

CBCS SCHEME

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15EE33

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 diagram, 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 transformer 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 in 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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 3 ϕ , 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 3 ϕ , 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
ISC armature current	-	200	250	300	-	-

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