INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech III Semester End Examinations (Regular), February – 2021

Regulation: IARE–R18

ELECTRICAL MACHINES – I

Time: 3 Hours   (EEE)   Max Marks: 70

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Write a short note on following terms i) Magnetic flux density ii) Magentic flux intensity iii) Magnetic torque.
   [5M]

2. Explain about the characteristics of DC Generator. **[5M]**

3. Explain the following methods for speed control of DC Motor i) Armature control method ii) Field control method. **[5M]**

4. What are the losses in a transformer? Deduce the condition for maximum efficiency. **[5M]**

5. Explain about the cooling methods of transformer. **[5M]**

6. Determine the expression for EMF equation of DC Generator. **[5M]**

7. Discuss about applications of DC Motors. **[5M]**

8. Define an auto transformer. State its merits and demerits over a two-winding transformer and write applications of auto transformer. **[5M]**

PART – B

9. Descibe an energy balance equation for a generator based on the principle of energy conversion. **[10M]**

10. The field winding of a DC electromagnet is wound with 960 turns and has resistance of 50 ohms. The exciting voltage is 230V and the magnetic flux linking the coil is 5mWb. Find the self inductance of the coil and energy stored in the magnetic field. **[10M]**

11. What is meant by DC Generator? Explain the theory and principle of operation and working of DC Generator. **[10M]**

12. A 4 pole generator with wave wound armature has 51 slots each having 24 conductors. The flux per pole is 10 mWb. At what speed must the armature rotate to give an induced emf of 0.24 kV. What will be the voltage developed, if the winding is lap connected and the armature rotates at the same speed? **[10M]**

13. Determine the expression for torque equation of DC motor. **[10M]**

14. A 250 volt DC shunt motor has armature resistance of 0.25 ohm on-load it takes an armature current of 50A and runs at 750rpm. If the flux of the motor is reduced by 10% without changing the load torque, find the new speed of the motor. **[10M]**

15. Explain the term of transformer under no load condition with phasor diagram and output equation. **[10M]**

16. The primary winding of the transformer is rated at 115 V and the secondary winding is rated at 300 V. The primary winding has 500 turns. If transformer has a full load secondary output of 300 VA at 300 V. Calculate i) The full-load secondary current ii) The full-load primary current (neglect all losses) iii) The number of turns on the secondary winding. **[10M]**

17. Discuss about principle operation of three phase transformer. **[10M]**

18. A single-phase auto-transformer has a voltage ratio 320V:250V and supplies a load of 20 kVA at 250V. Assuming an ideal transformer, determine the current in each section of the winding. **[10M]**

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