Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Operations Management

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Define Operations Management. Explain in brief the functions of operations management. **(08 Marks)**

    b.   Define productivity. Explain the factors affecting productivity.   **(06 Marks)**

    c.   State the classification of production system. Explain any one production system with example. **(06 Marks)**

2   a.   What is decision making? What are the steps involved in decision making? **(06 Marks)**

    b.   Explain decision making environment. **(06 Marks)**

    c.   A private owned summer camp for youngsters has the following operating data for a 12-week session:

Charge per camper = $120 per week

Variable cost per camper = $80 per week

Fixed cost = $ 48,000 per session

Capacity = 150 campers.

     i)   What is the total number of campers that will allow the camp to just break even?

     ii)   What is the profit for the 12-week session if the camp operates at 80% capacity?

(08 Marks)

3   a.   What is forecasting? State the benefits and costs associated with forecasting. **(06 Marks)**

    b.   Briefly explain the components of time series method. **(04 Marks)**

    c.   The following table gives the annual shipment (tons) of welded tube by an aluminium producer to machinery manufactures.

Year	2004	05	06	07	08	09	10	11	12	13	14
Shipment (tons)	2	3	6	10	8	7	12	14	14	18	19

Use 3 years moving average method to find the forecasted demand for the year 2015. Compare the forecasted demand with the estimate made using least square method.

(10 Marks)

4   a.   Define capacity planning. Explain long term and short term capacity strategies. **(06 Marks)**

    b.   Explain various factors that influence the location of the plants. **(06 Marks)**

    c.   An automobile spares manufacturer has a plan of buying a moulding machine which can manufacture 17000 parts/year. The moulding machine is a part of product line and its efficiency is 85%.

     i)   What is the required system capacity?

     ii)   Assume that 100 seconds time is required to produce each part and plant operates at 2000 Hrs/year. If the proposed moulding machines are used for 60% of the time and at 90% efficiency. What is the output of moulding machines/hour?

     iii)   How many moulding machines would be required? **(08 Marks)**

PART – B

5 a. List the common strategies used in aggregate planning. Explain any two. (06 Marks)
  b. State the functions of master production scheduling. (04 Marks)
  c. Fortune furniture's operates with a constant work force with which 3000 dining tables can be produced. The yearly demand is 12,000 units and is dispersed seasonally with quarterly indices $Q_1 = 0.80$, $Q_2 = 1.40$, $Q_3 = 1.00$ and $Q_4 = 0.80$. Inventories are accumulated when demand is less than capacity and are used up during periods of high demand. To satisfy the total demand i) How many tables must be accumulated each quarter? ii) What inventory must be on hand at the beginning of first quarter? (10 Marks)

6 a. Derive an equation for Economic Order Quantity (EOQ). (05 Marks)
  b. Explain briefly ABC classification in inventory control. (05 Marks)
  c. Factory Built Homes, Inc (FBH) purchases paneling components from nearby western New York mill for $5 per unit. It expects to use about 4,000 units during the coming year. FBH estimates that it costs $30 to place an order and $1.50 per unit-year for carrying and storage costs. The mill can provide FBH with immediate delivery of any reasonable quantity.
   i) What is the most economic quantity for FBH to order?
   ii) How many orders should be placed per year?
   iii) What is the total yearly cost associated with ordering, carrying and purchasing the EOQ amount? (10 Marks)

7 a. Define MRP. What are the main inputs and outputs of MRP? (06 Marks)
  b. State the benefits and limitations of MRP. (06 Marks)
  c. Complete the MRP for item X shown below. Note that this item has an independent demand that necessitates that a safety stock of 40 units be maintained.

Order quantity = 70	WEAK											
Lead time = 4 weeks Safety stock = 40	1	2	3	4	5	6	7	8	9	10	11	12
Projected requirements	20	20	25	20	20	25	20	20	30	25	25	25
Receipts		70										
On hand at the end of period 65												
Planned order release												

(08 Marks)

8 a. State the importance of purchasing and supply management. (06 Marks)
  b. Write a note on make or buy decision. (06 Marks)
  c. Explain stages of vendor development. (08 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Explain briefly the requirements of a control system.   **(04 Marks)**
    b. Explain the types of feedback control systems with examples.   **(10 Marks)**
    c. Identify and explain the salient features of a controller that corrects the error to zero.
                                                                                (06 Marks)

2 a. Derive the transfer function for the hydraulic system shown in Fig. Q2 (a).   **(10 Marks)**

Fig. Q2 (a)

    b. Derive the transfer function for the circuit shown in Fig. Q2 (b).   **(10 Marks)**

Fig. Q2 (b)

3 a. Determine $\dfrac{C(s)}{R(s)}$ for the block diagram, shown in Fig. Q3 (a) by using block diagram reduction rules?   **(08 Marks)**

Fig. Q3 (a)

    b. Determine $\dfrac{C(s)}{R(s)}$ for the signal flow graph shown in Fig. Q3 (b), using Mason's Gain formula.   **(12 Marks)**

Fig. Q3 (b)

4 a. Determine the expression for the response of the system shown in Fig. Q4 (a) to a ramp input $\theta_i = Kt$. Assume a critically damped system initially at rest. Sketch input versus time and output versus time curves. (10 Marks)
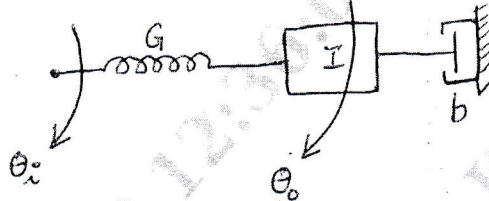

Fig. Q4 (a)

b. Determine the number of roots in left half plane, right half plane and on the imaginary axis for the characteristic equation $s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$ by Routh-Hurwitz criterion. (10 Marks)

PART – B

5 a. Explain Gain margin and phase margin using a polar plot. (05 Marks)

b. Plot Nyquist diagram and ascertain the stability of the control system for the given open loop transfer function $G(s)H(s) = \dfrac{100}{s^3 + 8s^2 + 25s + 26}$. (15 Marks)

6 Draw Bode asymptotic attenuation and phase angle diagrams for a system with the open loop transfer function, $G(s)H(s) = \dfrac{25(s + 2)}{s^2 + 10.5s + 5}$ and establish the nature of stability. (20 Marks)

7 For the control system shown in Fig. Q7, draw the Root Locus diagram and comment on the nature of stability of the system. (20 Marks)
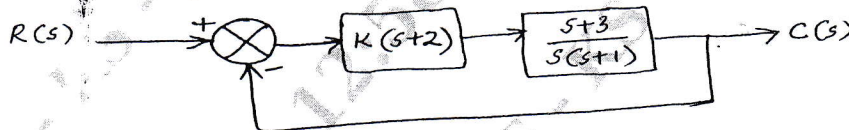
Fig. Q7

8 a. Explain the different types of feedback compensation with neat block diagrams. (06 Marks)

b. Determine the controllability property of control system with state equation,

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u(t)$$

by (i) Kalman's test
(ii) Gilbert's test. (14 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Tribology

Time: 3 hrs.   Max. Marks:100

*Note: 1. **Answer any FIVE full questions, selecting***
atleast TWO questions from each part.
2. Use of design data handbook is permitted.

PART – A

1 a. Define Viscosity and explain its meaning through the flow between two parallel surfaces.
                 (05 Marks)
   b. Explain the effect of temperature and pressure on viscosity.   **(05 Marks)**
   c. State the assumptions and derive Hagen – Poisulle's law for the flow through capillary tube.
                 (10 Marks)

2 a. Indicating the assumptions, derive the Petroff's equation and the expression for co-efficient of friction for a lightly loaded journal bearing.   **(10 Marks)**
   b. A lightly loaded journal bearing is to support a radial load of 2kN. The diameter of the shaft is 50mm and length of the bearing is 60mm. The oil used is SAE 30 at 65^0C. Find the co-efficient of friction and power loss in the bearing , if the speed of the journal is 750 rpm and the diametral clearance ratio is 0.001.   **(10 Marks)**

3 Derive the Reynold's equation in 2D and state the assumptions made.   **(20 Marks)**

4 a. Derive the expression for the load carrying capacity of a plane – slider bearing with fixed shoe.   **(10 Marks)**
   b. A slider bearing with a rectangular pivoted shoe has the following specifications :
   Length of the shoe in the direction of motion = 75mm ; Width of the shoe = 112.5mm ;
   Velocity of the moving member = 2 m/s ; Expected oil temperature = 70^0C ;
   Lubricating oil used = SAE40 ; Permissible min. oil film thickness = 0.0225mm.
   Assuming the condition of bearing surface corresponding to max. load carrying capacity and considering end leakage, determine i) Load carrying capacity   ii)   Power loss
   iii) Co-efficient of friction.   **(10 Marks)**

PART – B

5 a. Write a note on thermal equilibrium of journal bearing.   **(10 Marks)**
   b. A full journal bearing with circumferential oil groove is lubricated under pressure and has the following specifications :
   Journal diameter = 62.5mm ; Total length of bearing = 125mm   Width of circumferential groove = 6.25mm ; Diametral clearance = 0.0875mm ; Effective oil temp. = 100^0C   ;
   Lubricating oil = SAE20   ;   Minimum oil film thickness = 0.004375 mm. Determine what inlet pressure required , if in order to control the bearing temperature the rate of oil flow through the bearing is to be 4925 mm^3/s.   **(10 Marks)**

6 a. Derive an expression for the load carrying capacity of a hydrostatic step bearing. **(10 Marks)**

     b. A hydrostatic circular thrust bearing has the following data :
Shaft diameter = 300 mm ; Diameter of pocket = 200 mm ; Shaft speed = 100 rpm ; Pressure at the pocket = 500 kN/m² ; Film thickness = 0.07mm ; Viscosity of the lubricant = 0.05 Pa.S. Determine   i) Load carrying capacity   ii) Oil flow rate   iii) Power loss due to friction. **(10 Marks)**

7 a. Explain important properties of a bearing material. **(10 Marks)**

     b. Explain the following types of wear with simple sketches :
    i) Adhesive wear   ii) Abrasive wear   iii) Erosive wear   iv) Corrosive wear. **(10 Marks)**

8 a. Briefly discuss behaviour of tribological components. **(10 Marks)**

     b. Briefly explain :
    i) Improved design   ii) Surface Engineering. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Automotive Engineering

Time: 3 hrs.   Max. Marks:100

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

PART – A

1. a. Explain various methods of cylinder arrangements used in multi cylinder engine. **(10 Marks)**
   b. What is the necessity of cooling the valve? Explain with a neat sketch, the sodium cooled valve. **(10 Marks)**

2. a. Explain with a neat sketches, normal and abnormal combustion. **(05 Marks)**
   b. What are the main functions of a carburetor? Explain carter carburetor. **(10 Marks)**
   c. Sketch and explain AC mechanical pump. **(05 Marks)**

3. a. Explain the following with neat sketches:
      i) Root's supercharger
      ii) Vane type supercharger. **(10 Marks)**
   b. What is turbolag? Explain the principle of working of turbocharger. **(10 Marks)**

4. a. Explain with a neat sketch, working of a battery ignition system. **(08 Marks)**
   b. Explain the working of:
      i) Rotating armature type
      ii) Rotating magneto ignition system. **(12 Marks)**

PART – B

5. a. What are the requirements of clutch? **(04 Marks)**
   b. With sketch explain the working of single plate clutch. **(08 Marks)**
   c. With a neat sketch, explain the working of synchromesh gear box. **(08 Marks)**

6. a. Explain the working of Hotch kiss drive with a neat sketch. **(08 Marks)**
   b. Explain the effect of following on steering; i) Camber   ii) King pin angle   iii) Caster. **(06 Marks)**
   c. Explain the working of power steering. **(06 Marks)**

7. a. Explain the schematic diagram the air suspension system. Mention its advantages and disadvantages. **(12 Marks)**
   b. Explain with diagram, the working of hydraulic braking system. **(08 Marks)**

8. a. Briefly explain crankcase emission controlling. **(04 Marks)**
   b. Explain with diagram the exhaust gas circulation system (EGR). **(10 Marks)**
   c. Write a note on emission standards. **(06 Marks)**

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