BT – MRE – III – 08 – M

B.Tech. Degree III Semester Examination in Marine Engineering, November 2008

MRE 302 ELECTRICAL TECHNOLOGY

Time: 3 Hours Maximum Marks: 100

I a) Discuss how parameters of equivalent circuit of a single phase transformer are determined from suitable tests. (10)

b) A single phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60cm^2. If the primary winding be connected to a 50Hz supply at 500V, Calculate:
i) The peak value of the flux density in the core
ii) The voltage induced in the secondary winding. (10)

OR

II a) Derive an expression for saving in copper, in an auto transformer as compared to an equivalent two winding transformers. (10)

b) In a 50KVA transformer, the iron loss is 500 W and full load copper loss is 800 W. Find
i) the efficiency at full load 0.8 pf lagging.
ii) the efficiency at half full load 0.8 pf leading. (10)

III a) Derive the emf equation of a dc generator. (8)

b) The armature of a 12 pole dc shunt generator has 50 slots and is wave wound with 12 conductors per slot. The generator is running at a speed of 625 rpm and supplies to a resistive load of 15 ohms at a terminal voltage of 300V. The armature resistance is 0.5 ohm and field resistance is 60 ohms. Find the armature current, the generated emf and flux pole. (12)

OR

IV a) Draw and explain different characteristics of dc series motor. (8)

b) A 500 V shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. The resistance of armature is 0.12 Ω. Calculate the speed when a resistance is inserted in the field, reducing the shunt field to 80% of normal value, and the armature current is 100 A. (12)

V a) Draw and explain the torque-slip characteristics of a 3 phase induction motor. (10)

b) A 12 pole, 3 phase, 600 V, 50Hz, star connected induction motor has rotor resistance and stand still reactance of 0.03 and 0.5 ohm per phase respectively. Calculate:
i) Speed of maximum torque
ii) Ratio of full load torque to maximum torque, if the full load speed is 495 rpm. (10)

OR

VI a) Briefly discuss various methods of controlling the speed of a 3 phase induction motor. (12)

b) Why a single phase induction motor is not self starting. (8)

(Turn over)

VII a) Explain the terms distribution factor and coil span factor of an alternator. (10)

b) A 3 phase, 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wh, sinusoidaley distributed and the speed is 375 rpm. Find the phase and line emf. Assume full pitched coil. (10)

OR

VIII a) What are the advantages of connecting alternators in parallel? What conditions are required to be fulfilled for the successful parallel operation of alternators?. (10)

b) A 100 KVA, 3000 V, 50 Hz, 3 phase star connected alternator has effective armature resistance of o.2 Ω. The field current of 40 A produces short circuit current of 200 A and an open circuit emf of 1040 V (line value). Calculate the full load voltage regulation of 0.8 pf lagging and 0.8 pf leading. Draw the phasor diagrams. (10)

IX a) Explain two wire and three wire D.C. distribution. (10)

b) What is the percentage saving in feeder copper if the line voltage in a two wire dc system be raised from 220 V to 500 V for the same power transmitted? State any assumptions made. (10)

OR

X Write short notes on

i) Comparison of DC and AC transmission
ii) Ring main distributor
iii) Fuses and its material
iv) Air circuit breakers. (20)

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