Enrolment No.

Date:11/05/2015

Total Marks: 70

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GUJARAT TECHNOLOGICAL UNIVERSITY PDDC - SEMESTER-VIII • EXAMINATION - SUMMER • 2015

Subject Code: X80902

Subject Name: ELECTRICAL MACHINE DESIGN I & II

Time:10:30 am - 01:00 pm

Instructions:

0.4

(a)

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- (a) Explain various factors to be consider for designing power transformer and 07 0.1 distribution transformer.
 - **(b)** Explain different types of cooling systems in transformer.
- Q.2 **(a)** Explain methods for improving starting torque of 3 phase induction motor. 07
 - Write down the various factors to be consider for selection of an air gap in 3 **(b)** 07 phase induction motor.

OR

- **(b)** State the rules for selection of rotor slots. Describe the methods of reducing the 07 effect of harmonics torque.
- **Q.3** Derive the equation $Et = k\sqrt{Q}$ where Q = KVA rating of a transformer. (a)
 - The tank of 1250 KVA, natural oil cooled transformer has the dimensions **(b)** 07 length width and height as 1.55m x 065m x 1.85 respectively. The full load loss is 13.1 kW. Find the number of tubes for this transformer assuming $W/m^{20}C$ due to radiation as 6 and due to convection as 6.5, improvement in convection due to provision of tubes = 40%, temperature rise is 40° C; length of each tube=1m, Diameter of tubes = 50mm. Neglect top and bottom surfaces of the tank.

OR

- Explain the various factors to be consider for the selection of no of poles in the 0.3 07 (a) D.C. machine.
 - (b) What do you mean by specific electric loading applied to electric machines? 07 State the

factors on which the choice of these loadings depends.

- Derive an output equation of a 3 phase induction motor. How D and L are **O.4** 07 **(a)** estimated from this equation.
 - **(b)** Calculate the main dimension of a 5 h.p., 3 ph., 400 V, 1500 rpm, 50 Hz, 07 squirrel cage induction motor. Star delta starting is used. Assume ac/m = 22000Bav = 0.46T, full load p.f. = 0.84 lagging, full load efficiency= 83%, L / τ =1.5.

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- What is Dispersion coefficient? Explain the effect of Dispersion coefficient on **(b)** 07 maximum output power factor.
- State important design difference between turbo alternators and hydro Q.5 **(a)** 07 generators.
 - **(b)** Explain the term SCR and its effects on synchronous machine performance 07 OR
- Explain the terms "critical speed" and "run away speed" with reference to Q.5 07 **(a)** synchronous machine.
 - (b) Explain hunting in Synchronous machine. ******************

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