Student Exam No:-_____

GANPAT UNIVERSITY

B.Tech Semester-IV (MARINE)

Regular Examination April - June 2015

2MR401:Alternators & Motors

Time: 3 Hours **Total Marks:-70**

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

Q:1 **(A)** Using double-revolving field theory, explain why a single-phase induction motor is not self starting. **(6)**

(B) State the equation of torque for three phase induction motor.Derive & explain the torque-slip characteristic from the above equation with necessary diagrams. **(6)**

OR

Q:1 **(A)** A 500V, 3-phase induction motor develops an output of 15kW at 950 r.p.m. If input power factor is 0.6 lagging,mechanical losses are 730 W and stator losses 1500 W. Find: (i) the slip (ii) the rotor copper losses (iii)the motor input **(6)**

(B) Draw the circuit diagram of a capacitor start capacitor run single-phase induction motor and explain its working.where this type of motor is commonly used? **(6)**

Q:2 **(A)** 440V, 3Φ, 50 Hz, 4-pole , Y- connected induction motor has a full load speed of 1425 rpm. The rotor has impedance of (0.4 + j 4)Ω and transformation ratio of 0.8. calculate (1) full load torque (2) rotor current and rotor Cu loss (3) power output if windage and friction loss is 500w (4) Starting Current (5) Starting Torque **(5)**

(B) Discuss briefly the various methods of speed control of 3-phase induction motor. **(6)**

OR

Q:2 **(A)** What is a need of starter for three phase induction motor? Draw the power flow diagram for the same. **(5)**

(B) Obtain the condition for maximum torque under running condition and at starting. **(6)**

Q:3 **(A)** A 1100-V, 50 Hz delta connected induction motor has star connected slip rings with transformation ratio 3.8. The rotor resistance and standstill leakage reactance are 2 0.012Ω and 0.25Ω per phase respectively. Neglect Stator Impedance and Magnetizing Current. Determine (1) Rotor Current at start with slip ring shorted (2) Rotor p.f. at start with slip ring shorted (3) Rotor Current at 4% slip with slip ring shorted (4) Rotor p.f. at 4% slip with slip ring shorted **(6)**

(B) Give comparison between Squirrel cage and Slip ring induction motor. **(3)**

(C) A 3Φ induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate (1) Synchronous Speed (2) Rotor Speed, when slip is 4% (3) Rotor frequency when rotor runs at 600 rpm. **(3)**

SECTION-II

Q:4 (A) Derive E.M.F. equation of an alternator. (4)

(B) (i)Define (i)pitch factor (ii)distribution factor. (8)
(ii)Draw the vector diagrams of synchronous motor for lagging,leading & unity power factor conditions .

OR

Q:4 (A) 4-pole, 3-phase, 50-Hz, star-connected alternator has 60 slots, with 4 conductors per slot. Coils are short-pitched by 3 slots. If the phase spread is 60°, find the line voltage induced for a flux per pole of 0.943 Wb distributed sinusoidal in space. All the turns per phase are in series. (4)

(B) What is synchronous condenser? Discuss its use with the help of vector diagram. (4)

(C) Give the comparison between synchronous motor and induction motor. (4)

Q:5 (A) What do you mean by voltage regulation? Explain the synchronous impedance method for voltage regulation. (5)

(B) Name the different methods of starting the 3-phase synchronous motor and explain any one in detail. (5)

(C) By means of neat diagrams,describe the main parts of an alternator with their functions. (3)

OR

Q:5 (A) List out the different types of excitation related to synchronous motor.explain them in detail (4)

(B) State condition necessary for parallel operation of alternator. & explain dark lamp method for parallel operation of alternator. (7)

Q:6 (A) What are the 'V' curves of a synchronous motor? Draw and explain it at different load conditions. (3)

(B) Briefly describe the phenomenon of "hunting" in a synchronous motor. How is it rectified? (3)

(C) Explain the production of rotating magnetic field with angle 0 & 60 degree. (6)

END OF PAPER
Best of Luck