

B.E. Electrical IITBSSGS
Elect. M/C Design.

8.12.18
Q.P. Code : 794802

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(3 Hours)

[Total Marks : 80

- N.B. : (1) Question no.1 is compulsory.
(2) Solve any three out of remaining.
(3) Assume the suitable data in required and mention the same.

1. Answer the following :-

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- What is the significance of Carters Coefficient?
- What are the design modifications in stator of energy efficient motor as compared to standard motor.
- What is the significance of B_{60} in induction machine design?
- Discuss the significance of "Physical Properties" of transformer oil.

2. a. What are the different classifications of types of insulation in transformer? Discuss the various factors to be considered while designing the insulation of transformer. 10

2. b. Discuss the designing of core of a three phase transformer. 10

3. a. A 15000 KVA; 50 HZ; 33/6.6 KV; 3 phase star delta; core type of transformer has following data net iron area of each limb = $1.5 \times 10^{-3} \text{ m}^2$; neat area of yoke = $1.8 \times 10^{-3} \text{ m}^2$; mean length of flux path in each limb = 2.3m; mean length of flux path in each yoke = 1.6m; no of turns in HV = 450. calculate the no load current. Use the data provided. Density of limb = $7.8 \times 10^3 \text{ Kg/m}^3$. 10

Bm Wb/m ²	0.9	1.0	1.2	1.3	1.4
MmfA/m	130	210	420	660	1300
Iron Loss W/Kg	0.8	1.3	1.9	2.4	2.9

3. b. Derive the output equation for a three phase transformer and specify the various terms used. 10

4. a. What are the different circuits and parts of electrical machines. Discuss the various limitations on the design of these circuits. 10

4. b. Discuss the designing of end rings in three phase squirrel cage induction machine. How it affects the slip of machine. 10

5. a. What is frame and frame size in case of induction motor. Draw a figure showing structural dimensions of standard frame. 10

[TURN OVER]

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5. b. Discuss the designing of stator winding for three phase induction motor. 10
6. a. Derive the output equation for a three phase induction motor and specify the various terms used. 10
6. b. Determine the main dimensions, turns per phase, no of slots, conductor cross section, and area of a slot, for a 250 HP, 400V, 3 phase, 4 pole, 50Hz, 1410 rpm, delta connected squirrel cage induction motor with the data, average flux density in air gap = 0.5 Wb/m^2 , ampere conductor per meter = $30,000 \text{ A/m}$, efficiency = 0.9, power factor = 0.9, winding factor = 0.955, current density = 3.5 A/mm^2 , slot space factor = 0.4, ratio of length of core to pole pitch = 1.2, assume 5 slots per pole per phase. 10

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