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C14–EE–402

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2018

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. State the working principle of 1-phase transformer.

2. Compare between the core-type and shell-type transformers.

3. Draw the equivalent circuit of 1-phase transformer.

4. List various losses occurring in a transformer.

5. List any three special type of transformers.

6. Write any three cooling methods of a transformer.

7. Write the need for an exciter in an alternator.

8. Classify alternators based on rotor construction.

9. Define voltage regulation of an alternator.

10. Write the necessity for parallel operation of alternator.

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 the EMF equation of a 1-phase transformer.

(b) A single-phase 6600/230 V, 50 Hz transformer has a core area of 400 cm^2 and a maximum flux density of 1·18 Wb/m^2. Calculate the number of turns in primary and secondary windings.

12. The maximum efficiency of a 100 kVA, 6600/250 V, 50 Hz 1-phase transformer occurs at half-load is 98% at UPF. Calculate the full-load efficiency at 0·8 power factor lagging.

13. A transformer has its maximum efficiency of 0·98 at 15 kVA and UPF during a day it is follows 12 hours : 2 kW at p.f. 0·5, 6 hours : 12 kW at p.f. 0·8, 6 hours : 18 kW at p.f. 0·9. Find the all-day efficiency of the transformer.

14. What are the necessity and the conditions to be satisfied for parallel operation of 1-phase transformer?

15. *(a)* Explain the on-load and off-load tap changings.

(b) Draw the connection diagram of star-star configuration of 3-phase transformer.

16. Explain armature reaction in an alternator at different power factors.

17. Explain the constructional details of an alternator.

18. Two identical 3-phase alternators are coupled in parallel to a load of 1500 kW at 11 kV and p.f. of 0·8 lag. Synchronous reactance of each machine per phase is 60 ohms. While resistance is 2·8 ohms per phase, the power supplied by each machine being maintained the same, the excitation of the 1st alternator is adjusted so that its armature current is 45 A. Calculate—

(a) armature current of the second alternator;

(b) power factor at which each alternator operators;

(c) EMF of first alternator.

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