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**C Reg. No. :**

**Question Paper Code: 51P53**

M.E. DEGREE EXAMINATION, NOV 2017

First Semester

Power Electronics and Drives

15PPE103 - MODERN POWER SEMI CONDUCTOR DEVICES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. | Which of the following PNPN devices has two gates? | | | | | | CO1- R | | | |
|  | (a) Triac | | | | (b) SCS | | | | | |
|  | (c) SUS | | | | (d) DIAC | | | | |
| 2. | The temperature coefficient of resistivity for power BJT is | | | | | | CO2 -R | | | |
|  | (a) Positive | | (b) | | | (c) | (d) None of these | | | |
| 3. | Which of the following is preferred for VHF/UHF applications? | | | | | | CO3- R | | | |
|  | (a) BJT | | (b) MOSFET | | | (c) SIT | (d) IGBT | | | |
| 4. | When a UJT is used for triggering of an SCR, the wave shape of the voltage is a | | | | | | CO4 -R | | | |
|  | (a) Sine Wave | | (b) Saw-tooth wave | (c) Trapezoidal wave | | | (d) Square wave | | | |
| 5. | Snubber circuit is used to limit the rate of | | | | | | CO5- R | | | |
|  | (a) Rise of current | | | | (b) Conduction period | | | | | |
|  | (c) rise of voltage across SCR | | | | (d) none of these | | | | | |
|  | PART – B (5 x 3= 15Marks) | | | | | | | | | |
| 6. | What is controllable switch. CO1-U | | | | | | | | | |
| 7. | Compare BJT and MOSFET. CO2-Ana | | | | | | | | | |
| 8. | Compare RCT and FCT. CO3-Ana | | | | | | | | | |
| 9. | Define driver circuits. CO4-U | | | | | | | | | |
| 10. | List the various types of mounting of power devices. CO5-U | | | | | | | | | |
|  | PART – C (5 x 16= 80Marks) | | | | | | | | | |
| 11. | (a) | (i) Discuss the attributes of an ideal switch. | | | | | | CO1- Ana | (8) | |
|  |  | (ii) Write short notes on power switching devices | | | | | | CO1- U | (8) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | Describe various types of power Diode indicating clearly the differences amongst them. | | | | | | CO1- U | (16) | |
|  |  |  | | | | | |  |  | |
| 12. | (a) | Discuss problems associated with series and parallel operation of thyristor. How are they overcome? Explain in detail. | | | | | | CO2- Ana | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | (i) Discuss about converter grade and inverter grade Thyristors. | | | | | | CO2- Ana | (8) | |
|  |  | (ii) Explain the working principle of two transistor analogy of  Thyristors. | | | | | | CO2- U | (8) | |
|  |  |  | | | | | |  |  | |
| 13. | (a) | Explain the construction, operation, static and switching characteristics of IGBT with appropriate diagrams. | | | | | | CO3-U | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | (i) Design and explain about snubber circuit. | | | | | | CO3-Ana | (8) | |
|  |  | (ii) Compare IGBT and MOSFET. | | | | | | CO3-Ana | (8) | |
|  |  |  | | | | | |  |  | |
| 14. | (a) | Explain the firing and protection circuit of SCR | | | | | | CO4 - U | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | (i) Draw and explain the base drive circuit of BJT | | | | | | CO4 - U | (8) | |
|  |  | (ii) Write Importants of pulse Transformer and optocoupler. | | | | | | CO4 - U | (8) | |
|  |  |  | | | | | |  |  | |
| 15. | (a) | Explain the transient thermal impedance for power semiconductor devices. | | | | | | CO4 - U | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | (i) Suggest the various factors to be considered for the selection of  heat sink | | | | | | CO5-U | (8) | |
|  |  | (ii) Explain heat transfer through conduction. | | | | | | CO5-U | (8) | |
|  |  | | | | | | | | | |