

Model Question Paper-I with effect from 2018-19

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17EE33

Third Semester B.E.(CBCS) Examination Transformers and Generators

(Core subject, E&EE)

Time: 3 Hrs

Max.Marks: 100

Note: Answer any FIVE full questions, choosing at least ONE 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. **(07 Marks)**
(b) Write a short note on "All day efficiency of a transformer". **(05 Marks)**
(c) Starting from the fundamentals, develop the equivalent circuit, exact equivalent circuit and approximate equivalent circuit of a 1- \emptyset transformer referred to primary side. **(08 Marks)**

OR

2. (a) State the advantages of single 3-Phase unit transformer over bank of single phase transformers. **(06 Marks)**
(b) With the help of phasor diagram, explain how 2 phase supply can be obtained from 3 phase supply using Scott connection. **(08 Marks)**
(c) A 4 kVA, 200/400V single phase transformer supplying full load current of 0.8 p.f lagging. The OC/SC test results are:
OC Test: 200V, 0.8A, 70W.
SC Test : 20V, 10A, 60W (HV side). Calculate the efficiency. **(06 Marks)**

Module-2

3. (a) With a circuit diagram explain in detail Sumpner's test for determining the efficiency and voltage regulation of transformer. **(08 Marks)**
(b) Discuss the necessary conditions for the parallel operation of two transformers. **(04 Marks)**
(c) Derive an expression for the currents shared between the 2 transformers connected in parallel supplying a common load when no load voltages of these transformers are unequal. **(08 Marks)**

OR

- 4.(a) Two transformers each of 800kVA are connected in parallel. One has a resistance and reactance of 1% and 4% respectively and the other has resistance and reactance of 1.5% and 6% respectively. Calculate the load shared by each transformer and corresponding power factor when the total load shared is 100 kVA at 0.8 p.f lagging. **(05 Marks)**
(b) What is an auto-transformer? Derive an expression for the saving of copper in an auto-transformer as compared to an equivalent two winding transformer. **(07 Marks)**

- (c) With the help of sketches, explain the working of ON load tap changer and OFF load tap changer. (08 Marks)

Module-3

5. (a) Explain the necessity of tertiary winding transformer. (06 Marks)
(b) How stabilization is achieved due to tertiary winding.? (06 Marks)
(c) With a neat circuit diagram, explain armature reaction in DC machines. (08 Marks)

OR

6. (a) What is commutation? With a neat diagram, explain the process of commutation. (07 Marks)
(b) Define pitch factor and distribution factor of an synchronous generator and derive an expression for distribution factor K_d and pitch factor K_p in synchronous generator. (08 Marks)
(c) Explain the methods used to reduce harmonics in synchronous generator. (05 Marks)

Module-4

7. (a) What is synchronization of alternators? Explain the need for parallel operation of alternators. (08 Marks)
(b) Define electrical load diagram of a synchronous generator. (04 Marks)
(c) With a phasor diagram, explain the concept of two reaction theory in a salient pole synchronous machine. (08 Marks)

OR

8. (a) Discuss the effect of change of excitation at constant load. (06 Marks)
(b) Write a note on V curve of synchronous generator. (06 Marks)
(c) 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 the slip test. (08 Marks)

Module-5

9. (a) Define voltage regulation of an alternator. What are the various methods of determining the voltage regulation for 3- ϕ alternator and explain anyone method in detail. (10 Marks)
(b) A 2300 V, 50 Hz, 3 phase star connected alternator has an effective armature resistance of 0.2 Ω . A field current of 35A produces a current of 150 A on short circuit and an open circuit emf 780 V (line). Calculate the voltage regulation at 0.8 pf lagging and 0.8 pf leading for the full load current of 25A. (10 Marks)

OR

10. (a) Explain the capability curves of synchronous generator. (07 Marks)
(b) Discuss about hunting in synchronous machines. Also explain the role of damper Winding. (07 Marks)
(c) Discuss about short circuit ratio and its significance. (06 Marks)