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| 18. Relate BJT and MCT gate circuits in terms of drive requirements, switching speed, and control complexity. | 2 | K2 | CO3 |
| 19. Analyze the different types of heat sinks and distinguish their suitability for various power devices. | 2 | K2 | CO4 |
| 20. Examine the function of intelligent power modules in enhancing system efficiency and protection. | 2 | K2 | CO4 |
| 21. Select suitable high-power applications that make effective use of IGBTs based on their operational features. | 2 | K2 | CO5 |
| 22. Utilize steady-state and dynamic characteristics to assess the performance of BJTs in power circuits. | 2 | K2 | CO5 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) Compare the EMI effects produced by different power semiconductor devices during switching operations. | 11 | K2 | CO1 |
| OR | | | |
| b) Outline the types and functional features of power diodes used in power conversion systems. | 11 | K2 | CO1 |
| 24. a) Model the switching characteristics of a thyristor during the turn-on and turn-off process. Identify the factors affecting switching speed and device reliability. | 11 | K3 | CO2 |
| OR | | | |
| b) Apply the concept of latching and holding currents to explain the turn-on and turn-off mechanisms of an SCR. Support your explanation with waveforms. | 11 | K3 | CO2 |
| 25. a) Utilize the switching behavior of an IGBT to compare its turn-on and turn-off performance with that of a MOSFET. | 11 | K4 | CO3 |
| OR | | | |
| b) Inspect and classify the performance of IGBTs in modern power electronic converters utilizing new semiconductor materials. | 11 | K4 | CO3 |
| 26. a) Identify the necessity of isolation between power and control circuits, and illustrate the working of an opto coupler in achieving this isolation. | 11 | K3 | CO4 |
| OR | | | |
| b) Develop and explain suitable overvoltage and overcurrent protection circuits for power semiconductor devices. | 11 | K3 | CO4 |
| 27. a) Distinguish and explain liquid cooling and vapour-phase cooling techniques with respect to efficiency, cost, and application areas. | 11 | K4 | CO5 |
| OR | | | |
| b) Analyze the different thyristor mounting techniques using suitable diagrams and discuss their advantages. | 11 | K4 | CO5 |
| 28. a) (i) Choose the methods used to protect a Power BJT against overvoltage and over current condition. | 6 | K3 | CO4 |
| (ii) Inspect the critical factors influencing the selection of an appropriate heat sink for power devices. | 5 | K4 | CO5 |
| OR | | | |
| b) (i) A power MOSFET switches 5A (rms) at 10 kHz with a 90% duty cycle. Solve the junction operating temperature. | 6 | K3 | CO4 |
| (ii) Categorize the analogy between electrical and thermal quantities to model thermal behavior in power devices. | 5 | K4 | CO5 |