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C16-EE-401

**6440**

**BOARD DIPLOMA EXAMINATION, (C-16)**

**JUNE/JULY—2022**

**DEEE - FOURTH SEMESTER EXAMINATION**

**AC MACHINES - I**

*Time : 3 hours ]*

*[ Total Marks : 80*

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**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. Draw the vector diagram of single-phase transformer working at lagging power factor.
2. List out the various losses in a transformer.
3. Explain why transformer is rated in KVA but not KW.
4. State the necessity of parallel operation of transformers.
5. Draw the connection diagram of star-delta configuration of 3- $\phi$  transformers.
6. State any three applications of auto-transformer.
7. Define the following terms :  
(a) Synchronous reactance  
(b) Distribution factor
8. State any three advantages of short-pitch coils over full-pitch coils.

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9. Compare the salient pole type and cylindrical pole type of alternator in any six aspects.
10. State the conditions for operating the alternators in parallel.

### PART—B

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

11. Explain the constructional details of transformer with a neat sketch. 10
12. (a) The iron loss in a transformer is 52 watts at 40 Hz and 90 watts at 60 Hz at the same maximum flux density. Calculate (i) hysteresis loss and (ii) eddy current loss at 50 Hz. 5  
(b) Distinguish between power transformer and distribution transformer in any ten aspects. 5
13. (a) Draw the circuit diagram of SC test on a single-phase transformer and state the purpose of conducting it. 4  
(b) A 230/460 V, 1- $\emptyset$  transformer has a primary resistance of 0.2  $\Omega$  and leakage reactance of 0.5  $\Omega$  and the corresponding values for the secondary are 0.75  $\Omega$  and 1.8  $\Omega$  respectively. Find the secondary terminal voltage when supplying 10 A at 0.8 p.f. lagging. 6
14. A 100 kVA distribution transformer having iron losses of 1000 W and full load copper losses of 2000 W is supplying following loads : 10  
(a) 80 kW at 0.8 p.f. for 8 hours  
(b) 40 kW at unity p.f. for 6 hours  
(c) No-load for 10 hours

Find the all-day efficiency.

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- 15.** (a) State the functions of (i) Buchholz relay and (ii) Breather. 4  
(b) Describe any one of the cooling methods of power transformer with a neat sketch. 6
- 16.** A 3-phase, 4-pole, 50 Hz, star connected alternator has 60 slots. Each slot has 4 conductors and winding is short pitched by 3 slots. Find the induced e.m.f. between the lines for a flux per pole of 943 milliwebers distributed sinusoidally in space. 10
- 17.** Explain OC and SC tests of an alternator with a neat sketch. 10
- 18.** Two 75 MVA, 3- $\phi$  alternators operate in parallel. The settings of governors are such that the rise in speed from full-load to no-load is 2% in one machine and 3% in the other, the characteristics being straight lines in both cases. If each machine is fully loaded when the total load is 150 MW, what will be the load on each machine when the total load is reduced to 100 MW? 10

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