

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

	Marks	K – Level	CO
1. Which of the following materials show piezoelectric property (a) PVA (b) PZT (c) Quartz (d) ALN	1	K1	CO1
2. The temperature control system which maintains the temperature of a room at 30°C when it is set is an example of _____ (a) open loop system (b) Closed loop system (c) Both a and b (d) None of the above	1	K1	CO1
3. What is the maximum number of arrows (input) allowed to go inside a block (a) 1 (b) 2 (c) 3 (d) 4	1	K1	CO2
4. Heat in thermal system is analogous to _____ in electrical energy (a) current (b) potential difference (c) resistance (d) charge	1	K1	CO2
5. The type of distribution in which mean and variance are equal is (a) Poisson (b) Normal (c) Triangular (d) Bernoulli	1	K1	CO3
6. Which of the following is not the special purpose of simulation language (a) BASIC (b) GPSS (c) GASP (d) SIMSCRIPT	1	K1	CO3
7. Operation research approach is (a) Multi-disciplinary (b) Artificial (c) Intuitive (d) All of the above	1	K1	CO4
8. The region which satisfies all the constraints of the LPP is called as (a) General region (b) Feasible region (c) convex region (d) concave region	1	K1	CO4
9. The transmission system transmits _____ from engine to wheels (a) speed (b) power (c) current (d) pressure	1	K1	CO5
10. What is the principle on which brake works? (a) Vibration (b) Friction (c) suction (d) dragging	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11. What do you mean by closed loop system?	2	K1	CO1
12. Define PLC.	2	K1	CO1
13. Difference between sensor and Transducer.	2	K1	CO1
14. Define non-touching loop.	2	K1	CO2
15. Show the force balance equation of a dash-pot.	2	K2	CO2
16. Write the mason's Gain formula.	2	K2	CO2
17. What do you mean by Rapid controller prototyping?	2	K1	CO3
18. List the applications of simulation.	2	K1	CO3
19. Define objective function in LPP.	2	K1	CO4
20. What do you mean by fuzzy logic optimization techniques?	2	K1	CO4
21. List the various components of automotive system.	2	K1	CO5
22. Define actuator.	2	K1	CO5

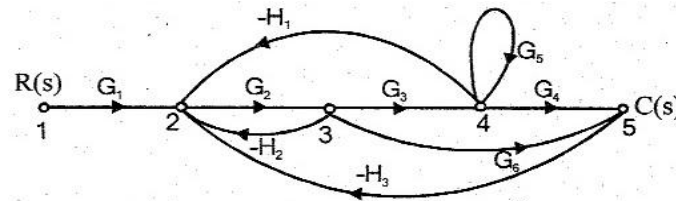
PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Explain sequential controller in detail with an example.	11	K2	CO1
OR			
b) Interpret engine management system in detail with neat sketch.	11	K2	CO1

24. a) Infer the overall transfer function for the signal flow graph as shown in fig.

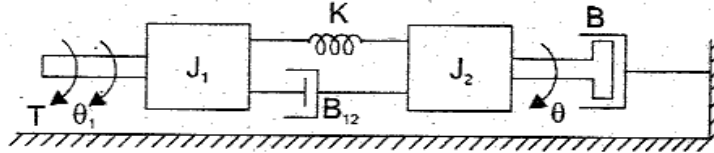
11 K3 CO2



OR

- b) Explain the differential equations governing the mechanical rotational systems as shown in fig and determine the transfer function.

11 K3 CO2



25. a) A car manufacturing company keeps stock of the popular branded cars. Daily demand based on past experience is given below.

11 K3 CO3

Demand	0	15	25	35	45	50
Probability	0.01	0.15	0.20	0.50	0.12	0.02

Consider the following sequence of Random numbers

48,78,09,51,56,77,15,14,68, 09

- (i) Using the sequence simulate the demand for next 10 days.
(ii) Find the stock situation, if the car company manufactures 35 cars per day. Also estimate the daily average demand for the cars on the basis of the simulated data.

OR

- b) Demonstrate the Hardware In Loop simulation in detail with industrial applications.

11 K3 CO3

26. a) A company manufactures two types of products B1 and B2. Each product uses shaper and drilling machines. The process time per unit of B1 on shaper is 10 hours and on drilling is 8 hrs. The process time per unit of B2 on shaper is 15 hours and on drilling is 10 hrs. The maximum number of hours available per week for shaper is 80 hrs whereas for drilling 60 hrs respectively. Also the profit per unit of selling B1 and B2 are Rs 25 and Rs 35 respectively. Formulate a LP model to determine the production volume of each product such that the total profit is maximized. Also determine the profit by using graphical method.

11 K3 CO4

OR

- b) Find the initial solution for the problem given below using VAM method

11 K3 CO4

	W1	W2	W3	Supply
P1	25	17	25	30
P2	15	10	18	50
Demand D_j	30	30	50	

27. a) Explain in detail about modelling of stewart platform with actuator.

11 K2 CO5

OR

- b) Elaborate the anti-lock braking system ABS with neat sketch.

11 K2 CO5

28. a) (i) Compare NWCR method and Least cost method.

6 K2 CO4

- (ii) With neat sketch explain any one component of Automotive system.

5 K2 CO5

OR

- b) (i) Explain any two optimization techniques in detail.

6 K2 CO4

- (ii) Justify the need for modelling and simulation in automotive system.

5 K2 CO5