

**FACULTY OF ENGINEERING****B.E. 4/4 (EEE) I - Semester (Suppl.) Examination, May / June 2019****Subject : Electrical Machine Design****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions from Part-A & any five questions from Part-B.****PART – A (25 Marks)**

- 1 Name the magnetic materials used for Yoke, Transformer Stampings and permanent magnet. [3]
- 2 What is magnetization curve? [2]
- 3 List the methods used for determining the motor rating for variable load drives. [3]
- 4 What are the problems that arise during the calculation of m.m.f. for air gap? [3]
- 5 What are the factors to be considered for the selection of number of poles in dc machine? [3]
- 6 Explain how depth of armature core for a D.C. machine is determined. [3]
- 7 Name the factors to be considered to choose the type of winding for a core type transformer. [3]
- 8 List the advantages and disadvantages of using closed type of rotor slot in squirrel cage induction motor. [3]
- 9 What are the advantages of digital computer? [2]

**PART- B (50 Marks)**

- 10 Explain the different types of magnetic materials and their properties in detail. [10]
- 11 Derive an expression for the thermal resistivity of winding and prove that the square of the length of the copper per metre of winding thickness is equal to space factor. [10]
- 12 Determine the diameter and length of armature core for a 55 KW, 110 V, 1000 rpm, 4-pole shunt generator, assuming specific electric and magnetic loadings of 26000 amp. cond./m and  $0.5 \text{ Wb/m}^2$  respectively. The pole arc should be about 70% of pole pitch and the length of core about 1.1 times the pole arc. Allow 10 ampere for the field current and assume a voltage drop of 4 Volts for the armature circuit. Specify the windings used and also determine suitable values for the number of armature conductors and number of slots. [10]
- 13 A 5 HP, 440 volt, 3 phase, 4 pole cage motor with 375 turns/phase in the stator has the following design data for its rotor. Slots = 30, rotor bar size = 8.5 mm X 6 mm; length of the bar = 12.5 cm; end ring size = 10 mm X 15 mm; inner diameter of the end ring = 11.5 cm. Calculate the rotor resistance when referred to the stator winding. Assume specific resistance as  $2 \times 10^{-6} \text{ cm}$ . [10]
- 14 Explain different approach methods of computer aided design. [10]
- 15 What are the various types of synchronous machines based on rotor construction? Bring out the constructional differences between them. [10]
- 16 (a) Derive the output equation of three phase transformer. [5]  
(b) What are the different conductor materials used in the construction of transformers and DC and AC machines? Point out salient properties of these materials. [5]

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