

CBCS Scheme

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15EE33

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017 Transformers and Generators

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing one full question from each module.

Module-1

- 1 a. Draw and explain the Full load phasor diagrams of single phase transformer for lagging, leading and unity power factor loads. (06 Marks)
- b. Develop the equivalent circuit of a single phase transformer and show that the parameters of the primary and secondary winding may be combined to give a simplified equivalent circuit referred to primary side. (05 Marks)
- c. Find the all day efficiency of single phase transformer having maximum efficiency of 98% at 15KVA at uPF and loaded as follows.
12 hours – 2kW at 0.5 pf lagging
6 hours – 2kW at 0.8 pf lagging
6 hours – No Load. (05 Marks)

OR

- 2 a. State the advantages of single three phase transformers over bank of single phase transformers. (05 Marks)
- b. Explain with circuit diagram and phasor diagram, how two transformers connected in open delta can supply the power successfully. (05 Marks)
- c. Two electric furnaces are supplied with 1 phase current at 80V from a 3 ϕ , 1100V system by means of two single phase scott connected transformers with similar secondary windings, when the load on one furnace is 500kW and on the other 800kW, what current will flow in each of the 3 lines
i) At UPF and ii) 0.8pf lagging. (06 Marks)

Module-2

- 3 a. Discuss the necessary conditions for the parallel operation of 2 transformers. (05 Marks)
- b. Derive an expression for the currents shared by between 2 transformers connected in parallel supplying a common load when no load voltages of these transformers are unequal. (06 Marks)
- c. How stabilization is achieved due to the tertiary winding? (05 Marks)

OR

- 4 a. What is an Auto transformer? Derive an expression for the saving of copper in an Auto transformer as compared to an equivalent two winding transformers. What are advantages and limitations? (08 Marks)
- b. Explain the operation of on load tap changer. (08 Marks)

Module-3

- 5 a. Discuss the harmonics in transformers. (05 Marks)
- b. What are the sources of Noise in transformers? How to reduce the noise problem in transformers? (05 Marks)
- c. With a circuit diagram explain in detail sumpners test for determining the efficiency and voltage regulation of transformer. (06 Marks)

OR

- 6 a. What is an armature reaction? With neat figures, explain armature reaction in DC machines under normal working conditions. (05 Marks)
- b. What is commutation? With a neat diagram, explain the process of commutation in DC machines and explain any one method of improving commutation. (06 Marks)
- c. Derive EMF equation of synchronous generator. (05 Marks)

Module-4

- 7 a. What is synchronization of alternators? What are the conditions for proper synchronization of alternators? How 3 ϕ alternators are synchronized? (08 Marks)
- b. Define voltage Regulation of an alternator and explain the load characteristics of alternator. (05 Marks)
- c. Write a note on V-curves of synchronous Generator. (03 Marks)

OR

- 8 a. With a neat circuit diagram, explain the slip test on salient pole synchronous machines and indicate how X_d and X_Q can be determined from slip test. (08 Marks)
- b. With a phasor diagram, explain the concept of two reaction theory in a salient pole synchronous machine. (08 Marks)

Module-5

- 9 a. Name the various methods for determining the voltage regulation for 3 ϕ alternator and describe any one method in detail. (08 Marks)
- b. A 2300V, 50Hz, 3 ϕ star connected alternator has an effective armature resistance of 0.2 Ω . A field current of 35A produces a current of 150A on short circuit and open circuit emf 780V (line). Calculate the voltage regulation at 0.8 pf lagging and 0.8pf leading for the full load current of 25A. (08 Marks)

OR

- 10 a. Write a note on capability curves of synchronous generator. (05 Marks)
- b. What is hunting in synchronous machines? Explain the role of damper winding. (05 Marks)
- c. With a neat sketch explain OCC and SCC characteristics of an alternator. (06 Marks)

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