

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), SEPT 2022**ELECTRICAL AND ELECTRONICS ENGINEERING
(2020 SCHEME)****Course Code: 20EET202****Course Name: DC Machines and Transformers****Max. Marks: 100****Duration: 3 Hours****PART A***(Answer all questions. Each question carries 3 marks)*

1. State the general rules for D.C armature winding.
2. Name the parts of dc machine and state the functions of any two parts.
3. Derive the expression for generated emf in DC generator.
4. What is armature reaction? What are the effects of armature reaction?
5. Derive the condition for gross mechanical power developed by motor is maximum?
6. What is starter? What is the necessity of starter in dc motor?
7. Explain different methods of cooling of a transformer.
8. Why the rating of transformer in kVA?
9. State the differences between autotransformer and ordinary transformer?
10. Describe the constructional features of dry type transformers.

PART B*(Answer one full question from each module, each question carries 14marks)***MODULE I**

11. a) Explain construction of DC machine with the help of neat diagram. (10)
- b) What are the conditions for voltage build up in a dc machine? (4)

OR

12. a) Draw the winding diagram of a dc machine with 4 poles, 12 slots progressive double layer lap winding. (10)
- b) Explain the need of dummy coils in DC machines. (4)

MODULE II

13. a) Name the different losses that occur in DC machine. How the magnetic losses are minimized in dc machine? (7)
- b) A 6 pole lap wound d. c. generator has 600 conductors on its armature. The flux per pole is 0.02Wb. Calculate (i) the speed at which the generator must be run to generate 300V (ii) what would be the speed if the generator were wave wound? (7)

OR

14. a) With neat diagram explain the parallel operation of shunt generator. (8)
- b) The open circuit characteristics of a DC shunt generator running at 750 rpm is given below.
- | | | | | | | |
|---------------------|---|-----|----|-----|-----|-----|
| Field current (A) : | 0 | 0.5 | 1 | 1.5 | 2 | 2.5 |
| E.M.F. (V) : | 5 | 50 | 84 | 105 | 120 | 131 |
- Calculate (6)
- i) If the machine is run as a shunt generator at 750 rpm, to what voltage will it excite with shunt field resistance equal to 70Ω .
- ii) What is the critical value of shunt field resistance?
- iii) What is the Critical speed when the shunt field resistance is 70Ω .

MODULE III

15. a) Explain with neat sketch how speed control of a DC shunt motor is carried out. (10)
- b) A 220kV DC shunt motor having an armature of 0.25Ω carries an armature current of 50A and runs at 600 rpm. If the flux is reduced by 10% by field regulators, find the speed assuming load torque remains the same. (4)

OR

16. a) What is the necessity of a starter in motor? With a suitable diagram, explain the working of 3 point starter. (8)
- b) Explain the characteristics curves of a DC series motor with the help of relevant equations? (6)

MODULE IV

17. a) Derive the condition for maximum efficiency of a transformer, and also find the output KVA corresponding to maximum efficiency. (7)
- b) A 400 kVA transformer has an iron loss of 2 kW and the maximum efficiency at 0.8 p.f occurs when the load is 240kW. Calculate (i) the maximum efficiency at unity p.f. (ii) the efficiency on full load at 0.71 p.f. lagging. (7)

OR

18. a) A 200 kVA ,2000/400 V, 50 Hz single phase transformer gave the following test results:
O.C test : 2000V, 1.8 A , 1.75 kW. on HV side
S.C test : 13V, 300A, 1 kW.....on LV side
Obtain the equivalent circuit as referred to HV side. (8)
- b) Draw the phasor diagram of a single phase transformer with inductive load. (6)

MODULE V

19. a) What is an auto transformer? Derive an expression for the saving of copper in an autotransformer as compared to an equivalent two winding transformer? (8)
- b) What is vector grouping? Name the vector groups commonly used in three phase transformers? (6)

OR

20. a) What is tertiary winding? What are the advantages and disadvantages of delta-delta connection? (6)
- b) Explain the working of off-load tap changing transformer with help of neat diagram. (8)
