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(Revision 2015)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – OCTOBER/NOVEMBER-2018.

ELECTRICAL MACHINE DESIGN

(Maximum Marks : 100) [Time : 3 hours]

PART–A

(Maximum marks: 10) Marks

I. Answer all questions in one or two sentences. Each question carries 2 marks.

1. List the types of electrical engineering materials?
2. Name the magnetic materials used for yoke of a dc machine and transformer stampings.
3. Name the types of transformer based upon construction.
4. Write the output equation and output co-efficient of synchronous machine.
5. List the quantities that are affecting the number of poles in a dc machine?

(5x2=10)

PART B

(Max. Marks: 30)

II. Answer any five of the following questions. Each question carries 6 marks.

1. Compare the properties of copper and aluminum.
2. State the difference between Power transformer and distribution transformer
3. Name the factors to be considered to choose the type of winding for a core type transformer.
4. List armature parameters of synchronous machine
5. Mention the advantages of fractional slot winding.
6. How is the length of commutator is determined in a dc machine?
7. List the constructional elements of a d.c. machine?

(5x6=30)

PART C

(Max. Marks: 60)

(Answer one full question from each unit. Each full question carries 15 marks)

UNIT I

III. (a)Explain basic design principles of both electric and magnetic circuits. (9)

(b)List and explain the limitation parameter in design of an electric machine. (6)

Or

IV. (a) Explain choice of specific electrical and magnetic loading. (9)

(b) List properties of a good magnetic material. (6)

UNIT II

V. (a)Derive the output equation of a single phase transformer. (9)

(b)What are the properties of transformer oil? (6)

Or

VI.(a)List the rules for selecting rotor slots of an induction motor (8)

(b) The ratio of flux to full load mmf in a 400 KVA, 50 Hz, single phase core type power transformer is 2.4×10^{-6} .Calculate the net iron area and the window area of the transformer .Max flux density in the core is 1.3 Wb/m^2,Current density 2.7 A/mm^2 and window space factor is 0.26. (7)

UNIT III

VII (a)Explain about the different types of stator slots in a synchronous machine. (9)

(b)Explain types of synchronous machines based on prime mover. (6)

Or

VIII (a) Explain about the different types of poles used in salient pole machines. (8)

(b)Find the main dimensions of a 2500 KVA,187.5 rpm,50 Hz, 3 phase ,3 KV salient pole synchronous generator. The generator is to be a vertical ,water wheel type. The specific magnetic loading is 0.6 Wb/m^2 and the specific electric loading is 34000 A/m. Use circular poles with ratio of core length to pole pitch=0.65. Specify the type of pole construction used if the run way speed is about 2 times the normal speed. Assuming winding factor as 0.955 (7)

UNIT IV

IX (a) Derive output equation of a dc machine (9)

(b) In a DC machine the maximum flux density in the armature teeth is limited to 2 Wb/m^2. The ratio of minimum width of tooth to slot pitch is 0.4.Calculate the limiting value of specific magnetic loading if the ratio of pole arc to pole pitch is 0.7. (6)

Or

X (a) Explain the effect of higher value of specific electrical loading (q) (8)

(b) A 350 Kw, 550 V, 450 rpm,6 pole DC generator is built with an armature diameter of 0.87m and core length of 0.32 m. The lap wound armature has 660 conductors. Calculate the specific electric and magnetic loadings. (7)