Code No: 134AX **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, December - 2018
ELECTRICAL MACHINES – II
(Electrical and Electronics Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) List any two differences between cage rotor and wound rotor. [2]
b) Explain the concept of RMF. [3]
c) Draw torque – slip characteristic of three phase IM. [2]
d) What is cogging? Explain? [3]
e) Why two reactances are required for the analysis of Salient pole alternator? [2]
f) List the differences between distributed and concentrated windings. [3]
g) What is synchronizing torque? [2]
h) What is Synchronous induction motor? Explain? [3]
i) Why single phase IM is not self starting? [2]
j) List Applications of shaded pole motor. [3]

PART-B

(50 Marks)

2.a) Discuss the points of similarities and dissimilarities between a transformer and an induction motor. Hence, explain why an induction machine is called a generalized transformer?
b) Explain why three phase induction motor, at no load operates at very low power factor? [5+5]

OR

3.a) Describe the principle of operation of three phase induction motor. Explain why the rotor is forced to rotate in the direction of rotating magnetic field?
b) Show that the voltage generated in the rotor circuit of a three phase induction motor at any slip s is equal to s times the voltage generated at standstill? [5+5]

4.a) Explain the principle of speed control of a 3-phase induction motor by V/f method and draw the corresponding torque-speed characteristics and discuss the applications and limitations of these methods.
b) A three phase, 400 V, 50 Hz induction motor takes a power input of 34 kW at its full load speed of 980 rpm. The total stator losses are 1.2 kW and the friction and windage losses are 1.5 kW. Calculate (i) slip (ii) rotor ohmic losses (iii) shaft power (iv) shaft torque and (v) efficiency. [5+5]

OR

5.a) Draw and explain the equivalent circuit of three phases IM.
b) A 3-phase, 400 V, 50 Hz induction motor has a rotor resistance of 0.1 Ω and standstill reactance of 0.9 Ω per phase. The full load slip is 4%, Calculate (i) Full load torque as a percentage of maximum torque and the value of extra resistance to be added in the rotor circuit to have 70% of maximum torque at start. [5+5]

6.a) What is armature reaction? Explain the effect of armature reaction on the terminal voltage of an alternator at ZPF lag and ZPF lead with the help of necessary phasor diagram?

b) A 500 kVA, 1000 V, 50 Hz star connected 3-phase alternator has armature resistance per phase of 0.1 Ω and synchronous reactance per phase of 1.3 Ω. Find its voltage for 0.8 pf lag. Also find the voltage regulation. [6+4]

OR

7.a) Briefly explain the procedure to conduct slip test on three phase alternator? From test results how to calculate X_d and X_q?

b) Explain how the potier triangle can be drawn with the help of OCC and any two points on the ZPF characteristic? What are the observations we can derive from the potier triangle? [5+5]

8.a) Two alternators A and B operate in parallel and supply a load of 10 MW at 0.8 p.f lagging By adjusting steam supply of A, its power output is adjusted to 6000 kW and by changing its excitation, its p.f is adjusted to 0.92 lag. Find the p.f of alternator B.

b) What is synchronizing power of an alternator? Derive an expression for the synchronizing power between the two alternators connected in parallel. [5+5]

OR

9.a) What is synchronous condenser? What are the advantages of installing a synchronous condenser in an electrical system? Illustrate your answer with an example.

b) A 400V, 50 Hz, 33kW, 3 phase star connected synchronous motor has a full load efficiency of 85%. The synchronous impedance of the motor is (0.2+j1.4) Ω/ph. If the excitation of the motor is adjusted to give a leading p.f of 0.8, Calculate induced emf developed for full load? [5+5]

10. Explain the constructional details and principle of operation of a split phase induction motor. List out its industrial applications. [10]

OR

11. What is double field revolving theory? Explain the equivalent circuit of single phase induction motor based on double filed revolving theory? [10]

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