Reg. No. :

Question Paper Code: 43302

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

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. Interpole winding is connected in

    (a) Series with armature   (b) Series with main poles
    (c) Parallel with armature   (d) Parallel with main poles

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. The direction of rotation of conductors of a DC motor can be determined by

    (a) Ampere law   (b) Fleming's left hand rule

    (c) Fleming's right hand rule   (d) Lenz's law

7. If a transformer primary is energised from a square wave voltage source, its output voltage will be

    (a) Square wave   (b) Sine wave

    (c) Pulse wave   (d) Triangular wave

8. Transformer action requires a

    (a) Constant magnetic flux   (b) Increasing magnetic flux

    (c) Alternating magnetic flux   (d) Alternating electric flux

9. Swinburne's test can be performed at

    (a) Any load   (b) Only no load

    (c) Only full load   (d) Only half load

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

    (a) copper losses   (b) core loss

    (c) total loss   (d) insulation resistance

PART - B (5 x 2 = 10 Marks)

11. What is hysteresis loss and how can this loss be minimized?

12. What are cumulative and differential compound generators?

13. Write the torque equation of a dc motor.

14. Compare core and shell type transformers.

15. Explain why Swinburne's test cannot be performed on DC series motor.

PART - C (5 x 16 = 80 Marks)

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

Or

  (b) Derive the torque equation in round rotor machines.   (16)

17. (a) Explain with a neat sketch, the construction of a dc machine.   (16)

Or

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

18. (a) Sketch and explain the speed-current, speed-torque and torque-current characteristics of a shunt motor, series motor and compound motor. (16)

Or

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

19. (a) Draw the no-load phasor diagram of a transformer and explain. (16)

Or

(b) Enumerate the various losses in a transformer. How these losses can be minimized. (16)

20. (a) A 60*KW*, 400V DC shunt motor has 4 poles and a wave connected armature of 450 conductors. The flux per pole is 45*mwb*, *Ra*=0.1*Ω* and *Rsh* =200*Ω*. If the full load efficiency is 90.5%. Find the (i) speed (ii) Armature torque (iii) Useful torque. (16)

Or

(b) Explain the Open circuit and short circuit on transformer. (16)

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