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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fourth Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; June - 2017

Electrical Machines - II

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Assume suitable missing data, if any.

UNIT - I

1	a.	With a neat diagram, Classify different types of DC Generator.	7
	b.	With relevant diagrams explain armature reaction in D.C. generators and also explain the measures adopted to reduce its effect.	8
	c.	Explain significance of back EMF in DC Motor.	5
2	a.	Explain why compensating windings are used in D.C. machines.	6
	b.	Draw and explain characteristics of a DC series motor.	7
	c.	A 220 V DC Shunt motor takes 4 A at no-load when running at 700 rpm. The field resistance is 100 Ω. The resistances of armature at standstill gives a drop of 6 volts across armature terminals when 10 A were passed through it calculate; (i) Speed on load (ii) Torque (iii) efficiency. The normal input of the motor is 8 kW.	7

UNIT - II

3	a.	Explain how efficiency of a series motor can be computed by conducting field test?	10
	b.	Describe Hopkinson's test on two similar DC shunt machines to find the efficiency.	10
4	a.	What are the advantages and disadvantages of retardation test?	5
	b.	The Hopkinson's test on two shunt machine gave following results for full load : Line Voltage 250 V; Line current excluding field current 50 A; Motor Armature current, 380 A; field current, 5 A and 4.2 A. Calculate the efficiency of each machine. Armature resistance of each machine is 0.02 Ω.	10
	c.	List the merits and demerits of Swinburne's test.	5

UNIT - III

5	a.	Summarize the advantages of connecting alternators in parallel.	4
	b.	Derive the expression for EMF equation of an alternator.	6
	c.	With neat sketches, explain the constructional features of smooth cylindrical rotor and salient pole alternators.	10

Contd…2

6 a. A 3000 kVA 6 pole alternator runs at 1000 rpm in parallel with other machines on 3300 V bus bars. The synchronous reactance is 25%. Calculate the synchronizing power for one mechanical degree of displacement and the corresponding synchronizing torque 10

b. Define : 10

(i) Pitch factor (ii) Distribution factor. Derive the expressions for both factors.

UNIT - IV

7 a. Explain Blondel's two reaction theory of a salient pole alternator with necessary phasor diagram to find the voltage regulation. 10

b. A 3-phase , 800 kVA, 3300 V 50 Hz alternator gave the following results : 10

Exciting current	50	60	70	80	90	100
O.C. Voltage	2560	3000	3300	3600	3800	3960
S.C. Current	190	-	-	-	-	-

The armature leakage reactance drop is 10% and the resistance drop is 2% of the normal voltage. Determine the excitation at full-load 0.8 pf lagging by MMF method.

8 a. Describe the synchronous Impedance (EMF) method to determine regulation of an alternator for lagging and leading power factor. 10

b. Explain the slip test on salient pole synchronous machines with a neat circuit diagram and indicate how X_d and X_q can be determined from the test. 10

UNIT - V

9 a. Explain the principle of operation of synchronous motor. 6

b. Describe V and inverted V curves for different loading condition of synchronous motor. 8

c. A 400 V, 10 HP 3-phase synchronous motor has negligible armature resistance and a synchronous reactance of 10 W/Phase. Determine the minimum current and the corresponding induced emf for full load conditions. Assume an efficiency of 85%. 6

10a. Describe the constructional features and principle operation of Permanent magnet DC Motors. 10

b. Write short notes on : 10

(i) Brushless Motor

(ii) Servomotor.

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