B.Tech. Degree III Semester Supplementary Examination in Marine Engineering December 2017

MRE 302 ELECTRICAL TECHNOLOGY
(Prior to 2013 scheme)

Time: 3 Hours   Maximum Marks: 100

$(5 \times 20 = 100)$

I. (a) What are the various tests that give the complete parameters of the equivalent circuit of the transformer? Explain it briefly.   (10)

   (b) Obtain the equivalent circuit of a single phase, 4 KVA, 200/400 V, 50 Hz transformer from the following test results: (10)

   OC test: 200 V   0.7 A   70 W on lv (primary side)

   SC test: 15 V   10 A   80 W on hv (secondary side)

OR

II. (a) Derive the emf equation of a single phase transformer and explain voltage transformation ratio.   (5)

   (b) Draw the phasor diagram of an ideal transformer for lagging pf load.   (5)

   (c) A 40 KVA transformer has iron loss of 450 W and full load copper losses of 850 W. If the power factor of the load is 0.8 lagging, calculate (i) full load efficiency (ii) the KVA load at which maximum efficiency occurs and (iii) the max efficiency.   (10)

III. (a) The armature of a 6 pole, 600 rpm lap-wound generator has 90 slots. If each coil has 4 turns, calculate the flux per pole required to generate an emf of 288 volts.   (5)

   (b) What are the different losses in a d.c. machine?   (5)

   (c) Explain the two effects in an armature reaction.   (10)

OR

IV. (a) Explain the characteristics of a d.c. shunt generator.   (10)

   (b) At 220 V d.c. shunt motor having an armature resistance of 0.25 Ω carries an armature current of 50 A and runs at 600 rpm. If the flux is reduced by 10% by field regulator, find the speed assuming load torque remains the same.   (5)

   (c) Explain the different speed control techniques for d.c. shunt motor.   (5)

V. (a) Describe the construction of these phase induction motor.   (5)

   (b) Explain the torque slip-characteristics of three phase induction motor.   (5)

   (c) A 6 pole, 50 Hz, 3 phase induction motor runs at 960 rpm when the torque on the shaft is 200 N.m. If the stator losses are 1500 W and friction and windage losses are 500 W, find (i) rotor copper loss and (ii) efficiency of the motor.   (10)

OR

VI. (a) What are the different starting methods of three-phase induction motor? (10)

   (b) Why is single phase induction motor not self starting? What are its starting methods?   (10)

(P.T.O.)

VII.	(a)	Derive the emf equation of an alternator. What do you mean by pitch factor and distribution factor?	(10)
	(b)	A 1200 KVA, 3300 V, 50 Hz, three-phase, star-connected alternator has armature resistance of 0.25 Ω per phase. A field current of 40 A produces a short circuit current of 200 A and an open circuit emf of 1100 V line-to line. Find the voltage regulation on (i) full-load 0.8 pf lagging (ii) full-load 0.8pf leading.	(10)

OR

VIII.	(a)	What are the conditions for paralleling an alternator with infinite bus bars? Explain any one method of synchronization.	(10)
	(b)	Explain the principle of operation of synchronous motors. Describe one starting method for it.	(10)

IX.	(a)	Explain ring main, radial main and interconnected system of distribution.	(10)
	(b)	Describe a typical AC power supply scheme with layout.	(10)

OR

X.	(a)	Describe the principle of operation of air circuit breakers with diagram.	(10)
	(b)	Compare the DC and AC transmission systems.	(10)

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