



BTS (C) - III - 05 - 056 (A)

B. Tech Degree III Semester Examination, November 2005

IT/CS/EC/ME/EB/EI 302 ELECTRICAL TECHNOLOGY

(1999 & 2002 Admissions)

Time : 3 Hours

Maximum Marks : 100

(All questions carry EQUAL marks)

- I. (a) Explain briefly the operation of a transformer and sketch phasor diagram on no load.
(b) A single phase transformer is connected to a 230 V, 50 Hz supply. The net cross sectional area of the core is 60 cm^2 . The number of turns on the primary is 500 and in the secondary 100. Determine the emf induced in the secondary winding and maximum value of flux density in the core.
- OR**
- II. (a) Derive an expression for the saving of copper on an autotransformer as compared to an equivalent two winding transformer.
(b) A 4 KVA, 400/200V, 50 Hz single phase transformer has the following test data :
O.C. test (l.v. side) 200 V, 1 A, 64 W
S.C. test (h.v. side) 15 V, 10 A, 80 W
Determine the equivalent circuit referred to l.v. side.
- III. (a) Explain the methods of improving commutation.
(b) Find the efficiency at full load for a 1200 KW, 600V shunt generator using the following data:
Armature resistance - 0.005Ω , shunt field resistance - 60Ω , mechanical and iron losses at rated load - 20 KW, stray load loss - 1.2% of output.
- OR**
- IV. (a) Discuss the various methods of speed control that can be used for dc shunt motor.
(b) A 220 V dc shunt motor draws a no-load armature current of 2.5 A when running at 1400 rpm. Determine its speed when taking an armature current of 60 A, if armature reaction weakens the flux by 3%.
- V. (a) Derive emf equation of alternator and explain coil span factor and distribution factor.
(b) A 3 phase star connected alternator is rated at 1500 KVA, 12000 V. The armature effective resistance and synchronous reactance are 2Ω and 35Ω respectively per phase. Calculate the percentage regulation for a load of 1200 KW at power factors of 0.8 lagging and 0.8 leading.
- OR**
- VI. (a) Explain 'V' and inverted 'V' curves as applied to synchronous motors.
(b) A 500 V, 1 ϕ synchronous motor gives a net output mechanical power of 7.46 KW and operates at 0.9 p_f lagging. Its effective resistance is 0.8Ω . If the iron and mechanical losses are 500 W and excitation losses are 800 W, estimate the armature current. Calculate the commercial efficiency.
- VII. (a) What are the various losses in an induction motor?
(b) The slipping rotor resistance and stand still reactance per phase of a 3300 V, 24 pole, 50 Hz, 3 phase star connected induction motor are 0.02Ω and 0.3Ω respectively. Calculate the speed at maximum torque and ratio of full load torque to maximum torque if full load torque is obtained at 246 rpm.
- OR**
- VIII. (a) Draw and explain the torque-slip characteristic of a typical induction motor.
(b) Explain why a single phase induction motor does not self start. Discuss its operation based on double revolving field theory.
- IX. (a) With necessary schematic diagram, explain the working of Nuclear Power Plant.
(b) What is corona? What are the factors which affect the corona?
- OR**
- X. Write short notes on :
(i) Electrical equipments in power station (ii) Electrical insulators
(iii) Skin effect.