

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fourth Semester

Electrical and Electronics Engineering

EE3405 - Electrical Machines – II

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	List the advantages of rotating field type of alternator.	RE	1	2
2.	Compare salient pole type and smooth cylindrical type of alternator.	UN	1	2
3.	Why synchronous motor is not a self-starting motor?	UN	2	2
4.	List the starting methods of synchronous motor.	RE	2	2
5.	Why are the slots on the cage rotor of induction motor usually skewed?	UN	3	2
6.	State the merits and demerits of double squirrel cage induction machines.	UN	3	2
7.	What is the need of starter for induction motor?	UN	4	2
8.	Compare plugging, dynamic braking and regenerative braking.	UN	4	2
9.	State the limitations of shaded pole motors.	UN	5	2
10.	List the applications of servo motor.	RE	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i Determine the voltage regulation of an alternator by using pessimistic method.	UN	1	5
	ii A 3.3 kV alternator gave the following results:	UN	1	8

Field current (A)	16	25	37.5	50	70
O.C. voltage (kV)	1.55	2.45	3.3	3.75	4.15

A field current of 18A is found to cause the full load current to flow through the winding during short circuit test. Predetermine the full load voltage regulation at (a) 0.8 power factor lag and (b) 0.8 power factor lead by MMF method.

Or

	b i	What is meant by synchronizing? State the conditions for paralleling alternator with infinite bus bar.	UN	1	5
	ii	A 3-phase, 50 Hz, star-connected alternator with double layer winding is running at 600 rpm. It has 12 turns/coil, 4 slots/pole/phase and a coil-pitch of 10 slots. If the flux/pole is 0.035 Wb sinusoidally distributed. Find the phase and line EMF induced. Assume that the total turns/phase are series connected.	UN	1	8
12.	a i	Explain in detail the V curve and inverted V curve of a synchronous motor.	UN	2	5
	ii	A 6600 V, 3 phase, star connected synchronous motor draws a full load current of 80 A at 0.8 power factor leading. The armature resistance is 2.2 Ω and reactance of 22 Ω per phase. If the stray losses of the machine are 3200 W. Find (i) EMF induced (ii) Output power (iii) Efficiency of the machine.	UN	2	8
Or					
	b i	Describe the reasons for the synchronous motor fails to start.	UN	2	5
	ii	A 3-phase star connected synchronous motor rated at 187 kVA, 2300 V, 47 A, 50 Hz, 187.5rpm has an effective resistance of 1.5 ohm and a synchronous reactance of 20 ohm per phase. Determine the internal power developed by the motor when it is operating at rated current and 0.8 power factor leading.	UN	2	8
13.	a	Describe the construction and working principle of three phase induction motor.	UN	3	13
Or					
	b	Sketch and Explain the torque slip characteristics of three phase cage and slip-ring induction motors. Show the stable region in the graph.	UN	3	13
14.	a	Discuss the following starters for three phase induction motor: (i) Autotransformer starter (7) (ii) Rotor resistance Starter (6)	UN	4	13
Or					
	b	Explain the following methods of speed control scheme: (i) Cascaded connection (7) (ii) V/f Control (6)	UN	4	13
15.	a	Using double field revolving theory, illustrate why a single phase induction motor is not self-starting. Also obtain the equivalent circuit of single phase induction motor with necessary equations.	UN	5	13
Or					
	b	Describe the construction and working principle of the following special machines: (i) Stepper motors (7) (ii) Linear induction motor (6)	UN	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	A 3 phase 50 Hz, 12 pole, 200 kW slip-ring induction motor drives a fan whose torque is proportional to the square of speed. At full load, the motor slip is 0.045. The rotor resistance measured between any two slip-rings is 61 m Ω . Invent what resistance should be added in the rotor circuit to reduce the fan speed to 450 RPM?	AP	4	15
Or					
	b	The rotor resistance per phase of a 3-phas, 60 kW induction motor is 0.020 Ω . Design a starter for this induction motor having six notches, where the upper current limit has to be the full load current so that the slip is 2.5% .	AP	4	15