Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91438

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fourth Semester

Electrical and Electronics Engineering

EE 2251/EE 1251 A/080280003/EE 42/10133 EE 402 — ELECTRICAL MACHINES – I

(Regulation 2008/2010)

(Common to PTEE 2251/10133 EE 402 – Electrical Machines – I for B.E (Part-Time) Third Semester – Electrical and Electronics Engineering – Regulation 2009-2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define MMF and EMF.

2. What is meant by dynamically induced EMF?

3. What happens if DC supply is applied to the transformer?

4. What are the losses in the transformer? And how those losses are minimized?

5. Define field energy.

6. Draw the general block diagram of electromechanical energy conversion device.

7. What is meant by distributed winding?

8. Define winding factor.

9. What is commutation in a DC machine?

10. Why swinburne's test cannot be performed on DC series motor.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Compare electric and magnetic circuit by their similarities and dissimilarities. (8)

(ii) Compare statically and dynamically induced EMF by their similarities and dissimilarities. (8)

Or

(b) (i) Discuss AC operation of magnetic circuits. (10)

(ii) A single phase 50 Hz. 50 KVA transformer for 6000/240V ratio has a maximum flux density of 1.4 Wb/m^2 and an effective core section of 150 m^2. The magnetising current (RMS) is 0.1 A. Estimate the inductance of each wire on open circuit. (6)

12. (a) Explain operation of a transformer with necessary vector diagrams

(i) on no load and

(ii) on load with upf, lagging and leading power factors. (16)

Or

(b) (i) Derive an expression for saving of copper when an auto transformer is used. (6)

(ii) A 3-phase step down transformer is connected to 11 KVolts mains and takes 10 Amps. Calculate the secondary line voltage and line current for the

(1) Δ / Δ

(2) Y/Y

(3) Δ / Y and

(4) Y / Δ connections. The ratio of turns per phase is 8 and neglect no load losses. (10)

13. (a) Deduce an expression for the mechanical force of field origin in a typical attracted armature relay. (16)

Or

(b) Obtain an expression for the magnetic force developed in a doubly excited magnetic systems. (16)

14. (a) Derive an expression for emf generated in :

(i) Synchronous machine. (8)

(ii) D.C machine. (8)

Or

(b) Deduce an expression for the torque in an AC and DC machines. (16)

15. (a) Explain the different methods of excitation and characteristics of a DC motors with suitable diagrams. (16)

Or

(b) State the various methods of speed control of a DC shunt motor? And briefly explain them with help of neat diagram. (16)

———————