CBCS SCHEME

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17EE33

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Transformers and Generators

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Draw and explain the full load phasor diagram of single phase transformer for lagging , leading and unity power factor loads. **(10 Marks)**

b. Prove that for maximum efficiency copper loss is equal to Iron loss. **(06 Marks)**

c. A 100 KVA, 6600/240 V, 50hz, single phase transformer takes 5A and 109W when 50V are applied in a short circuit test to the HV side and low voltage side shorted. Find the voltage to be applied to the HV side on full load at 0.8 power factor lagging when the secondary terminal voltage (LV) is 240V. **(04 Marks)**

OR

2 a. Explain SCOTT three phase/two phase connection with suitable circuit and phasor diagram. **(08 Marks)**

b. Explain with circuit diagram and phasor diagram, how two transformer connected in open delta can supply the power successfully. **(08 Marks)**

c. The primary and secondary winding of two transformers each rated 250 KVA, 11/2 KV and 50Hz are connected to open delta. Find i) The KVA load that can be supplied from this connection ii) Current on HV side if a delta connected 3ϕ load of 250KVA, 0.8 pf (lag) 2KV is connected to the LV side of the connection. **(04 Marks)**

Module-2

3 a. Discuss the necessary conditions for the parallel operation of 2 transformers. **(06 Marks)**

b. Derive an expression for the current shared by between 2 transformers connected in parallel supplying a common load when no load voltages of these transformer are equal. **(08 Marks)**

c. Two 1 phase transformer with equal turns have impedances of (0.5 + J3) ohms and (0.6 + j10) ohms with respect to the secondary. If they operate in parallel, how they will share total load of 100 kW at 0.8 lagging. **(06 Marks)**

OR

4 a. What is an Auto transformer? Describe its working and derive expression for saving of copper in an auto transformer as compared to an equivalent two winding transform. **(10 Marks)**

b. Explain the operation of on load tap changer. **(10 Marks)**

Module-3

5 a. Explain the necessity of terliary winding. **(06 Marks)**

b. What are the sources of noise in transformer? How to reduce the noise problem in transformer? **(08 Marks)**

c. A 4 pole lap wound dc shunt generator has flux per pole of 0.07 wb. The Armature winding consists of 220 turns, each turn having a resistance of 0.004Ω. Calculate the terminal voltage when running at 1000 rpm if the armature current is 60A. **(06 Marks)**

OR

6 a. Discuss the harmonics in transformers. **(06 Marks)**

b. Draw and explain the characteristics of DC shunt generator. **(08 Marks)**

c. Derive EMF equation of synchronous generator. **(06 Marks)**

Module-4

7 a. What is Synchronization of Alternators? What are the conditions for proper synchronization of alternators? Explain the method of synchronization of 3ϕ alternators. **(10 Marks)**

b. A 10 MVA 3 ϕ Alternator has an equivalent short circuit reactance 20%. Calculate the synchronizing power of the armature per mechanical degree of phase displacement when running in parallel on a 10,000 V, 50Hz bus bar at 1,500 rpm. **(07 Marks)**

c. Define Voltage regulation of alternator. **(03 Marks)**

OR

8 a. With the help of a neat phasor diagram, explain the concept of two reaction theory in a salient pole synchronous machine. **(10 Marks)**

b. Write a note on V – curve of synchronous generator. **(05 Marks)**

c. A synchronous generator has a direct axis synchronous reactance of 0.8 percent and a quadrature axis synchronous reactance of 0.5 per unit. It is supplying full load at rated voltage at 0.8 pf lagging. Find the open circuit voltage. **(05 Marks)**

Module-5

9 a. What do you mean by hunting in synchronous machine? Explain the role of damper winding. **(06 Marks)**

b. With a neat sketch, explain open circuit characteristic and short circuit characteristics of an alternator. **(06 Marks)**

c. Explain MMF method to find out regulation of an alternator. **(08 Marks)**

OR

10 a. A 600V, 60 KVA, single phase alternator has an effective resistance of 0.2Ω. A field current of 10A produces an armature current of 210A on short circuit and an emf of 480V on open circuit. Calculate i) Synchronous impedance and reactance.

ii) Regulation with 0.8 pf lagging, unity and 0.6 pf loading. **(06 Marks)**

b. Explain Potier Reactance method to determine Regulation. **(08 Marks)**

c. Write a note on Capability curves of Synchronous generator. **(06 Marks)**

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