CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

Third Semester B.E. Degree Examination, June/July 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 if any.

Module-1

1 a. Explain the operation of practical transformer on load with the help of phasor diagram.
                                                                    (06 Marks)
   b. Mention the advantages of bank of three single phase transformers used as three phase transformers.   **(04 Marks)**
   c. A 5kVA, 500/250V, 50Hz, SPH transformer gave following readings:
      O.C. test : 500V, 1A, 50W [LV side open]
      SC test : 25V, 10A, 60W [LV side shorted]
      Determine: i) Efficiency on full load, 0.8 lagging pf ;   ii) Voltage regulation on full load, 0.8 leading pf.   **(06 Marks)**

OR

2 a. With a neat circuit diagram of phasor diagra, explain the operation of 3ph transformer connected in star-star.   **(04 Marks)**
   b. Explain with a neat circuit diagram, how to convert a 3 phase supply to 2 phase supply.
                                                                    (06 Marks)
   c. Find the all day efficiency of 15kVA, single phase transformed having maximum efficiency of 98% at 15kVA, UPF and loaded as follows:
      12 hours – 2kW @ 0.5 pf
      6 hours – 12kW @ 0.8 pf
      6 hours – No load.   **(06 Marks)**

Module-2

3 a. What is an auto transformer? Derive an expression for the saving of copper in an autotransformer compared to two winding transformer.   **(08 Marks)**
   b. What is the necessity of parallel operation of 8 two single phase transformers? Derive an expression for the current shared by two transformers connected is parallel sharing a common load when no load voltage of both transformer are equal.   **(08 Marks)**

OR

4 a. Write short note on 3 phase auto transformer.   **(06 Marks)**
   b. List out the necessary condition to be satisfied for the parallel operation of two single phase transformers.   **(04 Marks)**
   c. Explain with a neat diagram, operation of OFF CIRCUIT Tap-changing Transform.
                                                                    (06 Marks)

Module-3

5 a. With a neat circuit diagram, explain in detail Sumpner's test for determining the efficiency of a transformer. Mention its advantages and disadvantages. **(08 Marks)**

   b. Define armature reaction. With neat figure, explain armature reaction in DC machines. **(08 Marks)**

OR

6 a. Briefly explain the current inrush in transformers. **(05 Marks)**

   b. What is commutation? With a neat diagram, explain the process of practical commutation in DC machines. **(06 Marks)**

   c. A 3ϕ, 16 pole, star connected alternator has 144 slots having 10 conductor/slot. The flux/pole is 30mWb and distributed sinusoidal and the speed is 375 rpm. Find the Emf [line] for i) Full pitched winding   ii) Short pitched by 1 slot. **(05 Marks)**

Module-4

7 a. With a neat circuit diagram, explain the slip test on salient pole synchronous machine and indicate how X_d, X_q and Voltage regulation is calculated. **(08 Marks)**

   b. Write short notes on power angle characteristics of a synchronous machines. **(04 Marks)**

   c. Explain the behaviour of synchronous generator on constant load and variable excitation with a neat phasor diagram. **(04 Marks)**

OR

8 a. With a phasor diagram, explain the concept of two reaction theory in a salient pole synchronous machine. **(08 Marks)**

   b. Define voltage regulation of an alternator and explain the load characteristics of an alternator. **(05 Marks)**

   c. Briefly explain the necessary conditions to be satisfied to synchronize the given alternator to infinite bus. **(03 Marks)**

Module-5

9 a. Write short note on hunting and dampers. **(06 Marks)**

   b. Name various methods of determining the voltage regulation of an alternator. Explain ZPF method to determine the regulation of an alternator. **(10 Marks)**

OR

10 a. Write short note on short circuit ratio and its significance. **(06 Marks)**

   b. The OC and SC test readings for a 3ϕ, star connected 1000 kVA, 2000V, 50Hz alternator are:

I_f	10	20	25	30	40	50
OC terminal voltage	800	1500	1760	2000	2350	2600
1SC armature current	-	200	250	300	-	-

The armature effective resistance is 0.2Ω/ph. Draw the characteristic curves and estimate the full load regulation for i) 0.8pf lag   ii) 0.8pf lead. **(10 Marks)**

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