



M 25932

Reg. No. :

Name :

**Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part-Time)
Examination, November 2014
PT2K6/2K6EC/AEI 303 – ELECTRICAL ENGINEERING
(2007 Admn. Onwards)**

Time: 3 Hours

Max. Marks : 100

Instruction : Answer all questions.

PART – A

1. a) A 250 V, 4-pole shunt motor has two circuit armature winding with 500 conductors. The armature circuit resistance is 0.25Ω , field resistance is 100Ω and the flux per pole is 0.02 wb. Armature reaction is neglected. If the motor draws 14.5A from the mains, then compute speed and the gross torque developed. **5**
- b) Discuss the functions of holding coil and over load release coil in a 3 pt starter. **5**
- c) Draw the phasor diagram of a loaded single phase transformer and derive from this equivalent circuit of the transformer. **5**
- d) What is the necessity of parallel operation of transformer ? And discuss the conditions for satisfactory operation of transformers in parallel. **5**
- e) Discuss the advantages of short pitch winding. **5**
- f) A 3-phase star connected attenuator is rated at 1600 kVa, 13,500 V. The armature resistance and synchronous reactance are 1.5Ω and 30 respectively per phase. Calculate the percentage regulation for a load of 1280 kW at 0.8 leading power factor. **5**
- g) A 3-phase induction motor has 2 poles and is connected to 400 V, 50 Hz supply. Calculate the actual rotor speed and rotor frequency when the slip is 4%. **5**
- h) Discuss the working of dc servomotor. **5**

(8×5=40)

P.T.O.



PART – B

2. a) Explain the different methods of improving commutation in a DC machine. 10
- b) How demagnetising and cross magnetising ampere turns per pole are calculated in a dc machine ? 5
- OR
- c) Discuss the working of a 2 point starter. 6
- d) A commutator machine is rated at 5 kW, 250 V, 2000 rpm. The armature resistance R_a is 1Ω . Driven from the electrical end at 2000 rpm the no-load power input to the armature is $I_a = 1.2$ A at 250 V with the field winding ($R_f = 250 \Omega$) excited by $I_f = 1$ A. Estimate the efficiency of the machine as a 5 kW generator. 9
3. a) A 10 KVA, 200/400 V, 50 Hz single phase transformer gave the following test results.
- D. C. test (hv winding open) 200 V, 1.3 A, 120 W
- S. C. test (lv winding short-circuited) 22 V, 30 A, 200 W
- Find parameters of equivalent circuit as referred to lv winding. 10
- b) Briefly discuss about the construction and function of a conservator in a transformer. 5
- OR
- c) Two transformers each of 80 KVA are connected in parallel. One has resistance and reactance of 1% and 4% respectively and the other has resistance and reactance of 1.5% and 6% respectively. Calculate the load shared by each transformer and the corresponding power factor when the total load shared is 100 KVA 0.8 p.f. leading. 9
- d) Compare an autotransformer with two winding transformer. 6
4. a) Compare synchronous impedance method and ampere turn method of predetermining regulation of alternator. 9
- b) A 50 Hz, 3 phase star connected alternator which generates 10,000 V between lines on open circuit has a flux per pole of 15×10^{-2} wb. If the distribution factor of the full pitch coil is 0.96, find the number of armature conductors in series per phase. 6

OR



- c) A 75 kW, 400 V, 4-pole, 3 phase star connected synchronous motor has a resistance and synchronous reactance per phase of 0.04Ω and 0.4Ω respectively. Compute for full load 0.8 p.f. lead the open circuit emf per phase and gross mechanical power developed. Assume an efficiency of 92.5%. **9**
 - d) Derive an expression for power developed in synchronous motor. **6**
 - 5. a) Compare induction generator and synchronous generator. **6**
 - b) The power input to the rotor of a 440 V, 50 Hz, 3 phase 6 pole induction motor is 60 kW. It is observed that the rotor emf makes 90 complete cycles per minute. Calculate :
 - i) The slip
 - ii) The rotor speed
 - iii) Rotor copper loss
 - iv) Mechanical power developed. **9**
- OR
- c) Explain the operation of AC servomotor. **9**
 - d) Explain the operation of variable reluctance stepper motor. **6**
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