USN | | | | | | | | | | 17EE33

Third Semester B.E. Degree Examination, June/July 2019
Transformer and Generator

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing
ONE full question from each module.

Module-1

1   a. Explain operation of practical transformer on no load along with neat phasor diagram.
        (07 Marks)
    b. With neat circuit diagram, discuss in detail how to perform OC and SC tests on single phase transformer.
        (08 Marks)
    c. Define voltage regulation of two winding transformer and derive condition for zero voltage regulation.
        (05 Marks)

OR

2   a. What is V-V connection? State the merits and demerits of V-V (open delta) connection.
        (07 Marks)
    b. Find all day efficiency of single phase transformer having maximum efficiency for 98% at 15KVA at UPF (Unity Power Factor) and loaded as follows:
        12 hours – 2kW at 0.5 power factor lagging
        6 hours – 12kW at 0.8 power factor lagging
        6 hours – No load.
        (08 Marks)
    c. State the advantages of single three phase transformer over bank of single phase transformer.
        (05 Marks)

Module-2

3   a. Two single phase transformer with equal voltage ratio connected in parallel, share a load of 400kVA at power factor of 0.8lag. Their equivalent impedance referred to secondary winding are (1+j2.5) Ω and (1.5 + j3) Ω respectively. Calculate the load shared by each transformer.
        (07 Marks)
    b. With neat circuit diagram, explain in detail how to perform Sumpner's test.   **(08 Marks)**
    c. Mention the need and necessary conditions for parallel operation of two single phase transformer.
        (05 Marks)

OR

4   a. What is autotransformer? State advantages and disadvantages of autotransformer.   **(07 Marks)**
    b. Derive an expression for saving of copper when an autotransformer is used and also mention its applications.
        (08 Marks)
    c. With neat diagram, describe off circuit tap changing transformer.   **(05 Marks)**

Module-3

5 a. A 6 pole, 150 armature current dc shunt generator has 480 conductors and is wave wound. Find demagnetizing and cross magnetizing ampere turns/pole at full load if.
  i) Brushes are at the geometrical neutral axis (G.N.A)
  ii) Brushes are shifted from G.N.A by 5° electrical
  iii) Brushes are shifted from G.N.A by 5° mech. **(07 Marks)**

  b. What is commutation? Explain practical commutation with neat diagram of DC machine. **(08 Marks)**

  c. What is three winding transformer? How the stabilization is achieved due to tertiary winding. **(05 Marks)**

OR

6 a. Discuss comparison between the following in alternator
  i) Single layer and double layer windings
  ii) Full pitch and fractional pitch coils. **(07 Marks)**

  b. What is armature reaction? With neat figures explain armature reaction in machine under normal working conditions. **(08 Marks)**

  c. Derive emf equation of alternators. **(05 Marks)**

Module-4

7 a. What is synchronization of alternators? State the necessary condition for synchronization. How three phase alternators are synchronized? **(10 Marks)**

  b. With neat circuit diagram, explain how to perform slip test on salient pole synchronous machine and indicate how X_d and X_q can be determined. **(10 Marks)**

OR

8 a. What is synchronoscope? How it is used for synchronization of alternators? **(07 Marks)**

  b. A 400V, 50Hz delta connected alternator has a direct axis reactance of 0.1Ω and q quadrature axis reactance of 0.07Ω per phase. The armature resistance is negligible. The alternator is supplying 1000A at 0.8pf lagging p.f. i) Find excitation emf neglecting saliency and assuming $X_d = X_s$; ii) Find the excitation emf taking into account the saliency. **(08 Marks)**

  c. Write a short note on V-curves on synchronous generator. **(05 Marks)**

Module-5

9 a. With neat circuit diagram, explain in detail how to perform zero power factor test and use potier reactance to determine regulation. **(10 Marks)**

  b. The effective resistance of 2.2kV, 50Hz, 440kVA, single phase alternator is 0.5Ω. on short circuit a field current of 40Amp gives a full load current of 200A. The emf on open circuit with the same field excitation is 1.16 KV. Find the value of synchronous impedance and find the voltage regulation at full load and i) Unity power factor ii) 0.8pf lag. **(10 Marks)**

OR

10 a. What is short circuit ratio? Explain the significance of SCR. **(07 Marks)**

  b. Write a short note on capability curves of synchronous generator. **(08 Marks)**

  c. What is hunting in synchronous machine? Explain the role of damper winding. **(05 Marks)**

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