MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech II Sem Regular End Examination, July 2022
Electrical Machines-II
(Electrical and Electronics Engineering)

Time: 3 Hours.   **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A
(10*2 Marks = 20 Marks)

1.	a)	Write the merits and demerits of slip-ring induction motor.	2M	CO1	BL1
	b)	Describe the relation between torque and rotor power factor.	2M	CO1	BL2
	c)	Derive the expression for maximum torque in 3-phase induction motor.	2M	CO2	BL1
	d)	Explain speed control of 3-φ IM using change of frequency.	2M	CO2	BL2
	e)	Differentiate between distributed and concentrated windings of alternators.	2M	CO3	BL2
	f)	Explain the term Voltage regulation and give its significance.	2M	CO3	BL4
	g)	What is hunting in synchronous motors?	2M	CO4	BL1
	h)	What is synchronous condenser? List any two applications of it.	2M	CO4	BL1
	i)	Explain the principle of double field revolving theory.	2M	CO5	BL4
	j)	Compare between capacitor start motors and split phase motors.	2M	CO5	BL2

PART- B
(10*5 Marks = 50 Marks)

2	a)	What are its advantages and disadvantages of wound rotor type induction motor?	5M	CO1	BL1
	b)	An 8-pole, 3-phase, 50 Hz induction motor is running at full load with a slip of 5 %. The rotor is star connected and its per phase resistance and standstill reactance are 0.35 Ω and 2 Ω respectively. The EMF between slip rings is 150 V. Determine the rotor current per phase and rotor power factor. Assuming the slip rings are short circuited.	5M	CO1	BL3

OR

3		Derive and explain rotating magnetic field in a three-phase induction motor.	10M	CO1	BL6

4	a)	Explain the construction and working principle of three phase induction motor.	5M	CO2	BL4
	b)	Derive the torque-slip equation for a 3-phase induction motor and also the equation for the slip at which maximum torque occurs?	5M	CO2	BL6

<div align="center">OR</div>

5		In a 6 pole, 3-phase 50 Hz induction motor with star connected rotor, the rotor resistance per phase is 0.3 ohm, the reactance at standstill is 1.5 ohm per phase and an emf between the slip rings on open circuit is 175V. Calculate: a) slip at a speed of 960 rpm, b) rotor emf per phase, c) rotor frequency and reactance at a speed of 950 rpm.	10M	CO2	BL3

6	a)	List and compare any three schemes for the determination of regulation of an alternator.	5M	CO3	BL2
	b)	A 5 KVA, 3 – phase, 220 V, three – phase star connected synchronous generator has X_d = 5 ohms and X_q = 2 ohms. If the generator delivers full load current at 0.8 power factor lagging and at rated voltage, determine the load angle and maximum power output of the generator.	5M	CO3	BL3

<div align="center">OR</div>

7		A synchronous generator is connected to infinite bus. Discuss with the help of phasor diagrams the effect of changing excitation at constant mechanical input.	10M	CO3	BL2

8	a)	A 36 MVA, 21 kV, 1800 rpm, 3-phase synchronous generator connected to a power grid has a synchronous reactance of 9 Ω per phase. If the exciting voltage is 12 kV (line-to-neutral), and the system voltage is 17.3 kV (line to line), calculate the following: i) The active power which the machine delivers when the torque angle δ is 30° (electrical). ii) The peak power that the generator can deliver before it falls out of step (losses synchronism).	5M	CO4	BL3
	b)	Discuss the principle of operation of a synchronous motor. Also list their applications.	5M	CO4	BL2

<div align="center">OR</div>

9		Explain the power angle characteristics of a salient pole synchronous motor and draw the equivalent circuit & phasor diagram of a synchronous motor.	10M	CO4	BL4

10	a)	Calculate the full load efficiency and slip of the shaded pole motor, having 2 poles, rated 6 W, 115 V, 60 Hz. The input power to the motor is 24 W and running at 2900 rpm.	5M	CO5	BL3
	b)	Explain the different methods of speed control of a single-phase induction motor?	5M	CO5	BL4

<div align="center">OR</div>

11		Draw and discuss the constructional details of a capacitor start and capacitor run single-phase induction motors.	10M	CO5	BL2

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