

K 1196

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Third Semester

Electrical and Electronics Engineering

EE 232 — ELECTRICAL MACHINES — I

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the two types of induction motors.
2. What is statically induced emf?
3. What is an ideal transformer?
4. State the different losses which occur in a transformer.
5. What are the causes for irrecoverable energy loss when the flux in the magnetic circuit undergoes a cycle?
6. Write an expression for the mechanical energy output when the armature is move from one position to another with constant coil current.
7. What are the advantages when the stator coils are short pitched?
8. Write an expression for synchronous speed.
9. Draw the torque current characteristics of various types of d.c. motors.
10. State the function of no volt coil of the starter.

PART B — (5 × 16 = 80 marks)

11. (i) Explain about A.C. operation of Magnetic circuits. (6)
- (ii) Write in detail about magnetically induced emf. and derive the relevant expressions. (10)
12. (a) (i) Derive the equivalent circuit of a single phase two winding transformer. (8)
- (ii) The maximum efficiency of a single phase 250 kVA, 2000/250 V transformer occurs at 80% of full load and is equal to 97.5% at 0.8 p.f. Determine the efficiency and regulation on full load at 0.8 p.f. lagging if the impedance of the transformer is 9 percent. (8)
- Or
- (b) (i) Explain the principle and operation of autotransformer. (8)
- (ii) With proper connection and phasor diagrams describe the different ways of connecting three phase transformers. (8)
13. (a) Explain the $i-\lambda$ characteristic of a magnetic system. Also derive expression for coenergy density assume the $i-\lambda$ relationship of the magnetic circuit is linear. (16)

Or

- (b) (i) Consider an attracted armature relay is excited by an electric. Explain about the mechanical force developed and the mechanical energy output with necessary equations. For linear and non-linear cases. (10)
- (ii) Write in brief about multiple-excited magnetic field systems. (6)
14. (a) Write in detail about the MMF space wave of three phase distributed winding. (16)

Or

- (b) Derive the torque equation of a round rotor machine. Also clearly state what are the assumptions made? (16)

15. (a) (i) Explain Swinburne's test for predetermining the efficiency of a D.C. Machine. (8)
- (ii) A 4 pole lap wound D.C. shunt generator has a useful flux/pole of 0.6 Wb. The armature winding consists of 200 turns, each turn having a resistance of 0.003Ω , calculate the terminal voltage when running at 1000 r.p.m. if armature current is 45 A. (8)

Or

- (b) Explain the different methods used for the speed control of d.c. shunt motor. (16)
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