[Total No. of Questions - 5] [Total No. of Pri. d Pages - 4]
(2066)

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B. Tech 4th Semester Examination

Electrical Machines-II (NS)

EE-221

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all. Select one question from each unit 1, 2, 3 & 4. Unit 5 is compulsory.

UNIT - 1

1. (a) Draw no-load phasor diagram of a transformer and derive expression for magnetizing and core-loss components of no-load current. (10)

   (b) A 10 KVA, 500/250V, 50Hz, single phase transformer has a net area of cross-section 90cm^2 and maximum flux density is 1.2 T. Calculate the number of turns on both primary and secondary. (10)

OR

   (a) What is regulation? How it can be obtained from equivalent circuit parameters? (10)

   (b) A single phase transformer has a core whose cross-section area is 150 cm^2 operates at a maximum flux density of 1.1 Wb/m^2 from a 50 Hz supply. If the secondary winding has 66 turns, determine the output in KVA when connected to a load of 4 Ω impedance.

   Neglect any voltage drop in the transformer. (10)

[P.T.O.]

UNIT - 2

2. (a) Draw the scott connection of transformer and mark the terminals and turn-ratio. (10)

   (b) A 100 KVA, 3-phase, 50 Hz 3,300/400 V transformer is delta-connected on the HV side and star-connected on the LV side. The resistance of the HV winding is 3.5 Ω per phase and that of the LV winding 0.02 Ω per phase. Calculate the iron losses of the transformer at normal voltage and frequency if its full-load efficiency be 95.8% at 0.8 p.f. (lag). (10)

OR

   (a) Discuss briefly the essential and desirable conditions to be fulfilled for operating two 3-phase transformers in parallel. (10)

   (b) A 3-phase transformer has its primary connected in delta and secondary connected in star. It has an equivalent resistance of 1% and equivalent reactance of 6%. The primary applied voltage is 6,600 V. What must be the ratio of transformation in order that it will deliver 4,800V at full load current and 0.8 power factor lag? (10)

UNIT - 3

3. (a) What do you understand by demagnetizing and cross magnetizing effects of armature reaction in a d.c. machine? (10)

   (b) A lap-wound d.c. shunt generator having 80 slots with 10 conductors per slot generates at no load an e.m.f. of 400V when running at 1000 r.p.m. At what speed should it be rotated to generate a voltage of 220V on open circuit? (10)

OR

(a) What are the different types of d.c. generator according to the ways in which fields are excited? Show the connection diagram of each type. (10)

(b) Distinguish between self-excited and separately excited d.c. generators. How are self-excited d.c. generators classified? Give their circuit diagrams. (10)

UNIT - 4

4. (a) What is necessity of a starter for a d.c. motor. Explain with a neat sketch, the working of a 3-point d.c. shunt motor starter, bringing out the protective features incorporated in it. (10)

(b) A 250 V d.c. shunt motor having an armature resistance of 0.25Ω carries an armature current of 50 A and runs at 750 r.p.m. If the flux is reduced by 10%, find the speed. Assume that the load torque remains the same. (10)

OR

(a) What are the losses that occur in d.c. machines? Derive the condition for maximum efficiency of a d.c. generator. (10)

(b) Derive torque and emf equations for a dc motor. (10)

UNIT - 5

5. Answer the following:

(i) What is normally the efficiency of a transformer?

(ii) What type of load should be connected to a transformer for getting maximum voltage regulation?

(iii) What advantage is obtained with the delta-connection?

(iv) While connecting transformers in parallel, what factors must be taken into consideration?

(v) How are CTs rated?

(vi) On what principle do the generators operate?

(vii) What is armature reaction?

(viii) What type of generator is used for electric welding?

(ix) What is the effect of inserting resistance in the field circuit of a dc shunt motor on its speed and torque?

(x) How the eddy current losses will change if the thickness of laminations is increased? (10×2=20)