* 4 4 6 2 *

C14–EE–402

4462

BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

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) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

1. List the various losses in a single-phase transformer.

2. Explain why OC test is always conducted on LV side of a transformer.

3. Define all-day efficiency.

4. Write the conditions for parallel operation of single-phase transformers.

5. Write any six cooling methods of a transformer.

6. Write the functions of breather in a transformer.

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 distribution factor of a synchronous generator.

10. State 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 EMF equation of a single-phase transformer. 5

(b) In a transformer, the core loss is found to be 52 W at 40 Hz and 90 W 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 ¼, ½ of the full-load at 0·8 p.f. lag.

(b) Calculate the load (kVA output) at which maximum efficiency occurs.

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 0·5 p.f.

6 hours—8 kW at 0·8 p.f.

6 hours—12 kW at 0·8 p.f.

4 hours—No-load

Find the all-day efficiency.

14. Draw the vector diagram for single-phase transformer on load at—

(a) unity power factor;

(b) lagging power factor;

(c) leading power factor.

15. *(a)* Derive the equation of copper saving in autotransformer as compared to two-winding 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 0·8 lag and 0·8 lead.

17. *(a)* Define *(i)* synchronous reactance and *(ii)* synchronous impedance of an alternator. 5

(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 :

Lighting load—500 kW

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.

★ ★ ★