2007 MAHATMA GANDI UNIVERSITY
I B.TECH DEGREE EXAMINATIONS
VIIISEMESTER ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL SYSTEM DESIGN

TIME : 3 HOUR
MARK : 100

ANSWER ALL QUESTIONS

PART A[10*4=40]

1.Compare between core type and shell type transformers.

2. Distinguish between distribution and power transformers.

3. Discuss the design details of ventilating ducts of 3-phase induction motor.

4. Determine the diameter and length of a 3000 kVA, 6.6 kV, 50 Hz, 187.5 r.p.m. 3-phase star connected alternator. Assume average gap density = 0.58 Wb/m2, winding factor = 0.955, ampere conductor / metre = 35000.

5. What is Carter's coefficient?

6. What do you understand by earthing? Why is it necessary to earth electrical installation?

7. Write a short note on plate earthing.

8. Draw the schematic layout of a substation and low voltage switchboard.

9. What is meant by specific magnetic and electric loading of synchronous machine?

10. Give and prove the relation between freq. number of poles and synchronous speed of a 3-phase induction motor.

 PART B[10*6=60]

11. (a) Discuss the steps for the design of shunt field winding of d.c. machine.

(b) Explain the designing details of height of the pole of a d.c. machine.

12. (a) Explain the terms : (i) window space factor; (ii) stacking factor.

(b) Derive the output equation of a 3-phase core type transformer.

13. Determine the dimensions of the core and yoke for a 100kVA, 50Hz, 1-phase core type transformer. A square core is used with distance between the adjacent limbs equal to 1.6 times the width of the laminations. Assume voltage per turn of 14 volts, maximum flux density 1.1 Wb/m2, window space factor = 0.32 and the current density 3 A/mm2. Take stacking factor = 0.9. Flux density in the yoke to be 80% of flux density in core. Assume missing data.

14. Calculate the diameter, core length, number of conductors of the stator, size of the conductor and no. of stator slots of a 30 MVA, 11kV, 3000 r.p.m., 50Hz star connected turboalternator. Assume Bav = 0.55 Wb/m2, ac = 55000 A/m, Kw = 0.955, periferal velocity = 160 m/s. Kw – window space factor. Ac – specific electric loading. Assume the missing data.

15. Draw the electrical wiring layout and estimate the quantity of materials required with cost of a Cinema Hall with necessary accessories and facilities.

16. Estimate the quantity of material required for erection of a 200kVA polemounting substation