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EX - 801

B.E. VIII Semester

Examination June, 2013

Computer Aided Electrical Machine Design

Maximum Marks : 100 ***Minimum Pass Marks :35***

Note: Attempt any one question from each unit. Each of the questions carry equal marks.

1. a) What is the advantage of computer aided design of electrical machine in reference to conventional method. 10

   b) Explain the methods of computer aided design of electrical machine. 10

2. Discuss the factors which govern the choice of number of poles in D.C machine.

   Find suitable values of diameter and length of armature core for a 100 kw, 250v, 750 r.p.m d.c. generator. State the assumptions made. 20

3. a) Define specific magnetic loading (Bav) and specific electric loading (ac) and obtain an expression for the "output coefficient" for a D.C machine. 10

   b) Show the complete magnetic path in a sketch of a 4 pole D.C machine. 10

4. a) Distinguish between distribution and power transformers. 10

   b) Explain why power transformers are designed to have maximum efficiency at or near full load. 10

5. Design a 250 KVA, 2000/400v, 50Hz 1-phase, core type, oil immersed self cooled, power transformer with the following data:-

   Induced E. M. F per firm = 15 v

   Max flux density in the core = 1.25 wb/m^2

   Current density = 2.75 A/mm^2

   Window space factor = 0.3

   Window proportion $\frac{H}{W}$ =3.

   Determine the main dimensions of the core and Yoke. 20

6. a) What is meant by SCR of an alternator. Discuss its significance in relation to stability, voltage regulation and parallel operation of synchronous generators. 10

   b) Explain the procedure for tentative design of the field winding of a 3-phase hydro generator and show that the height of the field winding is given by $hF = \frac{AT_{Fe} \times 10^{-4}}{\sqrt{q_f s_f d_f}}$ 10

7. Calculate the diameter core length, number of conductors of the stator, size of conductor number of stator slots of a 30 MVA, 11 KV, 3000 rpm, 50 Hz, star connected turbo alternators. Assume the following data :. 20

   Bav = 0.55 wb/m^2 ac = 55000 A/m

   K_W = 0.955, Peripheral velocity = 160 m/s.

8. a) Deduce the output equation of 3ϕ induction motor in terms of specific loadings, etc. 10

   b) What do you understand by the phenomena of cogging and crowling in an induction motor. What steps will you suggest at the design stage to avoid this. 10

9. a) Discuss the factors influencing the choice of flux density and current density in the design of induction motor. 10

   b) Find the main dimensions, number of stator turns, size of conductor and number of stator slots of a 5 H.P, 400V, 3ϕ, 50 Hz, 1500 r.p.m, squirrel cage I. M. Star-delta starting is used. use the following data

   Bav = 0.46 wb/m^2

   ac = 22000

   η = .83

   P.f = .84 (lagging)

   $\left(\frac{L}{\tau} = 1\right)$ 10

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