



C14-EE-402

4462

BOARD DIPLOMA EXAMINATION, (C-14)
SEPTEMBER/OCTOBER - 2020
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. Distinguish between core-type and shell-type transformers.
2. Draw the phasor diagram of single-phase transformer when it is supplying resistive load neglecting leakage reactance.
3. Draw the connection diagram for OC test of a single-phase transformer.
4. State the necessity of parallel operation of single-phase transformers.
5. Draw the connection diagram of delta-delta configuration of three-phase transformers.
6. Write any six cooling methods of a transformer.

- * 7. A three-phase, 10-pole alternator has 90 slots each containing 12 conductors. If the speed is 600 rpm and flux per pole is 0.1 Wb, calculate the induced EMF. Assume pitch factor to be 0.9 and distribution factor to be 0.96.
8. Define distribution factor of an alternator.
9. Define the term 'synchronous impedance' of an alternator.
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) Classify transformers based on the number of phases, construction and function. 6
- (b) A 100 kVA, 11 kVA/1400 V, 50 Hz single-phase transformer has 110 turns on secondary. Calculate the primary and secondary full-load currents, the maximum values of the flux in the core and the number of primary turns. 4
12. Develop the exact equivalent circuit of a single-phase transformer.
13. A 500 kVA distribution transformer whose copper loss at full-load and iron loss are 4.5 kW and 3.5 kW respectively. During a day of 24 hours, it is loaded as follows :
- (a) 6 hours 400 kW 0.8 pf lagging
- (b) 10 hours 300 kW 0.75 pf lagging
- (c) 4 hours 100 kW 0.8 pf lagging
- (d) 4 hours no-load
- Determine all-day efficiency.

- * **14.** (a) What are various losses in a transformer? 3
(b) In a single-phase transformer the core loss is found to be 52 W at 40 Hz and 90 W at 60 Hz, both losses being measured as the same maximum flux density. Calculate the hysteresis and eddy current losses at 50 Hz. 7
- 15.** State the functions of the following with neat sketches : $2 \times 5 = 10$
(a) Breather
(b) Explosion vent
(c) Conservator
(d) Buchholz relay
(e) Oil level indicator
- 16.** What is armature reaction? Explain the effect of armature reaction for various power factors in alternators.
- 17.** A 500 V, 50 kVA, single-phase alternator has an effective resistance of $0.2 \ \Omega$. A field current of 10 A produces armature current of 200 A on short circuit and an EMF of 450 V on open circuit. Calculate the full-load regulation at 0.8 pf lagging.
- 18.** Explain any one method of synchronization of three-phase alternatives using lamps.
