

Roll No.

3096

B. Tech. 4th Semester (EE)

Examination – July, 2021

ELECTRICAL MACHINES-II

Paper : PCC-EE-206-G

Time : Three hours]

[Maximum Marks : 75

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. 1 is *compulsory*. Attempt *four* more questions by selecting *one* question from each Section.

1. (a) Mention the undesirable effects produced by certain combination of rotor and stator slots.
- (b) What is synchronizing power in alternators ?
- (c) What is the role of damper winding in synchronous motor ?
- (d) Why wound rotor construction is adopted ?
- (e) Define cogging.
- (f) Why synchronous motor is not self-starting ?

$$2.5 \times 6 = 15$$

SECTION - A

2. (a) Describe mathematically development of rotating magnetic field in 3-phase induction motor. 10
(b) State difference between squirrel cage and slip ring induction motor. 5
3. Draw and explain the equivalent circuit of 3-phase induction motor. 15

SECTION - B

4. Why single phase induction motor is not self-starting while three-phase IM is self-starting? Describe starting methods used for single-phase IM. 15
5. What are the various methods of speed control of IM? Explain Slip power recovery speed control method of IM. Mention advantages and disadvantages of rotor resistance method. 15

SECTION - C

6. Define voltage regulation of an alternator. Describe Potier method of determining regulation of an alternator. 15
7. (a) A 4-pole, 50 Hz, star connected alternator has 15 slots per pole and each slot has 10 conductors. All the conductors of each phase are connected in

series and the winding factor being 0.95. When running on no-load for a certain flux-per-pole, the terminal e.m.f. was 1825 volt. If the winding are lap-connected as in d.c. machine, what would be the e.m.f. between the brushes for the same speed and the same flux/pole? Assume sinusoidal distribution of flux. 10

- (b) Define pitch factor and distribution factor. 5

SECTION - D

8. What are the conditions that must be satisfied for parallel operation of Alternators? Derive voltage and current equations for parallel operation of 2 alternators. 15
9. Write short note on : 15
 - (a) Damper winding.
 - (b) Synchronous condenser.
 - (c) Applications of synchronous motor.

B.Tech. (EE) 4th Semester (G Scheme)

Examination, July-2022

ELECTRICAL MACHINES-II

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Time allowed : 3 hours]

[Maximum marks : 75

Note : Question No. 1 is compulsory. Attempts five questions in total selecting one question from each unit.

1. (a) Discuss any two methods of starting of synchronous motor.
- (b) What is meant by plugging?
- (c) Why rotor bar are skewing in an induction motor?
- (d) Discuss principle of stepper motor.
- (e) Why an induction motor will never run at its synchronous speed?
- (f) List various methods to determine the voltage regulation of an alternator.
- (g) Briefly discuss the role of damper winding in synchronous motor.
- (h) Why is the field system of an alternator made as a rotor?
- (i) Distinguish between transient and sub-transient reactances.
- (j) Briefly discuss the principle of shaded pole motor.

1.5×10=15

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Unit - I

2. (a) Define field speed, rotor current and power factor of a three phase induction motor. 8
- (b) Explain three modes of operation of 3-phase induction motor. 7
3. Explain briefly various speed control schemes of 3-phase induction motor. 15

Unit - II

4. Explain various methods of starting of a 1-phase induction motor. 15
5. A 2-pole, 240V, 50Hz, single-phase induction motor has the following constants referred to stator: $R_1=2.2\Omega$, $X_1=3.0\Omega$, $R_2'=3.8\Omega$, $X_2'=2.1\Omega$, $X_m=86\Omega$. Find the stator current and input power when the motor is operating at a full load speed of 2820 r.p.m. 15

Unit - III

6. (a) Derive an expression for coil span factor and distribution factor. 8
- (b) Draw and explain phasor diagram for inductive and capacitive load of an alternator. 7
7. (a) Explain the procedure for Potier triangle method to calculate the voltage regulation of alternator. 7
- (b) A three phase star connected alternator on open

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circuit is required to generate a line voltage of 3600V at 50 Hz when driven at 500 r.p.m. The stator has 3 slots per pole per phase and 10 conductors per slot. Calculate (i) the no. of poles and (ii) useful flux per pole. Assume all the conductors per phase to be connected in series and coils to be full-pitch. 8

Unit - IV

8. What are the necessary conditions for parallel operation of an alternator? Also discuss dark-bright lamp method for synchronization 15
9. Write a short note on:
 - (a) Power-angle curve
 - (b) Synchronous condensor 15

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