22523

12 03	425 H	5 Iours / 7	0 Marks	Seat	No.							
Instructions – (1)			All Questions are Compulsory.									
		(2)	Answer each 1	next main	Quest	ion	on a	a ne	ew	pag	ge.	
		(3)	Illustrate your necessary.	answers	with ne	eat s	sketc	ches	W]	here	ever	
		(4)	Figures to the right indicate full marks.									
		(5)	Assume suitable data, if necessary.									
		(6)	Use of Non-programmable Electronic Pocket Calculator is permissible.									
		(7)	Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.									
											Ma	rks
1.	. Attempt any <u>FIVE</u> of the following										10	
	a)	Define synchronous speed. Write the relationship between Ns and Nr.						en				
	b)	State any two	repulsion	n motor	r.							
	c)	alternator	r.									
d) List different torque in synchronous motor.												
	e)	State method	s of starting of	synchron	ous mo	otor.						

- f) List applications of stepper motor.
- g) Draw the torque speed characteristics of A.C. servo motor.

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Attempt any <u>THREE</u> of the following a) Draw block diagram showing power stages of 3φ induction motor.

- b) Derive the emf equation of alternator
- c) Explain the effect of variable excitation on the behavior of synchronous motor under constant load condition.
- d) Compare slipring induction motor with squirrel cage induction motor on any four parameters.

3. Attempt any <u>THREE</u> of the following

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a) The power input to a 500V, 50 Hz, 6 pole, 3ϕ induction motor running at 975 rpm is 40 kW. The stator losses are 1 kW and the friction and windage losses total 2 kW.

Calculate

- i) The slip
- ii) The rotor CU loss
- iii) Shaft power
- iv) The efficiency
- b) State why three phase induction motor never runs on synchronous speed.
- c) State the double field revolving theory of single phase induction motor.
- d) Define the following terms and write their mathematical expression
 - i) Pitch factor
 - ii) Distribution factor related to winding of alternator.

Marks

4. Attempt any <u>THREE</u> of the following

- a) Explain the production of R.M.F. in 3-phase I.M. when 3ϕ supply is fed to it. Draw is phasor diagram.
- b) Describe the working of shaded pole induction motor with neat sketch.
- c) Explain construction and working of capacitor start and capacitor run 1ϕ induction motor with neat suitable diagram.
- d) Draw and explain dynamic characteristics of stepper motor.
- e) Describe the working of synchronous reluctance motor with the help of neat diagram.

5. Attempt any <u>TWO</u> of the following

a) A 12 pole, 50Hz, 3 phase induction motor has rotor resistance of 0.15Ω and stand still reactance of 0.25Ω / phase. On full load, it is running at a speed of 480 rpm. The rotor induced emf per phase at stand still is observed to be 32V

Calculate

- i) Starting Torque
- ii) Full load Torque
- iii) Maximum Torque
- b) Draw and explain torque speed characteristics of universal motor and state application of the same.
- c) Define voltage regulation of alternator. A 400V 20 KVA, 3φ star connected alternator has resistance per phase of 2Ω, open circuit voltage per phase of 90V is obtained for field current of 1.5A for same field current, short circuit current per phase is 20A Calculate.
 - i) Synchronous impedance
 - ii) Synchronous reactance
 - iii) Open circuit voltage/phase
 - iv) Regulation while supply a load current of 20A at 0.7 power factor lagging.

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6. Attempt any \underline{TWO} of the following

- a) Define armature reaction in an alternator. Explain the effect of armature reaction at various P.F. of loads of alternator.
- b) Draw and explain 'V' and inverted V curves for synchronous motors.
- c) Explain with suitable diagram the phenomenon of hunting. State causes and effects of hunting in 3φ synchronous motors.

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