

Code: EE4T4

II B.Tech - II Semester – Regular Examinations - JUNE 2014

**ELECTRICAL MACHINES – II
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) What are the features of an Ideal Transformer? Explain the operation of a single phase Ideal Transformer under no load with phasor Diagram? 7 M

- b) Explain with phasor diagram how the flux in the transformer core remains fairly constant from no load to full load by assuming lagging power factor. 7 M

2. a) Describe the method of calculating regulation and efficiency of a single phase transformer using Short Circuit and Open Circuit tests. 7 M

- b) A Transformer has its maximum efficiency of 0.98 at 15 KVA at unity power factor. During the day it is loaded as follows:
12 hours: 2KW at p.f. 0.5
6 hours: 12KW at p.f. 0.8
4 hours : 18KW at p.f. 0.9
2 hours : No load
Find the all day efficiency of the transformers. 7 M

3. a) Explain the need for the parallel operation of transformers. What are the conditions to be fulfilled for satisfactory parallel operation of transformers? With a neat circuit and phasor diagram, derive an expression for the load shared by the transformers connected in parallel having equal voltage ratios. 7 M
- b) A 200/400 V, 20 KVA, 50Hz transformer is connected as an auto-transformer to work off 600/200 V supplies. With a load of 20 KVA 0.8 p.f. lagging connected to the 200 V terminals. Find the current in common winding and KVA rating of auto transformer. 7 M
4. a) What are the uses of three phase Transformers? Explain in detail the various types of three phase Transformer Connections. 7 M
- b) Explain with necessary diagrams how two 3-phase transformers can be used to convert a 3 phase supply to a 2 phase one. If the load is balanced on one side, show that it will be balanced on the other side. 7 M
5. a) Derive an expression for the torque of an induction motor and obtain the condition for maximum torque 7 M

- b) A three phase squirrel cage Induction motor has a starting torque of 150% and maximum torque of 300% with respect to rated torque at rated voltage and rated frequency. Neglect the stator resistance and rotational losses. Find the value of slip at Maximum torque? 7 M
6. a) Explain the phenomenon of Cogging in 3 phase Induction motor? What is their effect? How it is avoided? 3 M
- b) Discuss the different power stages of a 3 phase Induction motor with losses. 4 M
- c) An 18.65 KW, 4 pole, 50 Hz, 3 phase induction motor has friction and windage losses of 2.5% of the output. Full load slip is 4%. Find for full load
- (i) Rotor copper loss,
 - (ii) Rotor input,
 - (iii) Shaft torque
 - (iv) The gross electromagnetic torque 7 M
7. a) Explain the advantages of double cage induction motor over single cage induction motor. 4 M
- b) Why starters are necessary for starting of 3- phase Induction motors? What are various types of starters for starting of Induction motors? Explain clearly the Star Delta starting method of 3 phase Induction motor. 7 M

c) Explain about Induction Generator. 3 M

8. a) Explain the operation of the following

(i) Split phase capacitor start single phase Induction Motor

(ii) Shaded pole motor 7 M

b) Explain the V/f control and rotor rheostat control for speed control of 3 phase slip ring induction motor. 7 M