(c) Explain the construction and working of a Stepper Motor. (6)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4058 **H**

Unique Paper Code : 2512012401

Name of the Paper : Electrical Technology (CORE)

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

Semester : IV

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. All questions carry equal marks
3. Attempt any five questions in all including question no. 1 which is compulsory.
4. Use of non-programmable Scientific Calculator is allowed.

P.T.O.

1. (a) Why is the transformer rating given in kVA? (3)

(b) State the different kinds of losses in a DC Generator. (3)

(c) What is the general principle of operation of Induction Motors? (3)

(d) What could be the reasons if a synchronous motor fails to start? (3)

(e) A 220V DC machine has an armature resistance of 0.5Ω.If the full load armature current is 20A, find the induced EMF when the machine acts as a

(i) generator,

(ii) motor. (3)

(ii) The working (or loss) component of no-load current. The iron loss.

(b) Explain the characteristics of a self-excited DC shunt generator (6)

(c) A 220V shunt motor has an armature resistance of 0.5 and takes a current of 40A on full load. By how much must the main flux be reduced to raise the speed by 50% if the developed torque is constant? (6)

7. (a) How a single-phase Induction Motor is made self-starting? (6)

(b) Explain various speed control methods for a DC Shunt Motor. (6)

5. (a) Explain the method of starting for Synchronous Motors. (6)

(b) Explain the differences between Synchronous and Induction Motors. (6)

(c) Derive the equation of Induced E.M.F. of Synchronous Generators (6)

6. (a) In a no load test of a single phase transformer, the following test data were obtained: (6)

Primary voltage: 220V, Secondary voltage: 110V, Primary current: 0.5A, Power input: 30W. Find the following

(i) The magnetising component of no-load current.

(f) What is Slip? What is its value at synchronous speed? (3)

2. (a) Derive the EMF equation of a transformer and relation between the turns ratio and the voltages. (6)

(b) A 25 kVA, single-phase transformer has 250 turns on the primary and 40 turns on the secondary winding. The primary is connected to 1500 V, 50 Hz mains. Calculate

(i) Primary and Secondary currents on full-load,

(ii) Secondary EMF. and

(iii) maximum flux in the core. (6)

P.T.O.

(c) Derive the relation between the phase and line voltages and currents in a three phase star connected circuit. Draw phasor diagram to establish it. (6)

3. (a) Derive the EMF equation of a generator and discuss the reduced form for lap and wave wound configuration. (6)

(b) Derive the voltage equation of a DC Motor. What is the significance of Back EMF in a DC motor? (6)

(c) A 440V shunt motor has an armature resistance of 0.8Ω and field resistance of 200Ω. Determine the back EMF when the motor output is 7.46KW at 85% efficiency. (6)

4. (a) Explain the torque-slip characteristics for poly-phase induction motor. (6)

(b) Differentiate between a Squirrel cage rotor and a Phase wound rotor for an induction motor based on their construction and applications. (6)

(c) A 4 pole 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate:

(i) The speed at which the magnetic field of the stator is rotating?

(ii) The speed of the motor when the slip is 0.04?

(iii) The frequency of the rotor currents at stand still? (6)

P.T.O.