CBCS Scheme

USN | | | | | | | | | | |

15EE33

# Third Semester B.E. Degree Examination, June/July 2018
## 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. Draw and explain the full load phasor diagrams of single phase transformer for lagging and leading process factor loads. **(06 Marks)**

b. Find the All day efficiency of single phase transformer having maximum efficiency of 98% at 15 KVA at UPF and loaded as follows :
12 hours – 2KW at 0.5 power factor lagging
6 hours – 2KW at 0.8 power factor lagging
6 hours – no load. **(06 Marks)**

c. Draw the approximate Equivalent circuit of a transformer referred to primary side. **(04 Marks)**

**OR**

2 a. State the advantages of single three phase transformers over bank of single phase transformer. **(05 Marks)**

b. Explain with the help of connection and phasor diagrams, how scott connections are used to obtain two base supply from three phase supply mains. **(06 Marks)**

c. The following results were obtained on a
50 KVA, 2400/120V, transformer
O.C test : 396W, 9.65A, 120V
S.C test : 810W, 20.8A, 92V
Determine : i) The circuit constants
ii) The efficiency at full load, 0.8 p.f. lagging
iii) The approximate vtg regulation. **(05 Marks)**

### Module-2

3 a. Discuss the necessary conditions for the parallel operation of 2 transformers. **(05 Marks)**

b. Drive an expression for the currents shared by between 2 transformers connected in parallel supplying a common load when no load voltages of these transformers are un equal. **(06 Marks)**

c. How stabilization is achieved due to tertiary winding. **(05 Marks)**

**OR**

4 a. With the help of neat sketches, explain the working of ON load tap changer and OFF load tap changer. **(10 Marks)**

b. Define auto transformer? Derive an expression for the saving of copper in an Auto transformer. **(06 Marks)**

### Module-3

5 a. Discuss the causes of noise in transformers? How to reduce the noise in transformers. **(05 Marks)**

b. Explain current Inrush phenomenon in transformers. **(05 Marks)**

c. With a circuit diagram, explain in detail Sumpner's test for determining the efficiency and voltage regulation of transformer. **(06 Marks)**

**OR**

6 a. With a neat circuit diagram, explain armature reaction in DC machines. **(06 Marks)**

b. Draw and explain the characteristics of DC shunt generator. **(05 Marks)**

c. Derive EMF Equation of synchronous generator. **(05 Marks)**

## Module-4

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

b. Define voltage regulation of an alternators. **(03 Marks)**

c. What is synchronization of alternators? Need for parallel operation of alternators. **(05 Marks)**

**OR**

8 a. With a neat circuit diagram explain the slip test on salient pole synchronous machine determine $X_d$ and $X_q$ from slip test. **(08 Marks)**

b. Write a note on V-curves of synchronous generator. **(04 Marks)**

c. Define electrical load diagram of a synchronous generator. **(04 Marks)**

## Module-5

9 a. What are the various methods of determining the voltage regulation for 3ϕ alternator and explain any one method in detail. **(08 Marks)**

b. The open and short circuit test reading for a 3ϕ - star connected 1000 KVA, 200V, 50Hz synchronous generator are,

| Field amps | 10 | 20 | 25 | 30 | 40 | 50 |
|---|---|---|---|---|---|---|
| OC terminal vtg | 800 | 1500 | 1760 | 2000 | 2350 | 2600 |
| SC armature current in amp | – | 200 | 250 | 300 | – | – |

The armature effective resistance is 0.2ohm per phase. Draw the characteristic curves and estimate the full load percentage regulation i) 0.8 p.f lagging ii) 0.8 p.f leading. **(08 Marks)**

**OR**

10 a. Write a short note on capability curves of synchronous generator. **(06 Marks)**

b. Discuss about hunting in synchronous machines. Also explain the role of damper winding. **(06 Marks)**

c. Discuss about short circuit ratio and its significance. **(04 Marks)**

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