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Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, April 2015
(2013 Scheme)
Branch : Electrical and Electronics Engg.
13.305 : DC MACHINES AND TRANSFORMERS (E)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **2** marks.

1. Explain different types of DC generators.
2. List the different types of armature windings and their applications.
3. Explain the conditions for parallel operation of DC generators.
4. Explain why starters are required for DC motors.
5. Explain different permanent magnet DC motors.
6. Explain regulation of transformer.
7. Draw the phasor diagram of a transformer on load.
8. What is the condition for maximum efficiency in transformer ?
9. Explain the advantages of auto transformers.
10. Explain the conditions for parallel operation of 3 phase transformers.

(10×2=20 Marks)

P.T.O.

PART – B

Answer **one full** question from **each** Module. **Each** question carries **20** marks.

Module – I

11. a) With a neat diagram, explain the different parts of a DC generator. **5**

    b) What is the commutator pitch of a 4-pole DC armature winding having 49 commutator bars ? **5**

    c) A 20 KW DC shunt generator gives full load output at a terminal voltage of 220 V. The armature and shunt field resistances are 0.4 and 270 ohms respectively and the brush drop is 2V. The iron and friction losses are 980 W. Calculate :

    i) Generated emf,

    ii) Copper loss and

    iii) Efficiency. **10**

OR

12. a) Draw and explain the load characteristics of DC generators. **5**

    b) Derive an expression for the demagnetizing and cross magnetizing components of armature reaction in a DC generator. **5**

    c) Two shunt generators having ratings of 45 KW and 95 KW have regulations of 6% and 4% respectively. Both have voltage rating of 230 V and operate in parallel and deliver a total current of 220 A. Assuming linear characteristics, determine :

    i) Current delivered by each machine and

    ii) Terminal voltage. **10**

Module – II

13. a) With a neat diagram, explain the operation of a 4 point starter. **10**

    b) A 220 V DC shunt motor runs at 1500 rpm on no load and takes 5 A. Armature and shunt field resistances are 0.4 and 230 ohms respectively. Calculate the speed of the motor when it draws a current of 40 A. The field weakening is 4%. **10**

OR

14. a) With a neat diagram, explain the Hopkinson's method of testing of DC motor. 10

b) A 230 V DC shunt motor has an armature resistance of 0.3 ohms and runs at 1500 rpm taking a current of 70 A. If the torque remains unchanged, find the speed and armature current when the field strength is increased by 25%. 10

Module – III

15. a) With necessary diagrams and equations, explain the constant loss and variable loss in a single phase transformer. 10

b) SC test was conducted on a 5 KVA, 440/230 V single phase transformer. The input voltage at full load current was 40V. The watt meter at input side reads 250 W. Find the power factor at which regulation at full load is zero. 10

OR

16. a) With a neat diagram, explain the Sumpner's test. 10

b) A 50 KVA transformer has a full load loss of 2 KW, losses being equally divided. During a day, transformer operates at full load for 8 hours and half load for 6 hours and no load for the rest of the day. Calculate the all day efficiency. 10

Module – IV

17. a) Derive an expression for the saving in copper in auto transformers. 10

b) A balanced 3 phase load of 50 KW at 1000 V, 0.86 pf lag is supplied from a 2000 V, 3 phase mains using single phase transformers connected in

i) star-star and

ii) V-V.

Find the current in the windings of each transformer and the power factor at which they operate in each case. 10

OR

18. a) With necessary equations and diagrams, explain the 3 phase connections of single phase transformers. 10

b) Write short notes on harmonics in transformers. 5

c) Explain the cooling methods of transformers. 5