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APR-MAY 2022

B. E. (Eighth Semester) Examination, ~~2020~~

(New Scheme)

(ET & T Engg. Branch)

POWER ELECTRONICS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d).*

Unit-I

1. (a) Write the light Triggering methods for Thyristor TURN-ON. 2

(b) Sketch the two Transistor Analogy of SCR with expression and explain it. 7

(c) Describe the different modes of operation of a SCR with the help of its VI characteristics. 7

(d) Write detail notes on : (any **one**) 7

(i) IGBT

(ii) Power MOSFET

(iii) SBS/GTO

Unit-II

2. (a) Why commutation circuit is required for SCR? 2

(b) What are the problem associated with series connection of SCR's. Derive and expression for optimum value of Resistance of static equalizing circuit. 7

(c) Explain the Half wave converter with RLE loads by using suitable waveform. 7

(d) A relaxation oscillator using an UJT, is to be designed for triggering an SCR.

The UJT has the following data :

(I) $\eta = 0{\cdot}72$, $I_P = 0{\cdot}6$ mA, $V_P = 18$ V, $V_u = 1{\cdot}0$ V, $I_v = 2{\cdot}5$ mA, $R_{BB} = 5\ k\Omega$, Normal leakage current with emitter open = 4·2 mA.

(II) The firing freq = 2 kHz; $c = 0.04\ \mu F$

Calculate : 7

(i) R_1 (ii) R_1 and (iii) R_2.

Unit-III

3. (a) What is Inversion mode of converter? 2

(b) Compare the Symmetrical and Asymmetrical circuit of bridge converter (single phase). 7

(c) Draw the full wave three-phase bridge converter and explain with suitable waveform. 7

(d) What is 1 ϕ dual converter? Explain its working with waveform. 7

Unit-IV

4. (a) Write the Chopper Control Technique. 2

(b) Explain Mc-Murrey full bridge inverter with suitable circuit diagram and waveform. 7

(c) Write short note on : (any **one**) 7

(i) Buck-Boost chopper

(ii) Jones chopper

(d) A step-up chopper has input voltage of 220 V and output voltage of 660 V. If the conducting time of thyristor-chopper is 100 μ s. (i) Compute the pulse width of output voltage. (ii) In case O/P voltage pulse width is halved for constant frequency operation, find the average value of new O/P voltage. 7

Unit-V

5. (a) Write application of cycloconverter. 2

(b) Draw and explain of single phase AC voltage controller with RL load. 7

(c) Explain the principle of Integral cycle control with their voltage expression. 7

(d) Describe the basic principle of working of single-phase to single-phase step-down cycloconverter. 7