Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PCEL 4302

Fifth Semester Back Examination – 2014

ELECTRICAL MACHINES - II

BRANCH (S) : EEE, ELECTRICAL

QUESTION CODE : L 249

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) How frequency of induced emf is related to speed in a three phase synchronous alternator ?

(b) What is voltage regulation of an alternator ?

(c) Calculate the pitch Factor for a three phase balanced distributed winding having 54 stator slots, 6 poles, and a coil span of 8 slots.

(d) What is the significance of short circuit ratio of an alternator ?

(e) Why per phase X_d of a salient pole three phase alternator is greater than its X_q ?

(f) Explain the objective of using an auxiliary winding in a single phase induction motor.

(g) What do you understand by synchonising of alternators ?

(h) Name various types of torques for a synchronous motor.

(i) Explain the advantage of using tertiary winding in a bank of star transformers.

(j) What is an universal motor ? Mention two of its application.

P.T.O.

2. (a) A 4 pole ,50Hz star connected alternator has a flux per pole of 0.12mWb. It has 4slots per pole per phase, conductors per slot being 4.If the winding coil span is 150°, find the e.m.f. 5

(b) Explain the method for determining the voltage regulation of three phase synchronous alternator by potier triangle method. 5

3. (a) A 3 phase star connected 50Hz synchronous generator has direct axis synchronous reactance of 0.65 p.u and quadrature axis reactance of 0.5 p.u. The generator delivers rated kVA at rated voltage. Draw the phasor diagram at full load 0.8 p.f (lag) and hence calculate the p.u open circuit voltage. (Neglect Saturation) 5

(b) Describe the experimental method of finding out the per phase direct axis and the quadrature axis synchronous reactances of a three phase salient pole synchronous machine by performing 'slip Test'. 5

4. (a) Draw the physical connection and phasor diagrams for the transformer connections 5

(i) Y z 1

(ii) D z 6 ?

(b) Two three phase transformers rated 500 KVA and 300 KVA respectively connected in parallel to supply a load of 1000 KVA at 0.8 pf (lag). The per phase resistance and per phase leakage reactance of the first transformer is 2% and 4% respectively and the second transformer is 1% and 5% respectively. Calculate the KVA load and power factor at which each transformer operates. 5

5. (a) Two single phase furnaces are supplied at 250 V from a 6.6 kV, 3 phase system through a pair of Scott connected transformers. If the load on the main transformer is 85 kW at 0.9p.f (lag) and on the teaser transformer is 69 kW at 0.8 p.f (lag), find the values of line current on the three phase side. (Neglect the magnetizing and core loss currents in the transformer) 5

(b) Draw the Scott Connection of transformers and mark the terminals. Also write the application of this connection. 5

6. (a) The synchronous reactance per phase of a 3 phase star connected 6.6 kV synchronous motor is 20 Ω . For a load input 915 kW at normal voltage and the induced line e.m.f is 8942 V. Neglecting resistance, determine : 5

(i) Line current

(ii) Power factor.

(b) Derive the power angle (P-∂) equation of a cylindrical rotor alternator. Also explain its characteristic. 5

7. (a) Draw the equivalent circuit diagram of a single phase induction motor ignoring core losses. 5

(b) What are the types of single phase induction motors based on the starting methods ? Explain any one briefly. 5

8. Answer any **two** of the following : 5×2

(a) 'V' curve of synchronous motor

(b) Open Delta (V) Connection

(c) Reluctance motor.