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| 17. Identify any two key applications of modern stepper motors in automation application. | 2 | K3 | CO4 |
| 18. Make use of the open-loop and closed-loop control in stepper motors. | 2 | K3 | CO4 |
| 19. Outline the basic components used in an AC servo drive system. | 2 | K2 | CO5 |
| 20. Recall the significance of feed back in the operation of AC servo drives used for motion control. | 2 | K2 | CO5 |
| 21. What are the main characteristics of a TRIAC? | 2 | K1 | CO1 |
| 22. Define electric drive. | 2 | K1 | CO2 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) Classify the different modes of operation with the characteristics of TRIAC. | 11 | K2 | CO1 |
| OR | | | |
| b) Illustrate the basic structure of IGBT with its working. Give its equivalent circuit and explain the turn ON and turn OFF processes. | 11 | K2 | CO1 |
| 24. a) An induction motor directly connected to a 400V, 50Hz supply utility has a rated torque of 30Nm that occurs at speed of 2940 rpm. The motor drives a fan load that can be approximated by $T_L = B \cdot \omega_m$ where $B = 0.05 \text{ Nm/rad/s}$, and rated speed of the motor is 3000 rpm. Stating any assumption made, show the speed, in equilibrium position at which the torque developed by the motor is equal to the load torque. | 11 | K2 | CO2 |
| OR | | | |
| b) Illustrate the choice of selection of the motor for different loads. | 11 | K2 | CO2 |
| 25. a) Outline the construction & operation of DC Motor. | 11 | K2 | CO3 |
| OR | | | |
| b) Interpret the typical driver circuits used for servomotors. | 11 | K2 | CO3 |
| 26. a) Illustrate the reluctance torque of a stepper motor and their characteristics. | 11 | K2 | CO4 |
| OR | | | |
| b) Explain the construction and operation of VR stepper motor. Also explain about micro stepping. | 11 | K2 | CO4 |
| 27. a) Explain the construction & operation of permanent magnet synchronous motor. | 11 | K2 | CO5 |
| OR | | | |
| b) Illustrate the construction & operation of linear electrical motor. | 11 | K2 | CO5 |
| 28. a) Interpret the control strategies used for PMSM Drives. | 11 | K2 | CO5 |
| OR | | | |
| b) Summarize the impact of VFDs on energy savings and discuss main application areas of AC motors. | 11 | K2 | CO5 |