CBCS SCHEME

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17EE33

Third Semester B.E. Degree Examination, Aug./Sept.2020
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. Explain the phasor diagram of practical transformer on load for resistive, inductive and capacitive load. **(08 Marks)**

b. A transformer has its maximum efficiency of 98% at 15kVA at unity power factor. During the day it is loaded as:
12 hours : 2kW at power factor 0.5lag
6 hours : 12kW at power factor 0.8lag
6 hours : 18kW at power factor 0.9lag
Find the all day efficiency. **(08 Marks)**

c. Explain open Delta (V-V) connection and show that it has KVA rating of 57.7% of Delta-Delta connection. **(04 Marks)**

OR

2 a. State the advantages of single 3 phase transformer over bank of three single phase transformer units. **(06 Marks)**

b. Explain equivalent circuit of single phase transformer refereed to primary side. **(06 Marks)**

c. Two electric furnaces are supplied with 1 phase current at 80V from a 3 phase 11kV system by means of two single phase Scott connected transformer 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 ii) at 0.8pf lag on furnace 2. **(08 Marks)**

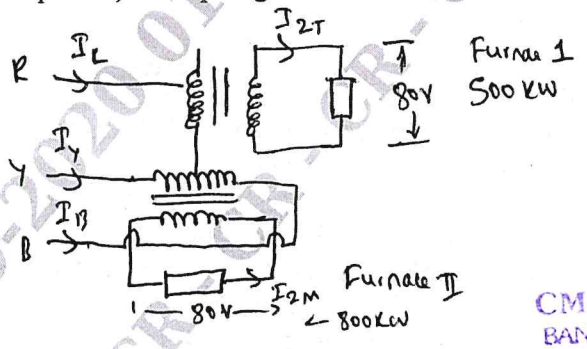

Fig.Q.2(c)

Module-2

3 a. With neat sketch, explain Sumpner's test conducted on single phase transformer. **(08 Marks)**

b. What are the conditions for parallel operation of transformers? **(06 Marks)**

c. Two single phase transformers rated 250kVA each other are operated in parallel on both sides. Impedance of transformer are $(1 + j6)\Omega$ and $(1.2 + j4.8)\Omega$ respectively. Find the load shared by each when the total load is 500kVA at 0.8pf lag. **(06 Marks)**

OR

4 a. Explain the construction of autotransformer and also show copper saving in it. **(08 Marks)**

b. With necessary circuit and phasor diagram explain parallel operation of transformer with unequal voltage ratio. Also derive equation for circulating current. **(06 Marks)**

c. Write a short note on tap changing transformer and explain its types. **(06 Marks)**

Module-3

5 a. What is the necessity of Tertiary winding? **(06 Marks)**

b. What is the armature reaction in DC machine? Explain it with neat sketch. **(08 Marks)**

c. A 4 pole DC generator has a wave connected armature with 722 conductor and it delivers 100A on full load. If the brush lead is 8°. Calculate the armature demagnetizing and cross magnetizing ampere turns. **(06 Marks)**

OR

6 a. Derive the emf equation of an alternator. **(06 Marks)**

b. What is commutation? With neat diagram explain the process of commutation and also describe the methods to improve the commutation. **(10 Marks)**

c. How to eliminate harmonics in alternator? Explain. **(04 Marks)**

Module-4

7 a. With neat diagram explain slip test on non salient pole alternator. **(08 Marks)**

b. Explain V-curves of alternator. **(04 Marks)**

c. With proper phasor diagram, explain general load characteristics of alternator for unity, leading and lagging pf. **(08 Marks)**

OR

8 a. Define two reaction theory and explain it. **(10 Marks)**

b. What is voltage regulation in alternators? **(04 Marks)**

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

Module-5

9 a. What is short circuit ratio? Explain its significance. **(06 Marks)**

b. A 50kVA, 500V single phase alternator gives the following results on
OC test : 12A field current produces emf of 300volts
SC test : 12A field current causes 175A to flow in short circuited armature effective armature resistance is 0.2Ω using this calculate synchronous impedance and reactance.
If alternator supplying a full load current of 100A at 0.8pf lag and sudden load is removed what will be the voltage regulation? **(08 Marks)**

c. Write a short note on hunting and role of damper windings to prevent hunting. **(06 Marks)**

OR

10 a. Explain the capability curves of alternator. **(06 Marks)**

b. With proper diagrams, explain procedure of ZPF method for predetermination of voltage regulation. **(08 Marks)**

c. Explain the necessity and methods of synchronization of alternators. **(06 Marks)**

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