



C14-EE-402

4462

**BOARD DIPLOMA EXAMINATION, (C-14)**  
**MARCH/APRIL—2017**  
**DEEE—FOURTH SEMESTER EXAMINATION**  
**AC MACHINES—I**

Time : 3 hours ]

[ Total Marks : 80

**PART—A**

3×10=30

**Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. List out various losses in a transfer.
2. Compare between core-type and shell-type transformers in any three aspects.
3. Why is the rating of a transformer expressed in kVA?
4. Draw the vector diagram of transformer working with leading p.f.
5. Draw the connection diagram of star-star connection of a three-phase transformer.
6. Write any three applications of autotransformer.
7. Compare salient pole-type rotor with cylindrical-type rotor in any three aspects.
8. Write any three advantages of stationary armature over rotating armature.

- \* 9. Define coil span and distribution factor of a synchronous generator.
10. Describe the necessity for parallel operation of alternators.

**PART—B**

10×5=50

**Instructions :** (1) Answer *any five* questions.  
 (2) Each question carries **ten** marks.  
 (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. (a) Derive e.m.f. equation of a single-phase transformer. 5

(b) Explain the procedure for conducting SC test. 5

12. (a) Derive the condition for maximum efficiency of a single-phase transformer.

(b) A 400 volts/230 volts, 50-Hz, single-phase transformer has 250 turns on the low voltage side. If the maximum flux density in the core is  $1.4 \text{ Wb/m}^2$ , calculate—

(i) the cross-sectional area of the core;

(ii) the primary number of turns;

(iii) transformation ratio.

\* 13. A 100 kVA distribution transformer has an iron loss of 1.5 kW and a full-load copper loss of 1.5 kW. The transformer is supplying a lighting load. The load cycle is as under :

Full-load for 3 hours

Half full-load for 3 hours

No-load for 18 hours

Calculate the all-day efficiency of the transformer.

- \* **14.** A 10-kVA, 200 V/400 V, 50-Hz single-phase transformer gave the following test results :
- OC test : 200 V, 1.3 A, 120 W on LV side  
SC test : 22 V, 30 A, 200 W on HV side
- Find the parameters of equivalent circuit as referred to LV side and draw the equivalent circuit.
- 15.** Briefly explain off-load tap changing and on-load tap changing.
- 16.** What is the armature reaction? Explain the armature reaction in alternator for various power factors.
- 17.** A 200-kVA, 415-V, 50-Hz three-phase alternator has an effective armature resistance of 0.01 ohm and an armature leakage reactance of 0.05 ohm. Compute the voltage induced in the armature winding, when alternator is delivering rated current at a load power factor of (a) 0.8 lag and (b) 0.8 lead.
- 18.** Explain synchronization of alternator with synchroscope.

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