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Question Paper Code : 73509

B.E./B.Tech. DEGREE EXAMINATION, APRIL/ MAY 2017.

Sixth Semester

Electrical and Electronics Engineering

EE 2355/EE 65/10133 EE 605 — DESIGN OF ELECTRICAL MACHINES

(Regulations 2008/2010)

(Common to PTEE 2355/10133 EE 605 – Design of Electrical Machines for B.E. (Part-Time) Fifth Semester – EEE – Regulations 2009/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the basic components required for the rotating machine?
2. List the types of duties and ratings of rotating electric machinery.
3. Identify the role of main poles and Inter-poles in DC machine.
4. State the guiding factors for choosing number of poles in DC machine.
5. List the advantages and disadvantages of three phase transformers.
6. What is meant by the core earthing?
7. Define the term cogging.
8. State the effect of change the number of poles in induction motor.
9. Classify the types of synchronous machines.
10. Define the term run away speed.

PART B — (5 × 16 = 80 marks)

11. (a) Evaluate the choice of specific electric and magnetic loading with necessary equations. (16)

Or

(b) Analyze the various methods used for determine the motor rating for variable load drives with necessary equations. (16)

12. (a) (i) Evaluate the performance of Lap winding and Wave winding in armature design of DC machine. (8)

(ii) Find the armature voltage drop of a 350 kW, 440V, 6 pole lap connected dc generator having 120 slats with 8 conductors per slot. Area of each conductor is 20 mm^3 and length of mean turn is 2.5m. The resistivity is 0.03 Ω/m and mm^2. (8)

Or

(b) Construct a DC motor with its main dimensions and derive the expression for the output equation. (16)

13. (a) Calculate approximate overall dimensions for a 250KVA, 6600/440V, 50Hz, 3 phase core type transformer. The following data may be assumed ; emf per tern = 12V; maximum flux density = 1.2 Wb/m^2 ; current density = 2 A/mm^2; Window space factor = 0.2 overall height = overall width, stacking factor = 0.8. Use a stepped core, width of largest stamping = 0.9 d, net iron area = 0.6 d^2 (16)

Or

(b) Design a transformer tank with tubes and discuss the various cooling methods of transformer cooling with necessary equations. (16)

14. (a) (i) Discuss the design of end rings in three phase induction motor with necessary parameters. (8)

(ii) A 11KW, 3 phase, 6 pole, 50Hz, 220V, star connected induction motor has 50 stator slots, each containing 9 conductors. Calculate the values of bar and end ring currents. The number of rotor bars is 54. The machine has an efficiency of 0.80 and power factor of 0.84. The rotor mmf may be assumed as 85 per cent of stator mmf. (8)

Or

(b) Draw the circle diagram and discuss the various parameters of induction motor obtained from the circle diagram. (16)

15. (a) (i) Compare single and double layer armature windings synchronous machine. (8)

(ii) Discuss the terms armature resistance and armature reactance with necessary equations. (8)

Or

(b) Estimate the diameter, core length, size and number of conductors, number of stator of 10 MVA, 11 KVA, 50Hz, 2 pole star connected turbo alternator with 75deg phase spread. Assume Bav = 0.45 Wb/m^2 ; ac 30000 A/m; current density = $5A/mm^2$, peripheral speed = 160 m/s. The winding should be arranged to eliminate 5^{th} harmonics. (16)
