C20-EE–402

7445

BOARD DIPLOMA EXAMINATION, (C-20)

NOVEMBER/DECEMBER—2022 DEEE –

FOURTH SEMESTER EXAMINATION

ELECTRICAL MACHINES-II (T & A)

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. Classify transformers based on *(i)* number of phases and *(ii)* function.

2. Define transformation ratio.

3. Draw a neat vector diagram of transformer working on load at lagging power factor.

4. State any three applications of auto transformers.

5. State the necessity of cooling of power transformers.

6. State any three advantages of stationary armature.

7. Define exciter and list various types of exciters in alternator.

8. Write the expressions for pitch factor and distribution factor of alternator.

9. Define synchronization in alternators.

10. List the methods of synchronization of 3-phase alternators.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. *(a)* Draw the vector diagram of a practical transformer on load for unity power factor and lagging power factor.

(OR)

(b) Derive the emf equation of a single phase transformer.

12. *(a)* Define voltage regulation of a transformer and derive an expression for voltage regulation at unity p.f.

(OR)

(b) Draw the equivalent circuit diagram refers to primary for a 4 kVA, 200/400 V and 50 HZ $1-\phi$ transformer from the test results as follows :

OC Test : 200 V, 0·8 A, 80 W on LV Side

SC Test : 20 V, 10 A, 100 W on HV Side

13. *(a)* Explain the procedure of on-load tap changing of transformers with a neat sketch.

(OR)

(b) State the expression for saving of copper in auto transformer and also write the advantages and disadvantages of auto transformers.

14. *(a)* Derive emf equation of an alternator.

(OR)

(b) A $3-\varphi$ 16-pole alternator has 144 slots with 4 conductors per slot, the winding being double layered winding, flux in the airgap is 50 mwb sinusoidally distributed. The coil span is 150° (electrical). Find the emf generated when the alternator shaft is driven at 375 r.p.m.

15. *(a)* Explain the procedure of synchronization of an alternator using synchroscope method.

(OR)

(b) Two AC generators running in parallel supply a lighting load of 2000 kW and a motor load of 4000 kW at a p.f. of 0·8 lagging. One machine is loaded to 2400 kW at 0·95 p.f. lagging. Find the output and power factor of the other machine.

PART—C

10×1=10

Instructions : (1) Answer the following question.

(2) The question carries **ten** marks.

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. What are the constructional differences between DC generator and AC generator (alternator)? Can a DC generator be converted into an alternator? Explain.

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