

CBCS SCHEME

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18ME71

Seventh Semester B.E. Degree Examination, June/July 2024 Control Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the classification of control systems. (08 Marks)
- b. Enumerate the difference between open loop and closed loop control systems. (06 Marks)
- c. Explain PID controllers with characteristic curves. (06 Marks)

OR

- 2 a. Explain the models of mechanical systems. (06 Marks)
- b. With a neat block diagram, explain the working of automatic electric iron. (06 Marks)
- c. Derive an expression for transfer function of armature controlled DC motor. (08 Marks)

Module-2

- 3 a. Explain the standard test inputs. (08 Marks)
- b. Define order and type of a system. (04 Marks)
- c. The response of a system subjected to a unit step input is $C(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$. Obtain the expression for the closed loop transfer function. Also determine the undamped natural frequency and damping ratio of the system. (08 Marks)

OR

- 4 a. Derive the relation for transient response of a second order system. (10 Marks)
- b. For the control system shown in Fig. Q4 (b), find the percentage overshoot and settling time for a unit step input.

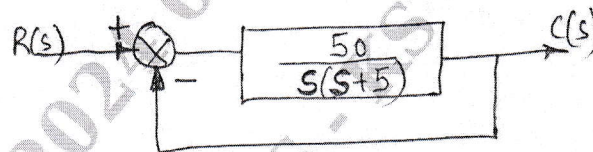


Fig. Q4 (b)

(10 Marks)

Module-3

- 5 a. For the system shown in Fig. Q5 (a), determine closed loop transfer function.

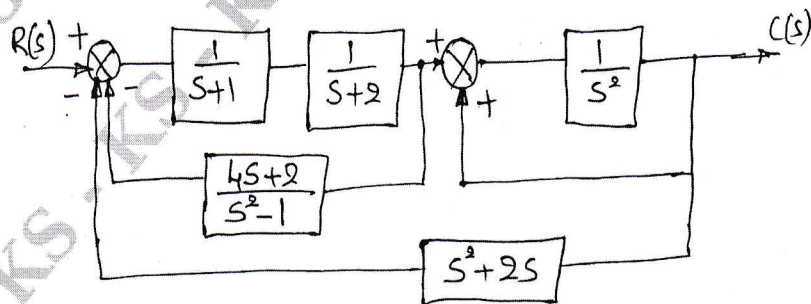


Fig. Q5 (a)

(10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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- b. Find the transfer function for the signal flow graph shown in Fig. Q5 (b), if $G_1 = 5$, $G_2 = G_4 = 10$, $G_3 = 1$, $G_5 = 2$, $H_1 = 1$, $H_2 = 2$, $H_3 = 0.5$ and $H_4 = 1$.

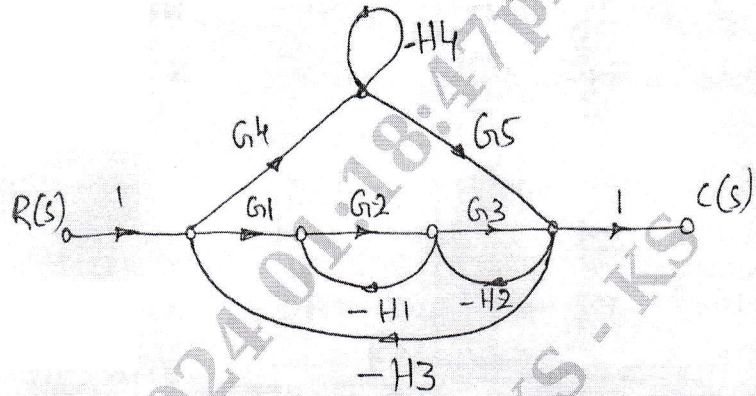


Fig. Q5 (b)

(10 Marks)

OR

- 6 a. Draw the signal flow graph for the given block diagram shown in Fig. Q6 (a) and find its control ratio using Mason's gain formula.

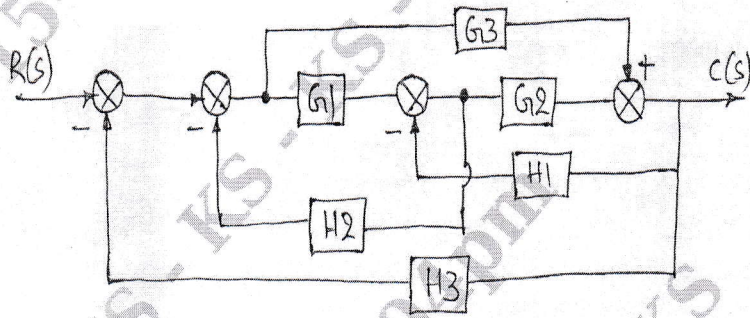


Fig. Q6 (a)

(10 Marks)

- b. Reduce the block diagram shown in Fig. Q6 (b) to its simplest possible form and find its closed loop transfer function.

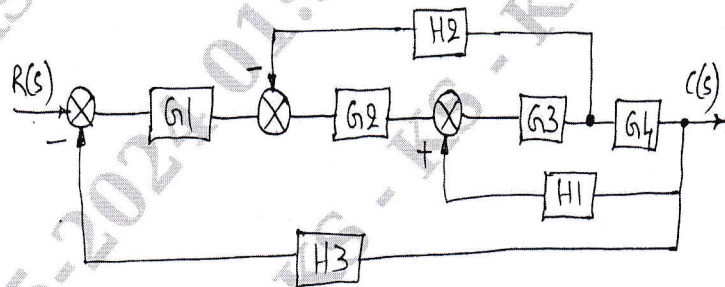


Fig. Q6 (b)

(10 Marks)

Module-4

- 7 a. Comment on the stability of the system for the characteristic equation $s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$, by Routh-Hurwitz criterion. (07 Marks)
- b. By applying RH criterion, discuss the stability of the closed loop system as a function of K for the following open loop transfer function, (07 Marks)

$$G(s)H(s) = \frac{K(s+1)}{s(s-1)(s^2 + 4s + 16)}$$

(07 Marks)

- c. Explain break away point and break in point in root locus. (06 Marks)

OR

- 8 Construct a root locus for the open loop transfer function, $G(s)H(s) = \frac{k(s+2)}{s(s+1)(s+8)}$. (20 Marks)

Module-5

- 9 a. Sketch the Polar plot for the transfer function, $G(s) = \frac{10}{s(s+1)(s+2)}$. (08 Marks)
- b. Using Nyquist criterion, investigate the stability of a system whose open loop transfer function is $G(s)H(s) = \frac{K}{(s+1)(s+2)(s+3)}$. (12 Marks)

OR

- 10 a. Explain gain margin and phase margin with sketches. (04 Marks)
- b. Sketch the Bode plot for the transfer function, $G(s) = \frac{Ks^2}{(1+0.02s)(1+0.2s)}$. Determine the value of K, for the gain cross over frequency to be 5 rad/sec. (16 Marks)

CBCS SCHEME

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18ME72

Seventh Semester B.E. Degree Examination, June/July 2024 Computer Aided Design and Manufacturing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define automation. Explain the reasons for automation in brief. (10 Marks)
- b. An average part produced in a certain batch manufacturing plant must be processed through an average of six machines. 20 new batches are launched each week. Average operation time is 6min, average set up time is 5hr, average non operations time per batch is 10hr / machine and average batch size is 25 parts. There are 18 machines in the plant. The plant operates an average of 70 production hours per week. If the availability is 95%, determine
- Manufacturing lead time for an average part.
 - Production rate
 - Production capacity
 - Plant utilization
 - Work in process
 - WIP ratio
 - TIP ratio. (10 Marks)

OR

- 2 a. What are the symbols used in an automated flow line? (05 Marks)
- b. Sketch and explain the walking beam transfer mechanism. (06 Marks)
- c. The ideal cycle time of a 16 station transfer line is 2min. The average downtime is 6 min and the probability of breakdowns per cycle is equal for all cycles and is equal to 0.004. Determine the production rate and line efficiency using upper and lower bound approach. (09 Marks)

Module-2

- 3 a. Explain the functions of graphic package system. (08 Marks)
- b. List and explain the phases involved in a design process. (08 Marks)
- c. A point (3, 4) has to be translated at a distance of 6 units in x-axis and 2 units in y-axis. Determine the coordinates of the translated point. (04 Marks)

OR

- 4 a. Explain retrieval CAPP system with the help of a neat block diagram. (10 Marks)
- b. Explain the various inputs and outputs of a MRP system. (10 Marks)

Module-3

- 5 a. What is group technology? Enumerate the advantages of GT. (05 Marks)
- b. With a neat block diagram, explain the components of FMS. (10 Marks)
- c. Define AS/RS and explain any two types of AS/RS system. (05 Marks)

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OR

- 6 a. Explain the following:
- Total work content
 - Cycle time
 - Line efficiency.
- (06 Marks)
- b. Define line balancing and list its objectives. (04 Marks)
- c. In a plant, a product is to be assembled as per the following data:

Element	1	2	3	4	5	6	7	8	9	10
Time (min)	6	4	9	3	2	7	5	6	4	7
Precedence	-	1	1	2	2	3	4, 5	3, 5	7, 8	6, 9

- Construct precedence diagram.
- If the cycle time is 12 min, calculate the number of stations required.
- Determine the balance delay and balance efficiency of the line using largest candidate rule. (10 Marks)

Module-4

- 7 a. Explain the elements of CNC system with the help of a block diagram. (10 Marks)
- b. Write a manual part program for multiple turning operation for the component shown in Fig.Q.7(b). (10 Marks)

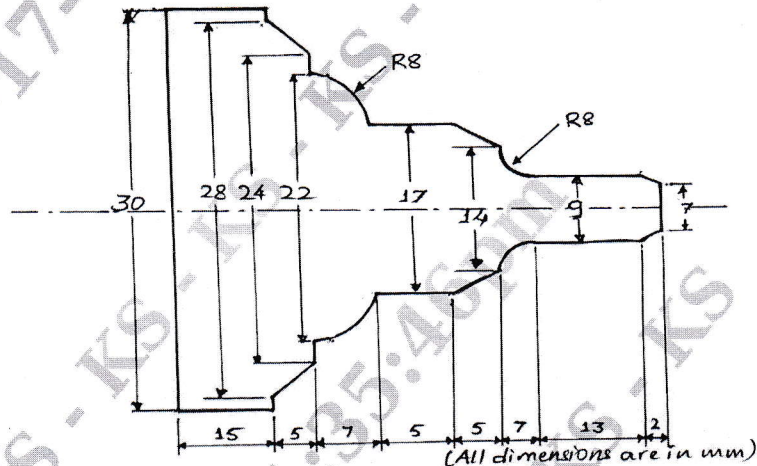


Fig.Q.7(b)

OR

- 8 a. Explain the following with neat diagram:
- Slip sensor
 - Range sensor
 - Tough sensor
 - Proximity sensor
 - Force and torque sensor.
- (10 Marks)
- b. Define robot. Explain the different types of robot joints with neat sketches. (10 Marks)

Module-5

- 9 a. Define additive manufacturing. Explain the steps involved in additive manufacturing process. (10 Marks)
- b. With a neat sketch, explain photo polymerization process. (10 Marks)

OR

- 10 a. List and explain the components of Industry 4.0 in brief. (10 Marks)
- b. Define IOT and explain its applications in manufacturing. (10 Marks)

CBCS SCHEME

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18ME734

Seventh Semester B.E. Degree Examination, June/July 2024 Total Quality Management

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define TQM. Explain how TQM has contributed to the success of Corporate World. (10 Marks)
b. Explain any one contribution of Kaoru Ishikawa towards the development of TQM. (10 Marks)

OR

- 2 a. What is ISO Quality Management System? Explain few of its advantages. (10 Marks)
b. Explain the concept of MBNQA (Malcolm Baldrige National Quality Award) with a neat block diagram. (10 Marks)

Module-2

- 3 a. List and explain various characteristics of TQM Leaders. (10 Marks)
b. Explain the ethics management program used by Corporate World. (10 Marks)

OR

- 4 a. Explain all 7 stages of strategic planning. (10 Marks)
b. Explain with an example that has resulted in a good decision and helped a company to grow remarkably. (10 Marks)

Module-3

- 5 a. What is Customer Satisfaction? What are various customer perception of service quality? (10 Marks)
b. Explain with an example the KANO diagram to translate needs into requirements. (10 Marks)

OR

- 6 a. Explain different stages of Team development. (10 Marks)
b. Explain how performance appraisal can support an organisation for its growth. (10 Marks)

Module-4

- 7 a. Explain Juran's trilogy for improvement of process. (10 Marks)
b. Explain 7 Quality control tools. (10 Marks)

OR

- 8 a. Explain the various cases of declaring a process out of control even though the points are within 2 control limits. (10 Marks)
b. Explain various caused of variation in a process and what charts are used to plot these variations. (10 Marks)

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Module-5

- 9 a. Explain different types of maintenance. (10 Marks)
b. Explain 5 'S' concept of TPM. (10 Marks)

OR

- 10 a. Explain the concept of Quality by design, with a neat block diagram. (10 Marks)
b. Define EMS. Why EMS is important in present context? Explain. (10 Marks)

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