CBCS SCHEME

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18EE33

Third Semester B.E. Degree Examination, June/July 2024
Transformer 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. Explain the operation of a single phase transformer on no load, with a phasor diagram. **(06 Marks)**

b. Define voltage regulation of a transformer. Explain its significance. **(06 Marks)**

c. A 200 KVA transformer is loaded as follows during 24 hrs. For 3-hours, 150KVA from 7am to 10am, 100 KVA form 10am to 6pm and no load afterwards till next day. Assuming unity power factor and both core loss and free load copper loss at 1.5KW, determine the all day efficiency. **(08 Marks)**

OR

2 a. Explain Y – Y operation of a 3 – ϕ transformer. **(06 Marks)**

b. Explain Scott connection for 3 – ϕ to 2 – ϕ conversion. **(08 Marks)**

c. A 100KVA transformer has iron loss of 2.5KW and full load Cu loss of 2.5KW. Find its efficiency at a load of 65KVA with a power factor of 0.87 lagging. **(06 Marks)**

Module-2

3 a. Briefly explain Polarity test of transformer. **(06 Marks)**

b. List out the conditions for successful parallel operation of transformers. **(07 Marks)**

c. Explain the advantages and limitations of Sumpner's test. **(07 Marks)**

OR

4 a. Explain the operation of a tap changing transformer. **(06 Marks)**

b. Explain load sharing in case of similar transformers. **(08 Marks)**

c. While conducting Sumpner's test on a pair of 250 KVA transformers, the wattmeter connected on the primary side (both primaries in parallel) indicated 5KW and the wattmeter connected on the secondary side (both secondaries connected in series) indicated 7.5KW. Find the individual efficiency of each transformer when each loaded at 75% full load with a leading p.f. of 0.8. **(06 Marks)**

Module-3

5 a. Explain different cooling methods in transformers. **(07 Marks)**

b. List out the causes of harmonies in synchronous generators. **(06 Marks)**

c. Explain effects of armature reaction in DC generators. **(07 Marks)**

OR

6 a. Explain the construction of a three winding transformer. **(06 Marks)**

b. Derive the emf equation of a synchronous generator. **(06 Marks)**

c. A star connected, 3 – ϕ, 6 – pore alternator has N_S 1000 rpm. The stator winding is in 90 slots with 8 conductors per slot. If flux per pole is 0.05 wb, calculate the voltage generated by this alternator. Take winding factor as 0.96. **(08 Marks)**

Module-4

7 a. Explain the operation of an isolated alternator on load. **(06 Marks)**

b. Define and explain voltage regulation of an alternator. **(06 Marks)**

c. A three phase star connected alternator is rated at 1600KVA, 13500volts. Armature resistance (effective) is 1.5Ω and synchronous reactance is 30Ω, per phase. Calculate the percentage regulation for a load of 1280 KW at power factors of 0.8 lagging and 0.8 leading. **(08 Marks)**

OR

8 a. Briefly explain open circuit and short circuit characteristics of alternator. **(06 Marks)**

b. Compare emf, mmf and ZPf methods of finding regulation of alternators. **(06 Marks)**

c. A 6600V alternator has following open circuit and short circuit data :

O.C vg,v	3100	4900	6600	7500	8300
Field current A	16	25	37.5	50	70

A field current of 20A circulates full load short circuit current. Find the regulation of the alternator by mmf method at 0.8p.f lagging. **(08 Marks)**

Module-5

9 a. Briefly explain the construction of a salient pole alternator. **(07 Marks)**

b. Define and explain synchronizing power. **(07 Marks)**

c. Briefly explain slip test. **(06 Marks)**

OR

10 a. Briefly explain the power angle curve of a salient pole alternator. **(07 Marks)**

b. Explain the phenomenon of hunting in salient pole alternators. **(06 Marks)**

c. Briefly explain two-reaction theory in case of salient pole alternators. **(07 Marks)**

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