(23)

B.E / B.Tech (Full - Time) DEGREE EXAMINATIONS, APRIL / MAY 2011

ELECTRICAL AND ELECTRONICS ENGINEERING BRANCH

FOURTH SEMESTER

EE 9253 - ELECTRICAL MACHINES I

(REGULATIONS 2008)

Time: 3 Hours **Max: 100 Marks**

Answer ALL Questions

PART A **(10x2 = 20)**

1. What are the main differences between statically and dynamically induced electromagnetic forces?
2. Draw the energy flow diagram for electromechanical devices.
3. What is the use of lamination provided in the core of a transformer?
4. What is the purpose of using three winding transformers?
5. What do you meant by distributed windings?
6. What do you meant by short pitch coil and full pitch coil?
7. What is the purpose of commutator in DC motors?
8. What are the various causes for the failure of generator voltage build up?
9. Draw the speed – current characteristics of a series motor and explain it.
10. What are the merits and demerits of using Hopkinson's test?

PART B **(5 x 16 =80)**

11. (i) Discuss briefly the term "Principle of energy conversion". (6)

    (ii) Derive an expression for the torque developed by a singly excited systems based on energy considerations. (10)

12. (a) (i) Explain the open circuit and short circuit test in detail. (8)

    (ii) A 5 kVA distribution transformer has a full load efficiency at unity pf of 95%, the copper and iron losses then being equal. Calculate it's all day efficiency if it is loaded throughout the 24 hours as follows:

    No load for 10 hours,

    Quarter load for 7 hours ,

    Half load for 5 hours,

    Full load for 2 hours.

    Assume load pf of unity. (8)

(OR)

(b) (i) Explain the conversion of three phase to two phase by Scott condition in detail. (8)

(ii) Two single phase transformers A and B rated at 250 kVA each are operated in parallel on both sides. Percentage impedances for A and B are (1+j6) and (1.2+j4.8) respectively. Compute the load shared by each when the total load is 500 kVA at 0.8 power factor lagging. (8)

13. (a) What are the procedure to be followed during the lap winding connection? Draw a developed diagram of a simple 2 layer lap winding 4-pole generator with 16 coils or winding elements. Mention the differences between lap and wave winding connection.

(OR)

(b) Explain the concept of rotating magnetic field in three phase induction motor with neat diagram.

14. (a) (i)Derive the expression for emf equation of a DC generator. (8)

(ii) Explain the No-load saturation curve for the separately excited and self excited DC shunt generator in detail. (8)

(OR)

(b) Define the term Armature reaction. Explain the effects of armature reaction on the machine performance and how to reduce the armature reaction effects.

15. (a) (i) A 250 V Shunt motor with armature resistance of 0.5 ohm runs at 600 rpm on full load takes an armature current of 20 A. If resistance of 1 ohm is placed in the armature circuit, find the speed at (i) full-load torque (ii) half full load torque. (8)

(ii) Explain the various field control methods used in DC shunt motor with neat diagram. (8)

(OR)

(b) (i) Explain the Swinburne's test for DC machines in detail. (8)

(ii) A 2 pole series motor runs at 707 RPM when taking 100 A at 85 V with the two field coils connected in series. The resistance of each field coil is 0.03Ω and that of the armature is 0.04Ω. Find the speed of the motor, if the field coils are connected in parallel and load torque remains constant. (8)