

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-VI EXAMINATION – WINTER 2025****Subject Code:3150910****Date:19-11-2025****Subject Name:Electrical Machine- II****Time:10:30 AM TO 01:00 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.

		<b>MARKS</b>
<b>Q.1</b>	(a) Explain term hunting for synchronous motor	<b>03</b>
	(b) Draw and explain the phasor diagram of 3-phase alternator with unity and lagging power factor load.	<b>04</b>
	(c) Derive the equation of electromagnetic torque for a three phase induction motor. Also obtain the condition for maximum torque.	<b>07</b>
<b>Q.2</b>	(a) Explain power stages of an induction motor in detail	<b>03</b>
	(b) Explain double field revolving theory for single phase Induction Motor.	<b>04</b>
	(c) Explain necessity of starters in three induction motor also draw and explain auto transformer starter in detail.	<b>07</b>
<b>OR</b>		
	(c) List out different methods of speed control of Induction Motor. Explain any one in detail.	<b>07</b>
<b>Q.3</b>	(a) Define pitch factor and distribution factor.	<b>03</b>
	(b) Give comparison between salient pole and cylindrical type alternator	<b>04</b>
	(c) Following test results are obtained from a 3 phase, 6000 kVA, 6600V, star connected, 2 pole, 50 Hz turbo alternator: With a field current of 125 A, the open circuit voltage is 8000 V at the rated speed; with the same field current and rated speed, the short circuit current is 800 A. At the rated full load, the resistance drop is 3%. Find the regulation of the alternator on full load and at a power factor of 0.8 lagging. Draw vector diagram for lagging load.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Derive induced emf equation for alternator.	<b>03</b>
	(b) Explain construction and working of shaded pole single phase motor.	<b>04</b>
	(c) Define voltage regulation and explain zero power factor method in case of an alternator.	<b>07</b>
<b>Q.4</b>	(a) State advantages and applications of linear induction motor	<b>03</b>
	(b) Briefly explain V-curves of synchronous motor	<b>04</b>
	(c) What is synchronizing of an alternator? Explain all dark lamp method in detail.	<b>07</b>

**OR**

- Q.4** (a) State the conditions to be satisfied for parallel operation of 3 phase alternators. **03**
- (b) Explain cogging and crawling in Induction Motor. **04**
- (c) A synchronous motor absorbing 60 kW is connected in parallel with a factory load of 240 kW, having 0.8 lagging power factor. If the combined load has 0.9 lagging power factor, what value of leading KVAR will be supplied by synchronous motor & at what power factor is it working? **07**
- Q.5** (a) Write short note on Auto synchronous motor. **03**
- (b) Explain synchronous condenser and synchronous phase modifiers. **04**
- (c) Discuss working and applications of Permanent magnet brushless DC motor **07**
- OR**
- Q.5** (a) Explain construction and working of Repulsion motor. **03**
- (b) Explain slip test for measurement of direct and quadrature axis reactance for salient pole machine. **04**
- (c) Explain construction, working and advantages and disadvantages of switched reluctance motor. **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2024****Subject Code:3150910****Date:28-11-2024****Subject Name:Electrical Machine- II****Time:10:30 AM TO 01:00 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.

	<b>Marks</b>
<b>Q.1</b> (a) Derive an equation of generated EMF in an AC generator.	<b>03</b>
(b) Explain the effect of distributed and short pitched winding on generated emf.	<b>04</b>
(c) State the functions and material used for the following parts of a 3-phase induction motor. (1)Stator core (2) stator winding (3) rotor winding (4) slip ring (5) shaft (6) stator frame and (7) rotor core	<b>07</b>
<b>Q.2</b> (a) What is slip in induction motor? State the methods to measure it.	<b>03</b>
(b) Explain revolving magnetic field in 3-phase induction motor.	<b>04</b>
(c) Explain torque/slip characteristics of induction motor.	<b>07</b>
<b>OR</b>	
(c) Compare salient pole type and cylindrical type synchronous machine.	<b>07</b>
<b>Q.3</b> (a) Explain the methods to get more starting torque in 3-phase slip ring induction motor.	<b>03</b>
(b) Explain construction and working principle of a universal motor.	<b>04</b>
(c) The power input to a 500V, 50Hz, 6-pole, 3-phase induction motor running at 975 RPM is 40KW. The total stator losses (iron and stator cu loss) are 1KW, the friction and windage losses are 2 KW. Determine (1) slip, (2) Rotor cu losses, (3) shaft power and (4) the efficiency.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) State the losses occurred in 3-phase induction motor and state the ways to reduce these losses.	<b>03</b>
(b) Draw the circuit diagram for No load and blocked rotor tests on 3-phase induction motor. Which measurements are taken during the tests? Also explain the purpose of these tests.	<b>04</b>
(c) In a No load test, a 3-phase, star connected induction motor took 10A and total input power is 450 watt at a line voltage of 110V. If the stator resistance per phase is 0.05 ohm and friction and windage losses amount to 135 watt, determine (1) the working component of no load current, (2) the magnetizing component of no load current, (3) No load power factor,(3)Ro ,and (5) Xo	<b>07</b>
<b>Q.4</b> (a) Explain the 1-phase induction motor used in ceiling fan.	<b>03</b>
(b) Explain the working principle of a shaded pole induction motor.	<b>04</b>
(c) Explain how the power factor and armature current varies with change in field current for a particular load condition in a 3-phase synchronous motor.	<b>07</b>

**OR**

- Q.4** (a) Explain hunting phenomena in synchronous machine. **03**  
(b) Explain any two starting methods for 3-phase synchronous motor. **04**  
(c) A 1-MVA, 11-KV, 3-phase, star connected synchronous motor has an armature resistance and reactance per phase are 3.5 ohm and 40 ohm respectively. Determine the induced emf and retardation angle fully loaded and operated at unity power factor. **07**

- Q.5** (a) What is voltage regulation? State the methods to determine it. **03**  
(b) Draw and explain O.C.C and S.C.C of a typical 3-phase alternator and explain how the synchronous impedance can be determined? **04**  
(c) A 3-phase, 12-pole, star connected alternator has 180 slots with 10 conductors per slot and conductors of each phase are connected in series. The coil span is  $144^\circ$  (electrical). Determine the phase values of emf if machine runs at 600RPM and the flux per pole is 0.06wb distributed sinusoidal over the pole. **07**

**OR**

- Q.5** (a) Explain the purpose of damper winding in synchronous machine. **03**  
(b) Explain the effect of change in steam input and change in exciting current on the output power of a 3-phase synchronized alternator with grid. **04**  
(c) What is synchronizing? State the conditions for synchronizing and explain how we can synchronize the incoming alternator with grid. **07**

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Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2023**

**Subject Code:3150910**

**Date:07-12-2023**

**Subject Name:Electrical Machine- II**

**Time:10:30 AM TO 01:00 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.

		<b>MARKS</b>
<b>Q.1</b>	(a) Explain term hunting for synchronous motor, also explain method to reduce this effect.	<b>03</b>
	(b) Explain working principle of induction motor. Give detail classification of induction motors, and its advantages and disadvantages.	<b>04</b>
	(c) Explain frequency of rotor current in induction motor. Derive torque equations for starting and running condition of induction motor.	<b>07</b>
<b>Q.2</b>	(a) Explain power stages of an induction motor in detail.	<b>03</b>
	(b) Draw and explain relation between torque and slip of induction motor.	<b>04</b>
	(c) Which tests required to draw circle diagram for induction motor? Explain steps to draw the circle diagram of an induction motor in detail.	<b>07</b>
	<b>OR</b>	
	(c) Explain necessity of starters in three induction motor also draw and explain star-delta starter in detail.	<b>07</b>
<b>Q.3</b>	(a) Explain cogging and crawling.	<b>03</b>
	(b) Draw and explain circuit diagram and vector diagram of an induction motor.	<b>04</b>
	(c) Why does rotor rotates in three phase induction motor? Explain in detail production of Rotating Magnetic Field.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Write methods of speed control of universal motor.	<b>03</b>
	(b) What is the use of centrifugal switch in single phase induction motor? Explain working of capacitor start induction run single phase induction motor with vector diagram.	<b>04</b>
	(c) Write types of single-phase induction motor, explain working of shaded pole induction motor.	<b>07</b>
<b>Q.4</b>	(a) Explain working of Switched reluctance motor.	<b>03</b>
	(b) Explain working and applications of Permanent magnet brushless DC motor.	<b>04</b>
	(c) Derive EMF equation of an alternator, also explain pitch factor and distribution factor.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Write advantages and applications of linear induction motor.	<b>03</b>
	(b) Explain vector diagrams of alternator in loaded condition.	<b>04</b>
	(c) What is voltage regulation of an alternator, list the methods of voltage regulation. Explain ZPF method.	<b>07</b>

- Q.5** (a) Explain application, advantages and disadvantages of stepper motor. **03**  
(b) Explain conditions for parallel operation of alternators. **04**  
(c) What is synchronizing of an alternator? Explain all dark lamp method in detail. **07**

**OR**

- Q.5** (a) What will be the effect on synchronous motor if it is over excited and under excited, explain with vector diagram. **03**  
(b) Draw and explain V-curve and inverted V-curve for synchronous motor. **04**  
(c) With vector diagram explain effect of change in excitation and effect of change in steam supply for alternators connected to bus bar. **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2022****Subject Code:3150910****Date:06-01-2023****Subject Name:Electrical Machine- II****Time:10:30 AM TO 01:00 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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|------------|--|-----------|
| <b>Q.1</b> | <b>(a)</b> Explain the working principle of 3 phase induction motor.   | <b>03</b> |
|            | <b>(b)</b> With neat diagram explain construction of 3 phase induction motor.  | <b>04</b> |
|            | <b>(c)</b> Give comparison between 3 phase squirrel cage and slip ring induction motor.                                    | <b>07</b> |
| <b>Q.2</b> | <b>(a)</b> Give comparison between salient pole and cylindrical type alternator.   | <b>03</b> |
|            | <b>(b)</b> Explain armature reaction of alternator.  | <b>04</b> |
|            | <b>(c)</b> Explain synchronous impedance method of alternator.   | <b>07</b> |
|            | <b>OR</b>  |           |
|            | <b>(c)</b> With diagram explain star-delta starter of 3 phase induction motor.   | <b>07</b> |
| <b>Q.3</b> | <b>(a)</b> Derive the EMF equation of an alternator.   | <b>03</b> |
|            | <b>(b)</b> Define pitch factor and distribution factor of alternator.  | <b>04</b> |
|            | <b>(c)</b> Explain no load and blocked rotor test on a three phase induction motor.  | <b>07</b> |
|            | <b>OR</b>  |           |
| <b>Q.3</b> | <b>(a)</b> Give condition for parallel operation of alternator with bus bar.   | <b>03</b> |
|            | <b>(b)</b> With diagram explain torque-slip characteristics of an induction motor.   | <b>04</b> |
|            | <b>(c)</b> Explain V curves and inverted V curves for synchronous motor.   | <b>07</b> |
| <b>Q.4</b> | <b>(a)</b> Draw power stages of an induction motor   | <b>03</b> |
|            | <b>(b)</b> Explain capacitor start induction run motor.  | <b>04</b> |
|            | <b>(c)</b> What is synchronization? Explain two bright and one dark lamp method of synchronization of 3 phase alternators. | <b>07</b> |
|            | <b>OR</b>  |           |
| <b>Q.4</b> | <b>(a)</b> Why 1 phase induction motor is not self starting?   | <b>03</b> |
|            | <b>(b)</b> Write a short note on double cage induction motor   | <b>04</b> |
|            | <b>(c)</b> Write a short note on shaded pole single phase motor.   | <b>07</b> |
| <b>Q.5</b> | <b>(a)</b> Explain synchronous condenser.  | <b>03</b> |
|            | <b>(b)</b> State advantages and applications of linear induction motor   | <b>04</b> |
|            | <b>(c)</b> Explain method of starting of synchronous motor.  | <b>07</b> |
|            | <b>OR</b>  |           |
| <b>Q.5</b> | <b>(a)</b> Discuss working of repulsion motor.   | <b>03</b> |
|            | <b>(b)</b> Explain principle and operation of auto synchronous motor.  | <b>04</b> |
|            | <b>(c)</b> Explain construction, working and applications of permanent magnet brushless DC motor.                          | <b>07</b> |

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