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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, November 2019

13.801 – ELECTRICAL DRIVES AND CONTROL (T) – I

(2013 Scheme)

Time : 3 Hours Max. Marks : 100

PART A

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

1. Explain speed torque characteristics of series DC motor.
2. Derive the emf equation of DC generator.
3. Explain the principle of operation of DC motor.
4. With neat diagram explain the steady state output characteristics of IGBT.
5. Give reasons why power BJTs have been replaced by power MOSFETs and IGBTs.
6. Explain the working of two quadrant chopper.
7. Determine the DC output voltage for a single phase full-bridge controlled rectifier fed from 230V, 50Hz AC supply at firing angle of 45°.
8. What are the features of half-controlled rectifier?
9. List different methods of voltage control adopted in inverter.
10. What is sinusoidal pulse width modulation?

(10 × 2 = 20 Marks)

P.T.O.

PART B

Answer any **one** full question from each module. Each question carries **20** Marks.

MODULE – I

11. (a) A 120V dc shunt motor has an armature resistance of 0.2Ω and a field resistance of 60Ω. The full-load line current is 60A and full-load speed is 1800 rpm. If the brush contact drop is 3V, find the speed of the motor at half load. **(10)**

    (b) Explain the speed-current, torque-current and speed-torque characteristics of DC shunt motor. **(10)**

Or

12. (a) Draw and explain the external characteristics of DC shunt and series generator. **(10)**

    (b) Explain the construction details of DC generator. **(10)**

MODULE - II

13. (a) With a neat diagram explain the static and switching characteristics of IGBTs. **(10)**

    (b) Design a simple drive circuit for power BJT. **(10)**

Or

14. (a) Explain the operation principle of four quadrant chopper with neat sketch and waveforms. **(12)**

    (b) Give the classification of choppers and explain its importance with its input voltage. **(8)**

MODULE - III

15. (a) Explain the working of a single-phase half-wave controlled rectifier and derive the average output voltage equation with resistive load. **(12)**

    (b) Distinguish between an uncontrolled and a controlled rectifier. **(8)**

Or

16. (a) A single-phase dual converter operating from 230V, 50Hz supply has a load resistance of 10Ω. If the delay angle of converter-1 $\alpha_1 = 45°$, and circulating inductance $L_r = 60mH$, calculate (i) the delay angle α_2 of converter-2 and (ii) the peak circulating current and the peak current of converter-1. **(10)**

(b) Explain the working of a single-phase full-wave controlled rectifier and derive the average output voltage equation with R-L load. **(10)**

MODULE - IV

17. (a) Explain speed control methods of induction motor drive. **(12)**

(b) Explain the working principle of a single-phase full bridge inverter. **(8)**

Or

18. (a) Explain with block diagram the working principle of offline UPS. **(10)**

(b) Explain multi-pulse width modulation technique of varying the magnitude of output voltage in single phase inverter. **(10)**