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10ME81

**Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**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 briefly with a schematic model the functions within business organization and operation management. (08 Marks)  
 b. Define operation management. Explain the classification of production systems. (06 Marks)  
 c. Define productivity. List the various factors affecting productivity. Mention how it can be improved. (06 Marks)
  - 2 a. What is decision making? Explain the frame work for decision making. (06 Marks)  
 b. Briefly explain the characteristics of operation decision. What is Break even analysis? Explain. (08 Marks)  
 c. Jindal steels Ltd. is planning to start a new factory for manufacturing steel utensils. It is considering three location options namely Bengaluru, Shimoga and Bellary. The fixed cost at these locations have been estimated at ₹ 8.15 million, ₹ 7.377 million and 7.903 million respectively. The variable costs 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 10000 units and in the initial year it will operate at 75% efficiency. Find the best location option, which has the lowest total cost of production. (06 Marks)
  - 3 a. What is forecasting? List the steps involved in forecasting process. (04 Marks)  
 b. Explain the moving average and simple exponential smoothing methods of forecasting. (08 Marks)  
 c. The Table below gives a sales record of a firm. Determine the regression line for the firm and find the forecast of sales in the month of January for next year (08 Marks)
- | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 90  | 111 | 99  | 89  | 87  | 84  | 104 | 102 | 95  | 114 | 103 | 113 |
- 4 a. Distinguish between design capacity and system capacity. (04 Marks)  
 b. Explain the various factors that influence the location of plants. (06 Marks)  
 c. What is facility layout? What factors determines the type of layout used in an organization? (05 Marks)  
 d. Sketch and explain any two types of layouts. (05 Marks)

**PART – B**

- 5 a. Briefly explain the following with the help of a flow chart:  
 (i) Aggregate planning. (ii) Master scheduling (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
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- b. A company produces mini computers that have a seasoned demand patterns. The available production capacity during regular time and overtime, as well as cost data are shown in the table below:

Period	Available capacity units			Demand Forecast units
	RT	OT	SC	
1	60	18	1000	100
2	50	15	1000	50
3	60	18	1000	70
4	65	20	1000	80

Initial inventory = 20

Final inventory = 25

Total cost/unit (Regular time) = ₹ 100/-

Overtime cost/unit = ₹ 125 /-

Sub contract cost/unit = ₹ 130/-

Carrying cost unit/period = ₹ 2

Using transportation.

(12 Marks)

- 6 a. What you mean by inventory? What are the types of inventory? (04 Marks)
- b. Define ABC analysis, EOQ and ordering cycle. (06 Marks)
- c. Calculate the economics lot size with uniform date of demand and instantaneous replacement. Give total costs and total annual costs. (06 Marks)
- d. An industry estimates that it will sell 12000 units of its product for the next year. The ordering cost is ₹ 100 per order and the carrying cost per unit per year is 20% of the purchase price per unit. The purchase price per unit is ₹ 50. Find (i) EOQ (ii) Number of orders per year (iii) Time between successive orders. (04 Marks)
- 7 a. Define MRP and with a block diagram, explain the various inputs to an MRP system. (10 Marks)
- b. What is ERP? Write the benefits and limitations of MRP. (05 Marks)
- c. A work centre operates 6 days a week on a two shifts per day basis (8 hours per shift). It has four machines with the same capacity. If the machines are utilized 75% of the time at a system efficiency of 90%, what is the rated output in standard hours per week? (05 Marks)
- 8 a. Why has purchasing and supply chain management assumed to be importance in today's organizations? (08 Marks)
- b. Briefly explain the following: (08 Marks)
- Vendor development
  - E-procurement.
  - Concept of tenders.
  - Make or buy decision.
- c. Define vendor rating. Explain the steps involved in the vendor rating. (04 Marks)

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10ME82

**Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018**

**Control Engineering**

Time: 3 hrs.

Max. Marks:100

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

**PART - A**

- 1 a. Explain regulator and follow-up closed loop control system with examples. (08 Marks)
- b. What are the requirements of an ideal control system? (04 Marks)
- c. Explain Proportional controller and Integral controller with block diagrams. (08 Marks)
- 2 a. Obtain differential equations for the mechanical system shown in the Fig.Q2(a). Also draw equivalent force-voltage and force-current circuits using analogues quantities.

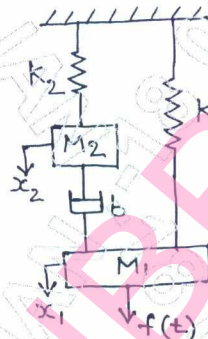


Fig.Q2(a)

(10 Marks)

- b. Fig.Q2(b) shows liquid level system in which  $q_i$  is inflow rate,  $q_o$  is out flow rate,  $R$  is hydraulic resistance,  $C$  is hydraulic capacitance and  $h$  is head of liquid. Obtain transfer function  $\frac{Q_o(s)}{Q_i(s)}$ .

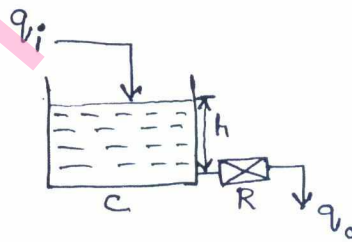


Fig.Q2(b)

(06 Marks)

- c. Obtain differential equation for RLC circuit. (04 Marks)
- 3 a. Obtain closed loop transfer function of the block diagram shown in Fig.Q3(a) using block diagram reduction techniques.

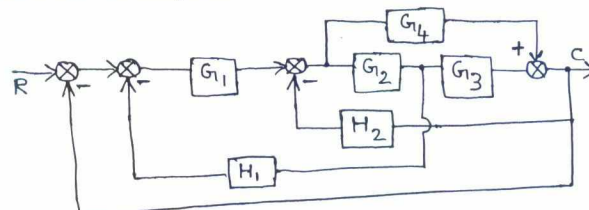


Fig.Q3(a)

(10 Marks)

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- b. Draw signal flow graph for the system shown in Fig.Q3(b) and find  $\frac{C}{R}$  using Mason's gain formula.

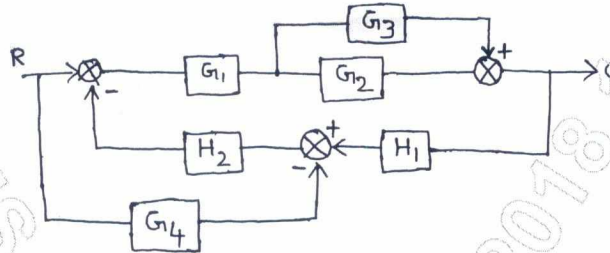


Fig.Q3(b)

(10 Marks)

- 4 a. Obtain response equation for a first order mechanical system subjected to unit step input. (08 Marks)
- b. Define the following terms:
- i) Rise time
  - ii) Delay time
  - iii) Settling time
  - iv) Maximum overshoot
- c. Using RH criteria determine the stability of a system whose characteristic equation is given by  $s^5 + 4s^4 + 3s^3 + 12s^2 + 5s + 20 = 0$ . (08 Marks)

**PART - B**

- 5 Plot the Nyquist diagram for the open loop transfer function  $G(s)H(s) = \frac{12}{s(s+1)(s+2)}$  and determine the nature of stability. (20 Marks)
- 6 The open loop transfer function of a certain unity feedback system is  $G(s) = \frac{K}{s(s+2)(s+20)}$ , construct Bode plots and determine:
- i) Limiting value of K for system to be stable.
  - ii) Value of K for gain margin to be 10 db.
  - iii) Value of K for phase margin to be  $50^\circ$ .
- (20 Marks)
- 7 a. Sketch Root Locus plot for the unity feedback system whose open loop transfer function is given by  $G(s) = \frac{K(s+1)}{s^2}$ . Discuss on stability of system. (14 Marks)
- b. Explain the effect of addition of poles and zero's to the system. (06 Marks)
- 8 a. A system is represented by a differential equation  $\ddot{y} + 6\dot{y} + 12y = 4U$ , where y is the output and U is the input of the system. Obtain state space equation. (06 Marks)
- b. Find controllability and observability of the system shown in Fig.Q8(b) using Kalman test.

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -6 & 2 & -4 \\ -18 & 3 & -8 \\ -6 & 1 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 3 \\ 1 \end{bmatrix} u(t)$$

Fig.Q8(b)

(06 Marks)

- c. Write notes on:
- i) Lag compensator
  - ii) Lead compensator.

(08 Marks)

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10ME833

**Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**Power Plant Engineering**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Explain Spreader Stoker with a neat sketch. (06 Marks)  
b. Draw the general layout the thermal power plant and explain the various circuits. (10 Marks)  
c. Discuss the advantages and disadvantages of pulverised coal. (04 Marks)
  
- 2 a. Explain Pneumatic ash handling system with a neat sketch. (06 Marks)  
b. What is circulation ratio? Explain forced circulation with a neat sketch. (06 Marks)  
c. Explain Velox Boiler, with a neat sketch. (08 Marks)
  
- 3 a. What do you understand by the term Draught? Classify different types of draughts. Explain with a neat sketch the balanced draught. (08 Marks)  
b. Determine the height of chimney to get net draught of 12mm, if the total draft losses are 4mm. The temperature of air is 25°C and the temperature of chimney gases is 300°C. The mass of air used per Kg of fuel used is 18kg. One Kg of air occupies a volume of 0.7734m<sup>3</sup> at NTP. (06 Marks)  
c. Write a note on superheaters and Economisers. (06 Marks)
  
- 4 a. Draw the general layout of diesel power plant and explain the working of different systems in brief. (10 Marks)  
b. Explain the importance of cooling system in diesel power plant. (05 Marks)  
c. Explain the working principle of closed cycle gas turbine with a neat sketch. (05 Marks)

**PART – B**

- 5 a. Write a note on :  
i) Pumped storage power plants  
ii) Surge Tanks. (08 Marks)
  
- b. The run of data of a river at a particular site is tabulated below :

Month	J	F	M	A	M	J	J	A	S	O	N	D
Discharge	45	30	20	15	0	50	75	100	110	70	60	40

Discharge in millions of CU-m : month = 30 days,

- i) Draw hydrograph and flow duration curve
- ii) If the head available is 80m and overall efficiency of generation is 85%. Find the power in MW available at mean flow of water. (12 Marks)

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- 6 a. Explain the principle of release of nuclear energy fusion and fission reactions. (06 Marks)  
b. Explain sodium – Graphite Nuclear reactor with a neat sketch. (08 Marks)  
c. Write short notes on radiation hazards and disposal of radioactive wastes. (06 Marks)
- 7 a. Define :  
i) Demand factor  
ii) Load factor  
iii) Diversity factor  
iv) Utilization factor  
v) Capacity factor  
vi) Use factor. (12 Marks)  
b. Explain performance and operating characteristics of power plants. (08 Marks)
- 8 Write a short notes on :  
a. Cyclone furnace  
b. Cooling Towers and Ponds  
c. Hydrographs and Mass curve  
d. Multiplication and Thermal Utilization factors. (20 Marks)

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10ME844

**Eighth Semester B.E. Degree Examination, Dec.2017/Jan.2018**  
**Automotive Engineering**

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART – A**

- 1 a. Draw the valve time diagram for a 4 – stroke Spark Ignition (SI) engine and explain. (06 Marks)  
b. Why cooling is necessary for I.C engines? Explain thermo siphon cooling with neat sketch. (07 Marks)  
c. What is Swirl? Explain the different methods of Swirl generation. (07 Marks)
- 2 a. With neat sketch, explain the normal and abnormal combustion in SI engines. (06 Marks)  
b. What are the main functions of carburetor? With neat sketch, explain Zenith carburetor. (07 Marks)  
c. What do you mean by Cetane and Octane numbers? (04 Marks)  
d. Explain briefly the alternate fuels for IC engines. (03 Marks)
- 3 a. Distinguish between Supercharging and Turbocharging. (06 Marks)  
b. With neat sketch, explain any one type of supercharger. (07 Marks)  
c. With neat sketch, explain the construction and operation of Turbocharger. (07 Marks)
- 4 a. Name the different types of Ignition systems. With neat sketch, explain Battery Ignition system. (08 Marks)  
b. With neat circuit diagram, explain the principles of Electronic Ignition system. (07 Marks)  
c. What do you mean by Ignition advance? List and explain any two factors affecting ignition advance. (05 Marks)

**PART – B**

- 5 a. Explain the working principle of Automatic transmission. (06 Marks)  
b. With the neat sketch, explain the working of constant mesh gear box. (06 Marks)  
c. With neat sketch, explain the working principle of Single plate and Multi plate clutches. (08 Marks)
- 6 a. Write a short note on Propeller shaft. (04 Marks)  
b. With neat sketches, explain the Hotchkiss and Torque tube drives. (10 Marks)  
c. Explain briefly the working of Power steering. (06 Marks)
- 7 a. What are the requirements of suspension system? With neat sketch, explain the working of leaf spring. (07 Marks)  
b. Differentiate between disc brakes and drum brakes. (06 Marks)  
c. Explain the purpose and operation of Antilock braking system. (07 Marks)
- 8 a. With the relevant sketch, explain the working of Exhaust Gas Recirculation [EGR]. (07 Marks)  
b. Write short notes on Euro – II and Euro – III norms. (05 Marks)  
c. Write short notes on :  
i) Catalytic converter ii) Controlling crank case emissions. (08 Marks)

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