

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V EXAMINATION – SUMMER 2025****Subject Code:3150910****Date:15-05-2025****Subject Name:Electrical Machine- II****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|--|-----------|
| Q.1 | (a) Why single phase induction motor is not self starting? | 03 |
| | (b) Derive EMF equation of Alternator. | 04 |
| | (c) Draw and explain torque-slip characteristics of 3 phase induction motor. | 07 |
| Q.2 | (a) Explain the working principle of Induction generator. | 03 |
| | (b) Explain the double field revolving theory of single-phase induction motor. | 04 |
| | (c) State the methods of starting of synchronous motor and explain any one of them. | 07 |
| OR | | |
| | (c) Explain speed control method of 3 phase induction motor. | 07 |
| Q.3 | (a) Explain the working principle of 3 phase induction motor. | 03 |
| | (b) Write a short note on double cage induction motor. | 04 |
| | (c) With diagram explain star-delta starter of 3 phase induction motor. | 07 |
| OR | | |
| Q.3 | (a) Explain crawling and cogging in induction motor. | 03 |
| | (b) Give comparison of squirrel cage and wound rotor motor. | 04 |
| | (c) Explain no load and block rotor test of 3 phase induction motor. | 07 |
| Q.4 | (a) Give comparison between salient pole and cylindrical type alternator. | 03 |
| | (b) Explain armature reaction phenomena in case of synchronous machine. | 04 |
| | (c) What is regulation of alternator? Explain ZPF method for finding regulation in alternator. | 07 |
| OR | | |
| Q.4 | (a) Give condition for parallel operation of alternator with bus bar. | 03 |
| | (b) Define the pitch factor and distribution factor for synchronous generator. | 04 |
| | (c) Draw and explain V-Curve of synchronous motor. | 07 |
| Q.5 | (a) Explain Synchronous condenser. | 03 |
| | (b) Explain principle and operation of auto synchronous motor. | 04 |
| | (c) Write a short note on universal motor. | 07 |
| OR | | |
| Q.5 | (a) State advantages and applications of linear induction motor. | 03 |
| | (b) Explain working of capacitor start capacitor run single phase motor. | 04 |
| | (c) What is synchronization? Explain two bright and one dark lamp method of synchronization of 3 phase alternator. | 07 |

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2024

Subject Code:3150910

Date:18-05-2024

Subject Name:Electrical Machine- II

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Explain necessity of starter in 3-phase induction motor.	03
	(b) State different types of starters used and explain any one of them in 3- ϕ induction motor.	04
	(c) Explain how a rotating magnetic field is produced when a three phase supply is given to three phase winding.	07
Q.2	(a) Define slip. how it relates with rotor speed?	03
	(b) State the difference between slip ring induction motor and squirrel cage induction motor.	04
	(c) State different methods of speed control of three phase induction motor. Explain any two of them.	07
	OR	
	(c) Derive the equation of starting torque for 3- ϕ induction motor and obtain condition of maximum starting torque from it.	07
Q.3	(a) Write the applications of 1- ϕ induction motors.	03
	(b) Explain working of split phase induction motor.	04
	(c) Explain two field rotating theory of 1- ϕ induction motor with diagram.	07
	OR	
Q.3	(a) Explain why 1- ϕ induction motor is not self starting.	03
	(b) Explain working of capacitor start induction motor.	04
	(c) List the methods of starting of 1- ϕ induction motor. Draw and explain construction and working of shaded pole induction motor.	07
Q.4	(a) State the conditions for synchronization of 3 phase alternator with infinite bus bar.	03
	(b) Explain Pitch factor and Distribution factor with reference to alternator winding.	04
	(c) A 3-phase, 50 Hz alternator is running at 600 rpm has a 2-layer winding, 12 turns/coil, 4 slots/pole/phase, and coil-pitch of 10 slots. Find the induced EMF per phase if the flux/pole is 0.035 Weber.	07
	OR	
Q.4	(a) Write the difference between stationary armature type and rotating armature type alternator.	03
	(b) Explain concept of synchronous reactance in synchronous machine.	04
	(c) A 3-phase star connected alternator is rated at 1600 KVA; 13500 V. The armature effective resistance and synchronous reactance are 1.5 ohms and 30 ohms respectively per phase. Calculate the percentage voltage regulation at full load, 0.8 lagging power factor.	07

- Q.5** (a) Explain methods of starting of synchronous motor. **03**
(b) Explain working principle of stepper motor. **04**
(c) A 6 pole three phase 440 V, 50 Hz. Induction motor develops 8 H.P. at 955 rpm, stator losses amount to 400 watts and the friction losses 0.5 H.P., Calculate (i) rotor copper loss (ii) efficiency of motor. **07**

OR

- Q.5** (a) Explain synchronous condenser. **03**
(b) Explain magnetic levitation principle. **04**
(c) Draw and explain different vector diagrams of synchronous motor on load. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- V EXAMINATION-SUMMER 2023****Subject Code: 3150910****Date: 26/06/2023****Subject Name: Electrical Machine- II****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Explain with reason why synchronous motor is not self starting?	03
	(b) Draw slip Torque characteristic of 3 phase Induction motor and explain in brief.	04
	(c) Define and describe the effect of armature reaction in an alternator.	07
Q.2	(a) Compare squirrel cage and slip ring Induction Motors.	03
	(b) Explain double field revolving theory for single phase Induction Motor.	04
	(c) A 415 V, 3 phase, 50 HZ, 4 pole star connected Induction motor takes a line current of 11 A with 0.85 p.f. lagging. Its total stator losses are 6% of the input. Rotor copper losses are 4% of the input to the rotor; mechanical losses are 3 % of the rotor input. Calculate (i) slip and rotor speed (ii) torque developed in the rotor and (iii) shaft torque.	07
	OR	
	(c) A 750 Hp, 415 V, 3 Phase 50 Hz 12 pole induction motor has a rotor impedance of $(0.02+j0.15)$ ohms at standstill. Full load torque is obtained at 480 RPM. Calculate (i) ratio of maximum to full load torque (ii) speed at maximum torque (iii) rotor resistance required to be added to get maximum starting torque.	07
Q.3	(a) Differentiate between salient pole and cylindrical rotor synchronous machine.	03
	(b) Explain construction and working of shaded pole single phase motor.	04
	(c) Discuss the procedure to perform no load and blocked rotor tests on a three phase induction motor.	07
	OR	
Q.3	(a) Define pitch factor and distribution factor.	03
	(b) Explain star delta starter for 3 phase Induction Motor.	04
	(c) Define voltage regulation and explain zero power factor method in case of an alternator.	07
Q.4	(a) State the conditions to be satisfied for putting a 3 phase alternator in parallel with infinite bus.	03
	(b) Briefly explain V-curves of synchronous motor.	04

- (c) The effective resistance and synchronous reactance of a 100 KVA, 440 V single phase alternator are 0.1 ohms and 0.3 ohms resp. Calculate the full load regulation at (i) unity (b) 0.8 lagging and (iii) 0.8 leading power factors. **07**
- OR**
- Q.4** (a) How direct axis and quadrature axis reactance can be measured for salient pole machine? **03**
- (b) Explain direct load test method for 3 phase alternator with circuit diagram. **04**
- (c) The effective armature resistance of a 3 phase star connected, 500 KVA, 1100 V alternator is 0.1 ohms per phase. Field current of 30 A produces the open circuit voltage of 400 V (line value) and the short circuit current of 200 A. Calculate the full load regulation at 0.8 p.f. lagging. **07**
- Q.5** (a) What do you mean by Auto Synchronous motor? **03**
- (b) What is hunting? How to minimize it? **04**
- (c) What is linear Induction motor? Describe its construction, working and application. **07**
- OR**
- Q.5** (a) Explain synchronous condenser and synchronous phase modifiers. **03**
- (b) Explain the procedure to construct the Circle diagram of Induction motor. **04**
- (c) Explain construction, working and applications of Permanent magnet brushless DC motor. **07**

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V(NEW) EXAMINATION – SUMMER 2022****Subject Code:3150910****Date:04/06/2022****Subject Name:Electrical Machine- II****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What is Synchronous speed ?	03
	(b) State the principle of operation of a three-phase Induction motor.	04
	(c) Explain the production of rotating field in 3-Phase Induction motor by Analytical Method.	07
Q.2	(a) Draw the phasor diagram of 3-phase alternator with unity power factor load and lagging power factor load.	03
	(b) Draw the per phase complete equivalent circuit of 3 -phase induction motor referred to the stator with approximate equivalent circuit.	04
	(c) The power input to the rotor of 440V, 50Hz, 6 pole, 3-Phase induction motor is 80 kW. The rotor emf is observed to make 100 complete alternations per min. Calculate (a) the slip; (b) the rotor speed;(c) the mechanical power developed;(d) the rotor copper loss per phase;(e) the rotor resistance per phase if the rotor current is 65 A.	07
	OR	
	(c) Derive the E.M.F. equation of an Alternator.	07
Q.3	(a) Define different types of losses in 3-phase Alternator.	03
	(b) Draw the equivalent circuit of a single-phase, single winding Induction motor based on two-revolving field theory.	04
	(c) State the different methods of starting squirrel cage motors.	07
	OR	
Q.3	(a) What is voltage regulation?	03
	(b) Explain the V-curves of synchronous motor.	04
	(c) Describe the construction and operating principle of synchronous motor.	07
Q.4	(a) Explain the double field revolving theory of single-phase Induction Motor.	03
	(b) Explain power stages in an Induction Motor with flow diagram.	04
	(c) Explain the construction, working principle of Permanent magnet brushless DC motor.	07
	OR	
Q.4	(a) Explain the effect of slip on rotor circuit in 3-phase Induction Motor.	03

- (b) What is synchronization and load division in Parallel operation of alternators ? **04**
- (c) Auto Synchronous Motor: Construction, principle of operation **07**
- Q.5** (a) What is Synchronous condenser? **03**
- (b) What is the process to make synchronous motor self-starting? **04**
- (c) A 3-phase, star connected alternator is rated at 1600 kVA 13500 V. The armature effective resistance and synchronous reactance are 1.5Ω and 30Ω respectively per phase. Calculate the percentage voltage regulation for a load of 1280 kW at power factors of (a) 0.8 lagging; (b) unity; (c) 0.8 leading **07**
- OR**
- Q.5** (a) What is the principle of Magnetic levitation? **03**
- (b) Explain the principle of operation Auto Synchronous Motor. **04**
- (c) Explain different methods to make single-phase Induction motor self -starting. **07**
