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SREE VIDYANIKETHAN ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

II B.Tech II Semester (SVEC-19) Regular Examinations August – 2021

ELECTRICAL MACHINES-II

[Electrical and Electronics Engineering]

Time: 3 hours **Max. Marks: 60**

Answer One Question from each Unit
All questions carry equal marks

UNIT-I

1.	a)	Describe the construction of a 3-phase cage-type induction motor with neat sketches.	6 Marks	L1	CO1	PO1
	b)	A 3-phase, 50Hz, 4 pole slip ring induction motor gives a reading of 120V across slip rings on open circuit, when at rest and supplied with normal supply voltage. The rotor impedance per phase is 0.3 + j1.5Ω. Find the rotor current and torque when machine is running at 5 % slip.	6 Marks	L3	CO1	PO4
		(OR)				
2.	a)	Explain Torque-Slip characteristics of Induction motor.	8 Marks	L1	CO1	PO1
	b)	If an 8-pole induction motor running from a supply of 50HZ has an **emf** in the rotor of frequency 1.5HZ, compute the slip and speed of the motor.	4 Marks	L2	CO1	PO5

UNIT-II

3.	a)	Explain, why the speed of 3-phase induction motor cannot be equal to synchronous speed.	4 Marks	L1	CO1	PO1
	b)	A 3-phase, 4-pole, 50Hz, induction motor has a star connected wound rotor. The rotor **emf** is 50V between the slip rings at standstill. The rotor resistance and standstill reactance are 0.4Ω and 2.0Ω respectively. Calculate: i) Rotor current per phase at starting when slip rings are short circuited. ii) Rotor current per phase at starting if 50Ω per phase resistance is connected between slip rings. iii) Rotor **emf** when the motor us running at full load at 1440 r.p.m. iv) Rotor current at full load and Rotor power factor at full load	8 Marks	L3	CO1	PO4
		(OR)				
4.	a)	Explain the principle of induction generator operation	6 Marks	L1	CO1	PO1
	b)	Discuss in detail about Crawling and Cogging.	6 Marks	L2	CO1	PO7

UNIT-III

5.	a)	Why is a rotating field system used in preference to a stationary field?	6 Marks	L2	CO2	PO1
	b)	A star connected 3-phase 4-pole 50Hz alternator has a single layer winding in 24 stator slots. There are 50 turns in each coil and the flux per pole is 0.05 Wb. Find the open circuit voltage.	6 Marks	L3	CO2	PO4
		(OR)				

6.	a)	Explain the principle of operation of a synchronous generator.	6 Marks	L1	CO2	PO1
	b)	A 220V, 50Hz, 6-pole star-connected alternator with ohmic resistance of 0.06Ω per phase are the following data for open circuit and full load ZPF characteristics:	6 Marks	L3	CO2	PO4

Field Current(A)	0.2	0.4	0.6	0.8	1.00	1.2	1.4	1.8	2.2	2.6	3.0	3.4
Open circuit Voltage (Volts)	29.0	58.0	87.0	116	146	172	194	232	261.5	284	300	310
ZPF voltage (Volts)	-	-	-	-	-	0	29	88	140	177	208	230

Find the percentage voltage regulation at full load current of 40Amps at power factor of 0.8 lagging.

UNIT-IV

7.	a)	Derive an expression for synchronizing torque when a 3-phase alternator is connected to infinite bus-bar.	6 Marks	L2	CO3	PO1
	b)	Two alternators A and B operate in parallel and supply a load of 10MW at 0.8pf lagging.				
		i) By adjusting steam supply of A, its power output is adjusted to 6,000KW and by changing its excitation, its P.F is adjusted to 0.92 lag. Find the Power Factor of alternator B.	6 Marks	L3	CO3	PO7
		ii) If steam supply of both machines is left unchanged, but excitation of B is reduced so that it's P.F becomes 0.92 lead. Find new P.F of A.				
		(OR)				
8.	a)	Discuss and state the conditions necessary for paralleling alternators.	6 Marks	L2	CO3	PO7
	b)	What are the various methods of synchronizing alternators?	6 Marks	L1	CO3	PO1

UNIT-V

9.	a)	Derive the expression for the maximum torque developed per phase of a synchronous motor.	6 Marks	L2	CO4	PO1
	b)	A 75KW, 400V, 4-pole, 3-phase, 50Hz, star connected synchronous motor has a resistance and synchronous reactance of 0.04Ω and 0.4Ω respectively. Compute for full load 0.8pf lead the open circuit **emf** per phase and gross mechanical power developed. Assume an efficiency of 92.5%.	6 Marks	L3	CO4	PO7
		(OR)				
10.	a)	What is hunting and discuss briefly various causes for hunting.	6 Marks	L2	CO4	PO7
	b)	Discuss in detail about Synchronous condenser.	6 Marks	L2	CO4	PO5