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Question Paper Code : X 60503

B.E./B.Tech. DEGREE EXAMINATIONS, NOV./DEC. 2020
Fifth Semester
Electrical and Electronics Engineering
EE 2302/EE52/EE1301/10133 EE 505 – ELECTRICAL MACHINES – II
(Regulations 2008/2010)
(Common to PTEE 2302/10133 EE 505 – Electrical Machines II for B.E. (Part-Time) Fourth Semester Electrical and Electronics Engineering – Regulations 2009/2010)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. Define distribution factor k_d.
2. Define synchronizing torque.
3. What are V curves ?
4. What are the starting methods of synchronous motor ?
5. Define 'slip' of an induction motor.
6. What are the advantages of double squirrel cage induction motor ?
7. What are the different methods of starting 3-phase induction motor ?
8. What is meant by slip power recovery scheme ?
9. Distinguish the terms rotating and pulsating magnetic fields.
10. State the limitations of shaded pole motors.

PART – B **(5×16=80 Marks)**

11. a) i) Describe the POTIER method of determining the regulation of an alternator. **(8)**

ii) A 3.3 kV alternator gave the following results :

Field current (A) :	16	25	37.5	50	70
OC voltage (kV) :	1.55	2.45	3.3	3.75	4.15

A field current of 18 A is found to cause the full load current to flow through the winding during short circuit test. Predetermine the full load voltage regulation at (1) 0.8 pf lag and (2) 0.8 pf lead by MMF method. **(8)**

(OR)

b) i) Describe the slip test for finding X_d and X_q. **(8)**

ii) Two similar, 3 phase alternators work in parallel and deliver a total real power of 1800 kW at 11kV and at 0.85 pf lagging to the load. Each alternator initially supplied half the load power. The excitation of the first alternator is then increased such that its line current becomes 60 A lagging. Find the line current delivered by the second alternator. **(8)**

12. a) i) Describe in detail about the effect of load change on load angle and power factor of a 3Φ synchronous motor operating on infinite bus bar and constant excitation. **(10)**

ii) Discuss in detail how V curves is obtained for a synchronous motor. **(6)**

(OR)

b) Describe the various methods of starting the synchronous motor. **(16)**

13. a) Explain the construction and working principle of three phase induction motor.

(OR)

b) A 110-V, 3-phase, star-connected induction motor takes 25 A at a line voltage of 30V with rotor locked. With this line voltage, power input to motor is 440 W and core loss is 40 W. The d.c. resistance between a pair of stator terminals is 0.1 ohm. If the ratio of a.c. to d.c. resistance is 1.6, find the equivalent leakage reactance/phase of the motor and the stator and rotor resistance per phase.

14. a) With neat diagrams, explain working of any two types of starter used for 3-phase squirrel cage induction motor. **(16)**

(OR)

b) i) Explain the speed control of 3-phase wound rotor induction motor by rotor resistance method. **(8)**

ii) Explain in details the slip recovery scheme. **(8)**

15. a) i) Illustrate the operation of single phase induction motor with double field revolving theory. **(8)**

ii) A 220V, 6-pole, 50 Hz, single-winding single-phase induction motor has the following equivalent circuit parameters as referred to the stator.

$R_{1m} = 3.0\ \Omega$, $X_{1m} = 5.0\ \Omega$

$R_2 = 1.5\ \Omega$, $X_2 = 2.0\ \Omega$

Neglect the magnetizing current. When the motor runs at 97% of the synchronous speed, compute the following:

1) The ratio E_{mf}/E_{mb}.
2) The ratio T_f/T_b.
3) The gross total torque. **(8)**

(OR)

b) i) Explain the theory of Brushless DC Machine. **(8)**

ii) Write short notes on Stepper Motor. **(8)**

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