CBCS SCHEME

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15EE33

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Transformers and Generators

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume Missing data any

Module-1

1 a. With the help of phasor diagram, explain the operation of practical transformer on load. **(08 Marks)**

b. A 3-phase 1000KVA, 6600/1100V transformer is delta connected on primary and star connected on secondary. The primary resistance/ph is 1.8Ω and secondary resistance/ph is 0.025Ω. Find the efficiency when secondary is supplying full load at 0.8p.f and the iron loss is 15kN. Also determine efficiency on full load unity p.f. **(08 Marks)**

OR

2 a. Explain star zig – zag – star and open delta connection with the help of connection diagram and phasor diagram. Mention its advantages applications. **(10 Marks)**

b. The parameters of 10KVA, 500/250V, 50Hz , single – phase transformer are as follows :

Primary resistance = 0.2Ω Primary reactance = 0.4Ω
Secondary resistance = 0.5Ω Secondary reactance = 0.1Ω

Exciting circuit resistance and reactance are 1500Ω and 750Ω respectively. Find out results of O.C and S.C test. **(06 Marks)**

Module-2

3 a. What is the need for parallel operation of transformer? Mention the conditions to be satisfied for parallel operation and explain. **(08 Marks)**

b. An autotransformer is used to supply a resistive load of 5kW at 400V. Supply voltage is 440V. Neglecting the losses calculate the currents in various parts of the winding. Find the percentage of copper saving effected due to use of the autotransformer instead of equivalent two winding transformer. **(08 Marks)**

OR

4 a. With a neat diagram, explain the construction and operation of on load tap changer for transformer. **(08 Marks)**

b. Two transformers gave the followings test results: with the LV side shorted, transformer A takes current of 10A at 200V, power input is 1000W. Similarly transformer B takes 30A at 200V; the power input is 1500W. On open circuit both transformers gave a secondary voltage of 2200V when 11KV is applied to the primary terminals. These terminals of the two transformers are connected in parallel. Calculate the load shared by each transformer. **(08 Marks)**

Module-3

5 a. Explain the current in rush phenomenon in transformer. **(04 Marks)**

b. With neat diagram, explain the commutation process in DC machines. **(06 Marks)**

c. A 4- pole, 3 – phase, 50Hz star connected alternator has 60 slots, with 4 conductors per slot. The coils are short pitched by 3 slots. If the phase spread is 60°, find the line voltage induced for a flux per pole of 0.943 wb, sinusoidally distributed in space. All the turns per phase are in series. **(06 Marks)**

OR

6 a. With a neat diagram, explain how sumpnesis test is used to find efficiency and voltage regulation of a transformer? **(06 Marks)**

b. A 4 – pole, lap wound armature running at 1400rpm delivers a current of 100A and has 64 conductor segments. The brush width is equal to 1.4 commutator segments and inductance of each armature coil is 0.05mH. Calculate the value of the reactance voltage assuming linear commutation. **(06 Marks)**

c. What are the methods used to reduce the harmonics in alternator? **(04 Marks)**

Module-4

7 a. Explain the effect of variation of excitation of an alternator supplying constant load. **(08 Marks)**

b. A synchronous generator has a direct axis synchronous reactance of 0.8pu and a quadrature axis synchronous reactance of 05pu. It is supplying full load at rated voltage at 0.8 p.g lag. Find the open circuit voltage. **(08 Marks)**

OR

8 a. Explain two reaction theory as applied to synchronous machines. **(08 Marks)**

b. Two identical, three phase star connected alternators, operating in parallel share equally a total load of 1000kW at 6600V and 0.8 power factor lagging. The field of the first generator is excited so that the armature current is 50A lagging. Find

i) Armature current of second machine

ii) The power factor of each machine. **(08 Marks)**

Module-5

9 a. Explain MMF method of determining voltage regulation of an alternator. **(08 Marks)**

b. A 3 – phase, 10KVA, 400V, 50Hz star connected alternator supplies the rated load at 0.8 power factor lagging. If the armature resistance is 0.5Ω, and synchronous reactance is 10Ω, find the voltage regulation. **(08 Marks)**

OR

10 a. With suitable graphs, explain the capacity curves for an alternator. **(08 Marks)**

b. A 2300V, 50Hz, 3 – phase star connected alternator has an effective armature resistance of 0.2Ω. A field current of 35A produces a current of 150A on short circuit and an open circuit emf 780V (line). Calculate the voltage regulation at 0.8 p.g, lagging and 0.8 leading for the full load current of 25A. **(08 Marks)**

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