Reg. No. : | E | N | G | G | T | R | E | E | . | C | O | M |

Question Paper Code : 20976

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Third Semester

Electrical and Electronics Engineering

EE 3303 – ELECTRICAL MACHINES – I

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Faraday's law of electro magnetic induction.

2. Define Fringing.

3. Explain the methods of improving commutation briefly.

4. State the reasons for parallel operation of DC Generators.

5. What is the significance of back EMF?

6. State the condition for maximum efficiency in DC machine?

7. Define all day efficiency.

8. State the conditions for parallel operation of single-phase transformers.

9. Compare star-delta and delta-star transformer.

10. Draw the additive and subtractive polarity of auto-transformer with the help of two winding transformer.

PART B — (5 × 13 = 65 marks)

11. (a) Differentiate statically and dynamically induced EMF. Also, explain the concept of statically and dynamically induced EMF with suitable diagram. (6+7)

Or

(b) Derive the energy stored and electromagnetic torque in double excited magnetic field system.

12. (a) (i) An 8-pole D.C. shunt generator with 778 wave-connected armature conductors and running at 500 R.P.M., supplies a load of 12.5 Ω. Resistance at terminal voltage of 50 V. The armature resistance is 0.24 Ω and field resistance is 250 Ω. Find the armature current, the induced E.M.F. and the flux per pole. (7)

(ii) Draw and explain the characteristics of DC shunt and series generators. (6)

Or

(b) (i) A long-shunt compound generator delivers a load current of 50 A at 500 V and has armature, series field and shunt field resistances of 0.05 Ω, 0.03 Ω and 250 Ω respectively. Calculate the generated voltage and the armature current. Allow 1 V per brush for contact drop. (7)

(ii) Explain the process of commutation with necessary diagrams. (6)

13. (a) (i) Derive the torque equation of DC motor. (5)

(ii) Explain the Field Controlled DC Series Motor. (8)

Or

(b) Discuss the Hopkinson's Test of DC motor. Why it is needed? What are its advantages? (13)

14. (a) Write the procedure for Open circuit and short circuit test on single phase transformer. (13)

Or

(b) Discuss the Sumpner's Test of Transformer. Why it is needed? What are its advantages? (13)

20976

15. (a) Draw and explain the circuit of Auto-transformer. State its applications.

(10+3)

Or

(b) Draw and explain the circuit of Scott connection. State its applications.

(10+3)

PART C — (1 × 15 = 15 marks)

16. (a) A D.C. series motor operates at 800 R.P.M. with a line current of 100 A from 230-V mains. Its armature circuit resistance is 0.15 Ω and its field resistance 0.1 Ω. Find the speed at which the motor runs at a line current of 25 A, assuming that the flux at this current is 45 per cent of the flux at 100 A.

Or

(b) In a 50 KVA Transformer, the iron loss is 500 W and full load copper loss is 800 W. Find the efficiency at full and half loads at 0.8 p.f. lagging.

———————

3   20976