME/EB 302 ELECTRICAL TECHNOLOGY***(2006 Scheme)*

Time : 3 Hours

Maximum Marks : 100

**PART A***(Answer ALL questions)**(All questions carry EQUAL marks)**(8 x 5 = 40)*

- I. (a) What are the losses in a transformer? How do they vary with load?  
 (b) What do you mean by CT and PT? Where are they used?  
 (c) Develop from first principles an expression for the emf generated in DC generator?  
 (d) Explain the significance of back emf in a dc motor  
 (e) Explain how the torque is developed in a rotor of  $3\phi$  induction motor.  
 (f) Explain any one starting method of single phase induction motor.  
 (g) Explain the term corona.  
 (h) Discuss the advantage of high voltage transmission.

**PART B**

- II. (a) Derive the condition for maximum efficiency of  $1\phi$  transformer. (7)  
 (b) A 20 KVA, 2500/250V, 50Hz  $1\phi$  transformer gave the following results :  
     OC Test : 250V, 1.4A, 105 W  
     SC Test : 104 V, 8 A, 320 W  
 (i) Draw the equivalent circuit with referred to Iv side  
 (ii) Obtain the loaded KVA for max efficiency (8)
- OR**
- III. (a) Draw and explain the vector diagram of a  $1\phi$  transformer at leading power factor. (7)  
 (b) A transformer rated for 10 KVA 2000V/100V, 50Hz when tested took 200W on open circuit at rated voltage and 250W on open short circuit test with full load current circulated in the windings. Determine the efficiency at full load, 0.8 pf lagging and the KVA loading to give maximum efficiency at upf. (8)
- IV. (a) Explain the effect of armature reaction? How is it compensated? (7)  
 (b) A shunt motor takes an armature current of 50A at 220V, when running on full load; at a speed of 800rpm . The armature resistance is of  $0.2\Omega$  . If the field strength is reduced by 10% and the torque remains the same, determine the steady speed attained and the armature current. (8)
- OR**
- V. (a) Explain the necessity of starter of DC motor, with neat sketch explain the working of 3 point starter. (7)  
 (b) A short shunt compound generator supplies a load of 11KW at 220V. The series field armature and shunt field resistances are 0.15, 0.02, and 47 ohms respectively. Stray losses are 305 W. Find  
     (i) emf generated  
     (ii) copper losses  
     (iii) output of the driving engine  
     (iv) commercial and electrical efficiencies (8)

*(Turn Over)*

- VI. (a) Define voltage regulation of an alternator. Explain the emf method for finding voltage regulation. (7)
- (b) A 100KVA, 3 KV, 50 Hz, 3  $\phi$  , Y connected alternator has effective armature resistance of  $0.2 \Omega$  . If a field current of 40A produces a short circuit current of 200A and an open circuit emf of 1040V (line to line). Calculate the full load voltage regulation at 0.8 pf lagging and 0.8 pf leading. (8)
- OR**
- VII. (a) Why single phase induction motor is not self starting? Explain with the help of double field revolving theory. (7)
- (b) A 3  $\phi$  , 50 Hz 4 pole induction motor has a slip of 4%. Calculate
- (i) Speed of the rotor
  - (ii) Frequency of the rotor emf
  - (iii) rotor current and power factor if it has a stand still resistance and reactance of  $1 \Omega$  and  $5 \Omega$  respectively at stand still and running at 1400 rpm. (8)
- VIII. With the help of neat schematic diagram explain the working of nuclear power plant. (15)
- OR**
- IX. Wrote short notes on :
- (i) Overhead lines and under ground cables
  - (ii) Circuit breakers
  - (iii) Electrical insulators. (15)

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