C14-EE-402

4462

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2018

DEEE—FOURTH SEMESTER EXAMINATION

A.C. MACHINES-I

Time : 3 Hours] [*Total Marks* : 80

PART—A 3×10=30

Instruction : (1) Answer **all** questions. Each question carries **three** marks.

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

1. Classify the transformers based on

(*i*) Number of phases

(*ii*) Construction

(*iii*) Function

2. Briefly explain the need for parallel operation of transformer.

3. List the various losses taking place in a single phase transformer.

4. Draw the phasor diagram of a single phase transformer when it is supplying

(*a*) Resistive load

(*b*) Inductive load

5. Write any three advantages of 3-phase transformers over bank of three single phase transformers.

6. Draw the connection diagram of star-star configuration of 3-phase transformers.

7. Write any three advantages of stationary armature over rotating armature.

8. A synchronous generator has 10 slots per pole. If each coil spans 8 slot pitches, what is the value of pitch factor?

9. List the methods of finding the regulation of alternator.

10. What will be the effect of change in excitation to an alternator connected in parallel?

PART—B 10×5=50

Instruction : (1) Answer any **five** questions and each question carries **ten** marks.

(2) Answers should be comprehensive and the criteria for valuation is the content but not the length of the answers.

11. (*a*) Develop the exact equivalent circuit of a 1-phase transformer. From this derive the approximate equivalent circuit of the transformer. 6

(*b*) Define magnetizing component and working component of no load current of a transformer. 4

12. Explain the OC test and SC test of a transformer with a neat circuit diagram. 10

13. (*a*) Find the efficiency of a 125 kVA transformer at 25% full load at 0.6 p.f. lag, if the copper loss at full load is 1000 W and iron loss is 800 W. 5

(*b*) Explain the polarity test on a transformer. 5

14. (*a*) A 50 kVA, 3300/240V, 50 Hz, 1-phase transformer has 660 turns on the primary. Determine

(*i*) the number of turns on the secondary

(*ii*) the maximum value of flux in the core

(*iii*) the approximate value of primary and secondary full load currents. Internal drops in the windings are to be ignored 7

(*b*) What is the necessity of parallel operation of 1-x transformer. 3

15. Explain any three methods of cooling power transformers. 10

16. (*a*) Explain the working principle of an alternator. 5

(*b*) Derive the e.m.f. equation of an alternator. 5

17. (*a*) Write the advantages & disadvantages of short pitch coils. 4

(*b*) A 3-phase, 16 pole alternator has a star connected winding with 144 slots and 8 conductors per slot. The flux per pole is 20 m Wb sinusoidally distributed.

Find the frequency, the phase and the line voltage if the speed is 500 rpm. 6

18. Two 3-phase, 11000 V, star connected alternators working in parallel supply the following loads : 10

(*i*) Lighting load of 600 kW

(*ii*) 400 kW at p.f. 0.8 lagging

(*iii*) 500 kW at p.f. 0.9 lagging

(*iv*) 800 kW at p.f. 07 lagging

Find the output, armature current and the p.f. of the other machine if the armature current of one machine is 100 A at 0.8 p.f. lagging.

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