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C09–EE–402

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Differentiate between distribution and power transformer on three aspects.

2. Briefly explain the need to install two or more transformers in parallel than one large unit.

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

4. Draw the connection diagram of star-star configuration of 3-phase transformer.

5. Write the functions of breather in a transformer.

6. Briefly explain the principle of an autotransformer.

7. Compare salient pole-type rotor with cylindrical-type rotor in any three aspects.

8. Draw the scheme of exciting the main alternator field with Pilot exciter.

9. Draw the phasor diagram of an alternator for a leading power factor load.

10. Write the conditions for operating alternators in parallel.

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 100 kVA, 1100/440 V single-phase transformer has the following test data :

OC test on LV side—440 V, 10 A, 433 W
SC test on HV side—570 V, 9·09 A, 1660 W

Calculate the equivalent circuit parameters referred to LV side and HV side. Draw the equivalent circuit diagrams referred to both the sides.

12. A 33 kVA, 2200/220 V, 50 Hz single-phase power transformer has the following parameter :

Primary winding (HV side)—Resistance r_1 2 4 , leakage reactance X_1 6

Secondary winding (LV side)—Resistance r_2 0 03 , leakage reactance X_2 0 07

(a) Find the primary resistance and leakage reactance referred to secondary.

(b) Find the secondary resistance and leakage reactance referred to primary.

(c) Find the equivalent resistance and equivalent leakage reactance preferred to primary.

(d) Find the equivalent resistance and equivalent leakage reactance preferred to secondary.

13. *(a)* Derive EMF equation of a single-phase transformer. 5

(b) What are the assumptions made with regard to ideal transformer? Draw its phasor diagram. 5

14. *(a)* Explain the principle of operation and working of a transformer. 5

(b) Describe with neat a sketch the construction of core-type transformer. 5

15. *(a)* Explain briefly the construction of a current transformer. 5

(b) Explain briefly the construction of a potential transformer. 5

16. A 100 kVA, 3000 V, 50 Hz, 3-phase star-connected alternator has effective armature resistance of 0 2 . The field current of 4 A produces short circuit of 200 A and an open circuit EMF of 1040 V (line value). Calculate the full-load voltage regulation at *(a)* 0·8 PF lag and *(b)* 0·8 PF lead. 5+5=10

17. A 3-phase, 10-pole alternator has 90 slots, each containing 12 conductors. If the speed is 600 r.p.m. and flux per pole is 0·1 Wb, calculate the line e.m.f. when the phases are star connected.

18. Two AC generators running in parallel supply lighting load of 2000 kW and a motor load of 4000 kW at a PF of 0·8 lagging. One machine is loaded to 2400 kW at 0·095 PF lagging. What is the kW output and PF of the second machine?

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