Code No: 155BB

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, February - 2022
ELECTRICAL MACHINE DESIGN
(Electrical and Electronics Engineering)

Time: 3 Hours
Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a) What are the advantages and disadvantages due to higher electric loadings.
  b) Explain the conducting Materials used in machines. [7+8]

2.a) What are the insulation properties that can change due to excess temperatures?
  b) Write the sequential steps involved in the design of electrical machines. [7+8]

3.a) Write the sequential steps for design of each part of a transformer.
  b) Derive output equation of single phase transformer. [9+6]

4. Determine approximate overall dimensions for a 200 kVA, 6600/440 V, 50 Hz, 3-phase core type transformer. The following data may be assumed: emf per turn =8V, maximum flux density =1.2 Wb/ m^2, current density =2.4 A/ mm^2, window space factor =0.2, overall height =overall width, stacking factor = 0.8 Use a 3 stepped cor.
   Foe a 3 stepped core:
   Width of largest stamping =0.8 d and
   Net iron area =0.5 d^2, where d is the diameter of circumscribing circle. [15]

5.a) Describe the procedure to draw the circle diagram of 3-ϕ induction motor.
  b) Explain the points help to serve as guidelines in the selection of stator slots of 3-phase I.M. [7+8]

6. A 90 kW, 500 V, 50 Hz, 3-phase, 8 pole induction motor has a star connected stator winding accommodated in 63 slots with 6 conductors per slot. If the slip ring voltage on open circuit is to be about 400 V, find a suitable rotor winding, stating (a) number of slots, (b) number of conductor per slot, (c) coil span, (d) slip ring voltage on open circuit (e) approximate full load current per phase in rotor. Assume efficiency = 0.9, power factor = 0.856. [15]

7. Determine a suitable number of slots and conductor per slot, for the stator winding of a 3-phase, 3300 V, 50 Hz, 300 rpm alternator. The diameter is 2.3 m and the axial length of core is 0.35 m. The maximum flux density in the air gap should be approximately 0.9 Wb/ m^2. Assume sinusoidal flux distribution. Using single layer winding and star connection for stator. [15]

8. Describe the finite element-based method of design of brushless DC machines. [15]

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