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|-----------------------|---------------------------|
| A) Class B Chopper | i) Two quadrant chopper |
| B) Class D chopper | ii) Four quadrant chopper |
| C) Class E chopper | iii) One quadrant chopper |
| a) A - i, B-ii, C-iii | b) A - ii, B-i, C-iii |
| c) A - iii, B-i, C-ii | d) A - iii, B-ii, C-i |

9. **Assertion (A):** The analog feedback system provides 0.2% at best speed regulation only when compared with digital feedback system. [K₂]

Reason (R): Because analog feedback system (PI controller) ideally should provides perfect speed regulation and fast response.

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| a) Both A and R are correct and R is correct explanation of A | b) Both A and R correct but R is not the correct explanation of A |
| c) A is correct but R is wrong | d) A is wrong but R is correct |

10. _____control drive is suitable for excellent speed regulation and fast dynamic response [K₁]

a) PI control	b) PID control
c) PLL control	d) Analog feedback control

PART B (10 x 2 = 20 Marks)

11. Draw the circuit diagram for flux control and armature control method of dc shunt motor. [K₁]
12. Write the advantages of electrical drive compared to mechanical drive. [K₁]
13. A single phase fully controlled rectifier with an ac source voltage of 220V, 50Hz, produces output of 175V. Calculate firing angle. [K₂]
14. What is meant by simultaneous control of dual converter? [K₁]
15. Mention the control strategies of chopper fed dc drive. [K₁]
16. What is the principle of regenerative braking in chopper fed drive? [K₁]
17. Mention the difference between PI and PID controller in terms of response. [K₂]
18. Write the transfer function of converter. [K₂]
19. What are all the advantages of PLL based dc drives? [K₁]
20. What is the effect of gate firing in control of dc drive? [K₁]

PART C (6 x 5 = 30 Marks)

21. Determine the half an hour rating of a 25KW motor having a time constant of 1.5 hours. Assume that the motor cools down completely between each load period. [K₂]
22. Explain Multi quadrant operation of drive with hoist load. [K₁]

23. A 220V, 1500rpm, 50A separately excited motor with armature resistance of 0.5 ohm, is fed from a circulating current dual converter with ac source voltage of 165V. Determine converter firing angle for the operating point is (i) motoring operation at rated motor torque and 1000rpm. [K₃]
24. Explain the operation of class-E chopper fed DC drive with neat circuit diagram. [K₁]
25. Illustrate the modeling of DC separately excited motor. [K₃]
26. Explain the operation of PLL based dc drive. [K₂]

PART D (4 x 10 = 40 Marks)

27. Describe the thermal model of a motor for heating and cooling. [K₂]
28. Explain the operation of single phase full converter fed DC separately excited motor drive operating in continuous and discontinuous mode. [K₂]
29. Derive an instantaneous current of Type A chopper fed DC drive with continuous conduction mode and also the average output voltage for the continuous conduction mode. [K₃]
30. Explain in detail about the control of DC drives using Micro Computer with program and flow chart for constant horse power control of dc drive. [K₂]
