Reg. No. : | | | | | | | | | | |

Question Paper Code: 43302

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Electrical and Electronics Engineering

14UEE302 - DC MACHINES AND TRANSFORMERS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Electromotive force is provided by

   (a) Resistance (b) A conducting path
   (c) An electric current (d) An electrical supply source

2. Hysteresis loss can be minimised by selecting a magnetic material having

   (a) large B/H loop area (b) High resistivity
   (c) High retentivity (d) Low hysteresis coefficient

3. Which generator has poorest voltage regulation?

   (a) Series (b) Shunt
   (c) Long shunt compound (d) Short shunt compound

4. In 8 - pole wave connected motor armature, the number of parallel paths are

   (a) 8 (b) 4 (c) 2 (d)1

5. The speed of the dc motor can be controlled by varying

   (a) Its flux per pole (b) Resistance of armature circuit
   (c) Applied voltage (d) All of the above

6. On what factors the speed of dc motor depends?

(a) applied voltage (b) field flux
(c) armature Current (d) all of the above

7. The frequency of secondary voltage is

(a) greater than primary voltage frequency

(b) less than primary voltage frequency

(c) equal to primary voltage frequency

(d) none of the above

8. Transformer cores are laminated in order to

(a) simply its construction (b) minimize eddy current loss
(c) reduce cost (d) reduce hysteresis loss

9. One of the main advantages of Swinburne's test is that it

(a) its applicable for shunt motors (b) needs one running cost
(c) its very economical and convenient (d) ignore any charge in iron loss

10. The main purpose of performing open-circuit test on a transformer is measure its

(a) cu loss (b) core loss

(c) total loss (d) insulation resistance

PART - B (5 x 2 = 10 Marks)

11. List the types of magnetic systems with examples.

12. Define critical resistance.

13. Why a series motor should not be started on no load?

14. Define all-day efficiency.

15. What are the losses in a DC machines?

PART - C (5 x 16 = 80 Marks)

16. (a) Briefly explain the multiply-excited magnetic systems? (16)

Or

(b) (i) Explain the concepts of rotating magnetic field. (8)

(ii) Obtain the torque equation for round rotor machines. (8)

17. (a) (i) Derive the EMF equation of DC generator. (8)

(ii) A 4 pole lap connected DC armature has 100 slots and 8 conductors per slot and runs at 700 *rpm*, EMF generated is 310 *V*. Find the useful flux per pole. (8)

Or

(b) (i) An 8 pole lap connected DC shunt generator delivers an output of 240 *A* at 500*V*.The armature has 1408 conductors and a 60 commutator segments. If the brushes are given a lead of 4 segments from no- load neutral axis estimate the demagnetizing and cross magnetizing AT/pole. (8)

(ii) Estimate the reactance voltage for a D.C shunt machines having 55 commutator segments brush width in commutator segments of 4cm, self-inductance of 0.153*mh* and current per coil of 27*A*.The speed of the machine is 700 *rpm*. (8)

18. (a) The back emf of a shunt motor is 230*V*, the field resistance is 16 *ohm*'s and field current is 1.5*A*. If the line current is 37*A*. Find the armature resistance also find the armature current when the motor is stationary. (16)

Or

(b) Explain the different methods used for the speed control of dc shunt motor. (16)

19. (a) (i) Draw the equivalent circuit of a transformer and derive the components with respect to primary side. (8)

(ii) Explain the working and construction of auto transformer. (8)

Or

(b) The primary and secondary windings of a 30*KVA*, 6.6 *KV*/230*V* transformer have resistance of 10Ω and 0.013Ω respectively. The leakage reactance of the windings are 17Ω and 0.022Ω. Estimate the percentage voltage regulation of the transformer when it is delivering full-load at 0.8 power factor lagging at the rated voltage. (16)

20. (a) With the help of neat circuit diagram explain the following test of a DC machine.

(i) Hopkinson's test (8)

(ii) Swinburne's test (8)

Or

(b) (i) What are the losses occurring in transformer and explain. (8)

(ii) Derive the condition for maximum efficiency in a transformer? (8)