Sr. No. of Question Paper : 1815   C   Roll No.............

Unique Paper Code   : 251601

Name of the Course   : B.Sc. (H) Electronics

Name of the Paper   : Electrical Machines : ELHT-601

Semester   : VI

Duration   : 3 Hours   Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. Attempt **five** questions in all, including Question No. 1 which is compulsory.

3. Use of non-programmable scientific calculator is allowed.

1. (a) Give the expression for resultant pitch for lap winding and wave winding. (3)

   (b) What is the effect of armature reaction ? (3)

   (c) What is the necessity of a motor starter ? (3)

   (d) What will be the value of equivalent secondary resistance R_2 as referred to primary side in a transformer ? (3)

   (e) What is the value of slip when rotor is stationary ? (3)

2. (a) A short shunt compound generator delivers a load current of 30 A at 220 V, and has armature, series field and shunt field resistance of 0.05 ohms, 0.30 ohms, and 200 ohms respectively. Calculate the induced e.m.f. and the armature current. (5)

   (b) Derive the condition for maximum efficiency of a d.c. generator. (5)

   (c) Give the load saturation curve of a separately excited d.c. generator. (5)

3. (a) Derive the voltage equation of a d.c. motor and the condition for maximum power. (5)

(b) Give the characterstics of d.c. shunt motor.   (5)

(c) A 250 V d.c. shunt motor has armature resistance of 0.25 ohm, on load it takes an armature current of 50 A and runs at 750 r.p.m. If the flux of motor is reduced by 10% without changing the load torque, find the new speed of the motor.   (5)

4. (a) Derive the relation between phase voltages and line voltages, phase current and line currents in a 3 phase delta connected system.   (6)

(b) Derive the expression for total power in a 3-phase delta connected system.   (4)

(c) A balanced star connected load of 8+j6 ohms per phase is connected to a balanced 3-phase 400 V supply. Find the line current, power factor, and total power.   (5)

5. (a) Derive the expression for e.m.f. equation of transformer.   (5)

(b) Explain the open circuit test of a transformer.   (5)

(c) Derive the expression for saving in copper in an autotransformer.   (5)

6. (a) Derive the expression for torque under running conditions of 3-phase induction motor.   (5)

(b) Explain the relationship between torque and slip of a 3-phase induction motor.   (5)

(c) Give the advantages and disadvantages of 3-phase induction motor.   (5)

7. (a) Explain the principle of operation of synchronous motor.   (5)

(b) Explain the working of capacitor start single phase induction motor.   (5)

(c) Explain the working of a.c. series single phase induction motor.   (5)