CBCS SCHEME

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17EE33

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
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 diagrams of 1ϕ transformers for lagging leading and upf load. **(07 Marks)**

b. How all day efficiency is different from standard efficiency? Briefly explain. **(06 Marks)**

c. A 5KVA 200/1000V, 50Hz, 1ϕ transformer gave the following test results :
OC Test (LV side) : 200V, 1.2A, 90W
SC Test (HV side) : 50V, 5A, 110W
i) Calculate the parameters of the equivalent circuit referred to the LV side.
ii) Calculate the output secondary voltage
When delivering 3kW at 0.8pf lagging, the input primary voltage being 200V. Find the percentage regulation also. **(07 Marks)**

OR

2 a. Enumerate the advantages of 3ϕ transformers compare to 1ϕ transformers. **(06 Marks)**

b. Show that open Delta connection of 3ϕ transformers has KVA rating of 57.7% of that of Δ-Δ connection. Show the connection diagram. **(07 Marks)**

c. Two 1ϕ furnaces working at 100V are connected to 3300V, 3ϕ mains through Scott connected transformers. Calculate the current in each line of the 3ϕ mains when the power taken by each furnace is 400kW at a pf of 0.8 lagging Neglect lossess in the transformers. **(07 Marks)**

Module-2

3 a. What are the conditions to be satisfied for parallel operation of two transformers? Explain briefly. **(06 Marks)**

b. Derive expression for load shared between two transformers connected in parallel when voltage ratios are different. **(07 Marks)**

c. Explain how stabilization is achieved due to the tertiary winding. **(07 Marks)**

OR

4 a. With the help of sketches explain the working of on load tap changer. **(07 Marks)**

b. Derive expression for saving of copper in auto transformer compared to two winding transformer. **(07 Marks)**

c. Two 1ϕ transformers with equal turns have impedances of $(0.5 + j3)\Omega$ and $(0.6 + j10)\Omega$ with respect to the secondary. If they operate in parallel, determine how they will share a total load of 100kW at pf 0.8 lagging. **(06 Marks)**

Module-3

5 a. Write a short note on Noise in transformers. **(06 Marks)**

b. Explain the methods used to reduce harmonics in 3ϕ alternators. **(06 Marks)**

c. What is commutation? What are the methods available for improving commutation? Explain briefly. **(08 Marks)**

OR

6 a. Derive EMF equation of an 3ϕ Alternator. **(06 Marks)**

b. What is an armature reaction? With a neat diagram, explain armature reaction in DC machine under normal working conditions. **(08 Marks)**

c. With a vector diagram, explain synchronous reactance of an alternator. **(06 Marks)**

Module-4

7 a. Define voltage regulation of an alternator and explain its significance with a vector diagram. **(06 Marks)**

b. What is synchronization of alternators? What are the conditions for proper synchronization of an alternator? How 3ϕ alternators are synchronized? **(08 Marks)**

c. Write a short notes on power angle characteristics of an alternator. **(06 Marks)**

OR

8 a. With a neat circuit diagram, explain slip test to determine direct axis reactance and quadrature axis reactance of an salient pole synchronous Generator. **(07 Marks)**

b. Explain the behaviour of synchronous generator on no load under variable excitation connected to infinite bus bar. **(06 Marks)**

c. With a phasor diagram, explain the concept of two reaction theory in a salient pole alternator. **(07 Marks)**

Module-5

9 a. Enumerate the methods available for determining the voltage regulation of an alternator, explain mmf methods in detail. **(10 Marks)**

b. A 3.5 MVA, Y – connected alternator rated at 4160V at 50Hz has the OCC given by the following data :

I_f in amps	50	100	150	200	250	300	350	400	450
V_{oc} (line) in volts	1620	3150	4160	4750	5130	5370	5550	5650	5750

a field current of 200A is found necessary to circulate I_{FL} on SC of the alternator. Calculate by i) EMF method ii) MMF method. The voltage regulation at full load 0.8 pf lagging. Neglect resistance, comment on result obtained. **(10 Marks)**

OR

10 a. Write a note on capability curves of synchronous generator. **(06 Marks)**

b. What is hunting in synchronous machines? Explain the role of damper winding. **(07 Marks)**

c. Explain ZPF method of predetermination of regulation of alternator. **(07 Marks)**

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