



C09-EE-402

3474

BOARD DIPLOMA EXAMINATION, (C-09)  
OCT/NOV—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 any six characteristics of an ideal transformer.
2. Explain why OC test conducted always on LV side of a transformer.
3. Why is the rating of the transformer mentioned in KVA?
4. Draw the connection diagram of star-star configuration of 3-phase transformer.
5. Write any six cooling methods of a transformer.
6. Write the functions of breather in a transformer.
7. Compare the salient pole type rotor with cylindrical type rotor in any three aspects.

8. Write any three <sup>\*</sup> advantages of stationary armature over rotating armature.
9. Briefly explain distribution factor of a synchronous generator.
10. Write 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) In a transformer, the core loss is found to be 52 watt at 40 Hz and 90 watt at 60 Hz, both losses being measured at same flux density. Compute the hysteresis loss and eddy current loss at 50 Hz supply. 5
12. A 10-kVA, 2500/250 V, single-phase transformer gave the following test results :  
OC test : 250 V, 0.8 A, 50 W  
SC test : 60 V, 3 A, 45 W  
(a) Calculate the efficiency at  $\frac{1}{4}$ ,  $\frac{1}{2}$  of the full load at 0.8 PF lag. 5  
(b) Calculate the load (kVA output) at which maximum efficiency occurs. 5
13. A transformer has its maximum efficiency of 98% at 15 kVA at UPF. During the day it is loaded as follows :  
8 hours—2 kW at 0.9 pf lag  
6 hours—8 kW at 0.8 pf lag  
6 hours—12 kW at 0.8 pf lag  
4 hours—No load  
Find the all day efficiency. 10

- 14.** Draw the vector diagram for single-phase transformer on load at
- (a) unity power factor;
  - (b) lagging power factor;
  - (c) leading power factor. 3+3+4=10
- 15.** (a) State the advantages and disadvantages of auto-transformer. 5
- (b) Briefly explain the oil natural air-forced cooling of power transformer with a neat sketch. 5
- 16.** A 200-kVA, 415-V, 50-Hz, 3-phase alternator has effective armature resistance of 0.01 and an armature leakage reactance of 0.05 . Compute the voltage induced in the armature winding when the alternator is delivering rated current at a load p.f. of (a) 0.8 lag and (b) 0.8 lead. 5+5=10
- 17.** (a) Define the following : 5
- (i) Synchronous reactance
  - (ii) Synchronous impedance of an alternator
- (b) Explain with a neat sketch the construction details of a salient pole synchronous machine. 5
- 18.** Two alternators working in parallel supplying the following loads :
- 1000 kW at p.f. of 0.8 lagging
  - 800 kW at p.f. of 0.7 lagging
  - 500 kW at p.f. of 0.8 leading
- One alternator is supplying 1500 kW at 0.9 p.f. lagging. Calculate kW output and p.f. of the other machine. 10

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