[Total No. of Questions - 9] [Total No. of Pri. d Pages - 3]
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16196(D) - 0 DEC 2016

B. Tech 7th Semester Examination

Electrical Machine Design (NS)

EE-412

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt Five questions. Select one question from each of the section A, B, C and D. Question no. 9 in section E is compulsory. All questions carry equal marks.

SECTION - A

1. (a) On what basis the classification of insulating material is done? Discuss the types of insulating materials along with the applications. (10)

   (b) Why the losses occur in electrical machines? Briefly discuss the causes and methods to reduce losses in electrical machines. (10)

2. (a) Classify the various types of BIS specifications for transformer conductors and oil. (10)

   (b) Explain the methods of cooling and ventilation in case of transformers and three phase induction motors. (10)

SECTION - B

3. (a) Which type of low voltage and high voltage windings are there in transformers? Discuss in detail. (10)

   (b) What are the various types of windings used for induction motor? Also discuss the significance of winding factor. (10)

4. (a) Discuss in detail the role of magnetic circuit parameters in operation and design of transformer. (10)

   (b) Derive an expression for the specific slot permeance of a semi closed rectangular slot with single layer winding in it. (10)

SECTION - C

5. (a) Draw the circuit diagram of three phase core type distribution transformer. Discuss in detail the important design aspects for successful operation of transformers. (10)

   (b) What are the different types of cooling systems used in transformers? Does the cooling system depend on the dimension and weight of transformer. (10)

6. (a) How the transformer design can contribute in the improvement of transformer efficiency? Also discuss the role of regulation on the performance of transformer. (10)

   (b) A 300 KVA, 6600/440 V, three phase delta/star core type transformer has a flux density of 1.35 wb/m and the total weight of core is 650 kg. The magnetizing VA/kg and iron loss/kg corresponding to 1.35 wb/m are 30 and 2.5 W respectively. Calculate the no load current if the mmf required for joints is 2.5% of that for iron. (10)

SECTION - D

7. (a) Explain the design aspects of slip ring induction motors. Which type of windings are used in construction of stator and rotor of motor. (10)

   (b) How the number of slots is decided during construction of machine? Discuss the criteria to decide the insulation level for slots . (10)

8. (a) On what basis the efficiency of an induction motor can be calculated? Does the rise in stator temperature effect the efficiency of induction motor? (10)

   (b) Develop the flow chart for computer aided design of three phase induction motor by considering all the possible constraints. (10)

SECTION - E

(Attempt all questions)

9. (a) What is unbalanced magnetic pull?

   (b) What is hot spot temperature?

   (c) What is the role of tertiary winding in transformers?

   (d) What do you understand by steady state temperature rise?

   (e) Why is the harmonic leakage flux in induction motor?

   (f) How Leakage reactance can be reduced in transformers?

   (g) On what bases the classification of insulating material is done?

   (h) Which cooling system is more effective in case of totally enclosed machines? (8×2½=20)