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10ME/PM81

Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Operations Management

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Explain with schematic model the main functions of business organization and role of operations management. (05 Marks)
 b. Distinguish between manufacturing and service organization. (05 Marks)
 c. Classify production systems and explain with examples. (05 Marks)
 d. Define productivity. What are the factors affecting productivity? (05 Marks)

- 2 a. Explain steps in decision making process. (06 Marks)
 b. Jindal steels limited is planning to start a new factory for manufacturing steel utensils. It is considering three location options namely. Bangalore, Shimoga and Bellary. The fixed cost at these locations have been estimated at ₹ 81,50,000, ₹ 73,77,000 and ₹ 79,03,000 respectively. The variable cost at the three locations are estimated at ₹ 500 per unit, ₹ 580 per unit and ₹ 490 per unit respectively. The factory will have an annual production capacity of 10,000 steel utensils and in the initial years it will operate at 75% efficiency. Find the best location option, which has the lowest total cost of production. (06 Marks)
 c. The values of a pay-off table are:

	New Bridge	No New Bridge
A	1	14
B	2	10
C	4	6

Determine the choice to make under maximin and Laplace strategies. (08 Marks)

- 3 a. What is forecasting? List the steps involved in forecasting process. (05 Marks)
 b. List the elements of good forecasting technique. (05 Marks)
 c. A car manufacturing firm finds a relation of sales of car and index of demand for a car. Sales for the past five years are given in the table below. Find the relation between the demand index and sale of car by least square of linear regression. Further make a forecast for the sixth year assuming the index of demand is 210. (10 Marks)

Year	1	2	3	4	5
Sales	110	130	150	160	180
Demand index	100	110	140	150	200

- 4 a. What are the determinants of capacity? (04 Marks)
 b. Explain various factors that influence the location of the plants. (05 Marks)
 c. What is facility layout? Sketch and explain product and process layout. (05 Marks)
 d. ISRO is considering expansion of the existing facility by adding 1 ton capacity of curing furnace for manufacturing solid propellant. Each batch of 1 ton propellant must undergo 30 minutes of furnace time, including loading and unloading operations. Due to power restrictions, furnace is used only 80 percent of time. In a shift of 8 hours the required output is to be 16 tons. If the plant system estimated is 40% of system capacity determine the number of furnaces required. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. What is aggregate planning? Explain the different strategies in aggregate planning. (05 Marks)
- b. State functions of master process schedule. (05 Marks)
- c. A firm has developed the following demand forecast in units for an item which is influenced by seasonal factor.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Forecast Demand	270	220	470	670	450	270	200	370

Suppose the firm estimates that it costs ₹ 150/- per unit to increase the production rate, ₹ 200 per unit to decrease the production rate by changing work force and ₹ 100/- per unit if subcontracted. Compare the cost incurred if both pure strategies are followed. (10 Marks)

- 6 a. Define inventory. Enumerate the various reasons for maintaining inventory. (05 Marks)
- b. Explain briefly ABC classification in inventory control. (05 Marks)
- c. A manufacturing company buys a component from a vendor. The component costs ₹ 2.50 per unit and it takes ₹ 40/- to place an order. Its inventory carrying charge is 18% of the average inventory. The company currently purchases ₹ 25000/- worth of these components:
- What is the EOQ?
 - What is the optimum number of orders per year to minimize the company's cost?
 - What is the total optimal duration between each order?
 - What is the total annual inventory cost including materials? (10 Marks)
- 7 a. Define MRP. What are the main inputs and outputs of MRP? (06 Marks)
- b. Briefly explain:
- MRP – II
 - ERP (06 Marks)
- c. Forecast demand for a firm is 400 units in 4th week and 500 units in 8th week. The firm has on hand inventory of 50 units including safety stocks and scheduled to receive 350 units in week 4 and 500 units in week 8. Estimate further orders to be placed by the firm. (08 Marks)
- 8 a. What is the importance of purchasing and supply chain management in operations management? (08 Marks)
- b. Briefly explain:
- Make or buy decision
 - Vendor development.
 - E procurement
 - Concept of Tenders. (12 Marks)

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10ME/PM82

Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Control Engineering

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

- 1 a. Define: i) System; ii) Controller; iii) Open loop system; iv) Closed loop system; v) Feed back, with examples. (05 Marks)
 - b. With the help of block diagram, explain i) PI ii) PID. (10 Marks)
 - c. List the advantages and disadvantages of i) Proportional controller; ii) Integral controller. (05 Marks)
- 2 a. Write the differential equations governing the mechanical system shown. Also draw F-V and F-C analogous circuits. (14 Marks)

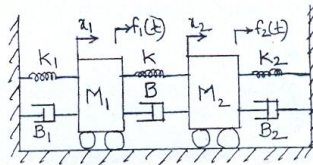


Fig.Q.2(a)

- b. Obtain the transfer function for the given thermal system. (06 Marks)

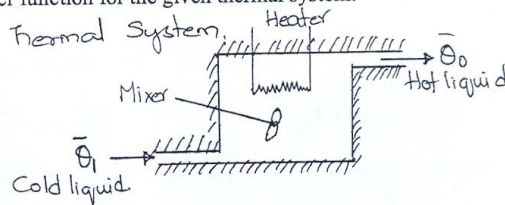


Fig.Q.2(b)

- 3 a. Reduce the block diagram and obtain control ratio $\frac{C(s)}{R(s)}$. (10 Marks)

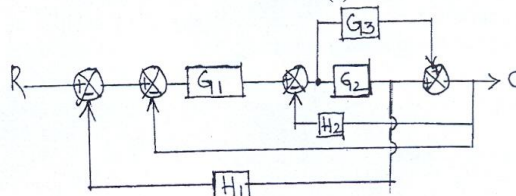


Fig.Q.3(a)

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- b. Obtain the overall TF $\frac{C(s)}{R(s)}$ of the SFG given: (10 Marks)

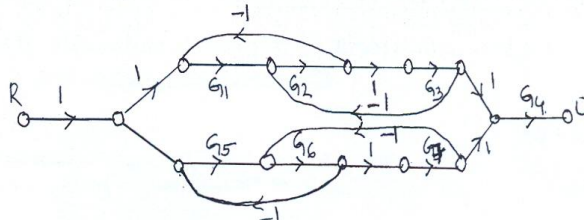


Fig.Q.3(b)

- 4 a. Define: i) Time response; ii) Step signal; iii) Ramp signal; iv) Parabolic signal; v) Impulse signal. (05 Marks)
 b. Derive an expression for response of 1st order system for unit step input. (05 Marks)
 c. A unity feedback CS has an OLTf $G(s) = \frac{10}{s(s+2)}$. Find t_r , $\%M_p$, t_p , t_s for a step input of 12 units. (05 Marks)
 d. Using R-H criterion, determine the stability of the system represented by the characteristic equation $s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$. (05 Marks)

PART - B

- 5 a. Construct a Nyquist plot for a feedback control system whose OLTf is given by $G(s)H(s) = \frac{5}{s(1-s)}$. Comment on the stability of open loop and closed loop system. (14 Marks)
 b. Define with respect to Nyquist plot, i) Gain Margin; ii) Phase Margin; iii) Relative stability. (06 Marks)
 6 Sketch the bode plot for the following TF and determine phase margin and gain margin. (20 Marks)

$$G(s) = \frac{75(1+0.2s)}{s(s^2+16s+100)}$$

 7 Sketch the root locus for UFB system whose open loop TF. (20 Marks)

$$G(s) = \frac{K}{s(s^2+6s+10)}$$

 8 a. Define: i) State; ii) State variables; iii) State space; iv) State trajectory; v) State vector. (05 Marks)
 b. Write a note on: i) Lag compensator; ii) Lead compensator. (10 Marks)
 c. Explain the following terms with examples: i) Controllability; ii) Observability. (05 Marks)
