Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Operations Management

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. Define Operations Management and how the production systems are classified. **(06 Marks)**
   b. What are the various functions of operations management? **(06 Marks)**
   c. Define productivity. List the various factors affecting productivity. **(08 Marks)**

2 a. Briefly explain the importance of decision making and list the steps involved in it. **(06 Marks)**
   b. What is Break Even Analysis? Explain with the help of a chart? **(06 Marks)**
   c. A spring washer manufacturing industry has the following data on costs at two volumes of production for spring washer which sells at Rs 6/- per unit.

Cost particulars	3000 units	7000 units
Materials cost (Rs)	4000/-	9000/-
Labour cost (Rs)	3000/-	8000/-
Overhead charges (Rs)	1000/-	6000/-
Depreciation costs (Rs)	10,000/-	10,000/-
Total costs in (Rs)	Rs. 18000/-	Rs. 33000/-

   i) Find the fixed cost and variable cost
   ii) Find the BEP graphically and verify the results analytically. **(08 Marks)**

3 a. Define forecasting. What are the steps involved in forecasting process? **(06 Marks)**
   b. List the various factors affecting forecasting. **(04 Marks)**
   c. A company adopts method of least squares to develop a linear trend equation for the data as shown in the table below :

Year (x)	1	2	3	4	5	6	7	8	9	10	11
Shipment in tones (y)	2	3	6	10	8	7	12	14	14	18	19

Calculate the trend forecast for the year 12 and 20. **(10 Marks)**

4 a. Define the following :
   i) Design capacity
   ii) System capacity
   iii) Capacity planning. **(06 Marks)**
   b. List the various factors to be considered during plant location. **(05 Marks)**
   c. A automobile manufacturers must acquire some moulding machines capable of producing 160,000 good parts per year. They will be installed in a production line that normally produces 20% rejects because of tight specifications.
   i) What is the required systems capacity?
   ii) If it takes 90 seconds to mould each part and the plant operates for 2000 hours per year and if the moulding machines are used only 50% of the time and are 90% efficient, what actual moulding machines output per hour would be achieved?
   iii) How many moulding machines would be required? **(09 Marks)**

PART – B

5 a. What is aggregate planning? Briefly explain pure strategies of aggregate planning. **(08 Marks)**

b. A firm has developed the following demand forecast in units for a item which is influenced by seasonal factors. Suppose the firm estimates that it costs Rs. 150/unit to increase production rate, Rs. 200/unit to decrease production rate, Rs. 50/unit/month to carry the inventory and Rs. 100/unit if subcontracted. Compare the costs incurred if pure strategies are followed :

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

(12 Marks)

6 a. Define inventory. What are the objectives of inventory control? **(06 Marks)**

b. Briefly explain the reasons for holding inventories. **(06 Marks)**

c. Write short notes on the following :
   i) Economic Order Quantity (EOQ)
   ii) ABC Analysis for inventory control. **(08 Marks)**

7 a. What is a Materials Requirement Planning? What are the various steps involved in the implementation of MRP? **(08 Marks)**

b. What are the benefits and limitations of MRP? **(06 Marks)**

c. Briefly explain :
   i) Capacity Requirement Planning [CRP]
   ii) Manufactures Resources Planning [MRP-II] **(06 Marks)**

8 a. What is Supply Chain Management? What are its functions? **(06 Marks)**

b. Briefly explain Make or Buy decision. **(06 Marks)**

c. Write short notes on :
   i) Vendor development
   ii) E – Procurement. **(08 Marks)**

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Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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 the concepts of openloop and closed loop control systems with two examples for each. **(10 Marks)**
   b. What are the requirements of an ideal control systems? **(04 Marks)**
   c. Explain the proportional Integral and Differential (PID) controller. **(06 Marks)**

2 a. Obtain the differential equations for the mechanical system shown in Fig.Q2 (a) and obtain the analogous electrical circuit based on the force voltage analogy. **(12 Marks)**
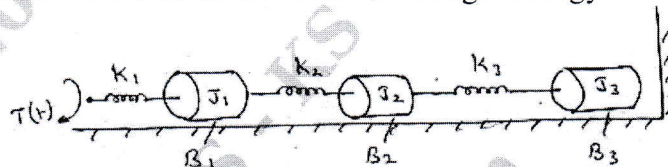

Fig. Q2 (a)

   b. A thermometer is dipped in a vessel containing liquid at a constant temperature θ_i. The thermometer has a thermal capacitance for storing heat as C and thermal resistance to heat flow as R. If the temperature indicated by the thermometer is θ_o, obtain the transfer function of the system. **(08 Marks)**

3 a. Reduce the block diagram, shown in Fig. Q3 (a) and determine its transfer function. **(10 Marks)**
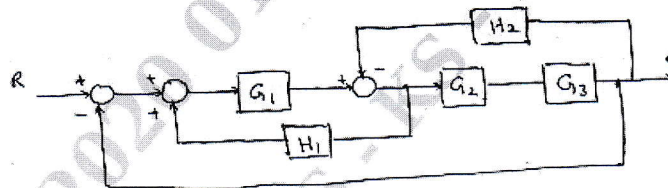

Fig. Q3 (a)

   b. Find $\dfrac{C(s)}{R(s)}$ by Mason's gain formula for the system shown in Fig. Q3 (b). **(10 Marks)**
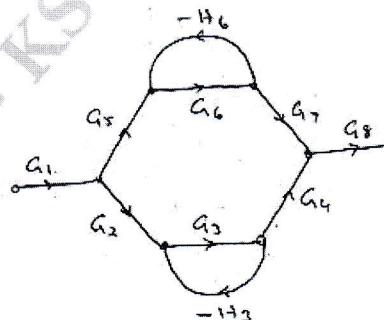

Fig. Q3 (b)

4 a. Derive an expression for the response of a first order system subjected to a unit step input.
(04 Marks)

b. When the system shown in Fig. Q4 (a) is subjected to a unit step input, its response is as shown in Fig. Q4 (b). Determine the values of K and T from the response curve. (08 Marks)
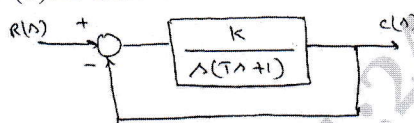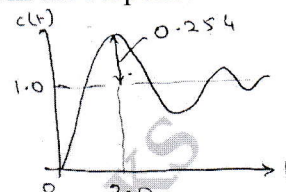

Fig. Q4 (a)

Fig. Q4 (b)

c. By applying Routh's criterion, discuss the stability of the closed loop system whose characteristic equation is $s^6 + 3s^5 + 5s^4 + 9s^3 + 8s^2 + 6s + 4 = 0$. (08 Marks)

PART – B

5 a. Sketch the polar plot for $G(s)H(s) = \dfrac{1}{(1+5s)(1+10s)}$. (05 Marks)

b. Sketch the Nyquist plot for a system whose open loop transfer function is,
$G(s)H(s) = \dfrac{K}{s(s+2)(s+10)}$. Determine the range of K for which the system is stable.
(15 Marks)

6 A unity feedback system has $G(s) = \dfrac{K}{s(s+4)(s+10)}$. Sketch the Bode plot and find the value of K for which the system is marginally stable. (20 Marks)

7 Sketch the root locus for the system $G(s)H(s) = \dfrac{K}{s(s+4)(s^2+4s+20)}$. Discuss the stability of the system. (20 Marks)

8 a. Explain the need for system compensation. List the types of compensator used. (05 Marks)
b. Explain : (i) Lead compensator   (ii) Lag compensator
(iii) Lag-Lead compensator. (15 Marks)

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Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Tribology

Time: 3 hrs.   Max. Marks:100

Note:1. *Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. *Design Data handbooks are allowed.*

PART - A

1   a. Derive an expression for the velocity of oil flow between two fixed parallel plates. **(10 Marks)**
    b. Explain with neat sketches : i) Michell or workshop viscometer   ii) Saybolt universal viscometer. **(10 Marks)**

2   a. With suitable neat sketches, explain the Mechanism of pressure development in an oil film. **(10 Marks)**
    b. A lightly loaded full journal bearing has the following specifications :
        Journal diameter = 100 mm , Bearing length = 80mm , radial clearance = 0.05mm , Radial load = 1kN and Absolute viscosity of oil = 0.015 Pa-S. Using Petroff's equations, find   i)   Speed of Journal which corresponds to a coefficient of friction of 0.4 and ii) Power loss at this speed. **(10 Marks)**

3   Derive the Reynold's equation in Two dimensions. Also state the assumptions. **(20 Marks)**

4   a. Derive an expression for load carrying capacity of an idealized plane – slider bearing with fixed shoe. **(10 Marks)**
    b. A Rectangular plane slider bearing with a fixed shoe has the following specifications :
        Length of bearing = 80mm , Width of bearing = 60mm , Slider velocity = 2m/s , Viscosity of lubricant = 0.1 Pa – S , Minimum film thickness = 0.02mm and Maximum film thickness = 0.06mm. Calculate i) Load carrying capacity   ii) Co-efficient of friction and iii) Power loss. **(10 Marks)**

PART - B

5   a. Write a note on Thermal Equilibrium of Journal bearing. **(06 Marks)**
    b. A Journal bearing operating under steady state condition has the following specifications :
        Diameter of Journal = 100mm , Length of bearing = 105mm , Radial clearance = 0.075mm , Load = 27.3 kN , Journal speed = 1600 rpm , Expected mean oil film temperature = 99^0C and Minimum film thickness must not be less than 0.015mm. The bearing is lubricated under pressure with inlet oil temperature of 44^0C. Determine   i) Required viscosity of lubricating oil   ii) Power loss   iii) Inlet oil pressure required for cooling the bearing and   iv) Corresponding rate of flow. **(14 Marks)**

6   a. Derive an expression for rate of flow of oil through a Hydrostatic bearing. **(10 Marks)**
    b. A Hydrostatic step bearing has the following characteristics : Shaft diameter = 100 mm , Diameter of pocket = 50mm , Vertical thrust on bearing = 18.16 kN ,
        External pressure = 1.031 MPa , Shaft speed = 60 rpm , Desirable oil film thickness = 0.1mm and viscosity of lubricant = 80 Cp. Determine   i) Required inlet pressure   ii) Rate of oil flow through bearing   iii) Power loss due to viscous friction and iv) Co-efficient of friction under operating conditions. **(10 Marks)**

7   a. Explain briefly any five Properties of bearing materials.   **(10 Marks)**
    b. Explain briefly commonly used bearing materials (any five).   **(10 Marks)**

8   Write short notes on :
    a. Selection of bearings.
    b. Surface Engineering.
    c. Adhesive wear.
    d. Wear of Ceramic materials.   **(20 Marks)**

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Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Automotive Engineering

Time: 3 hrs.   Max. Marks:100

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

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PART – A

1 a. What are the methods of engine cooling? Explain with a neat labeled sketch the thermo syphon coding system. **(08 Marks)**
   b. What is the function of cylinder liner? State advantages of using alluminium as cylinder liner. **(08 Marks)**
   c. Explain the splash lubrication with a neat sketch. **(04 Marks)**

2 a. Explain the construction and working principle of a zenith carburetor with neat sketch. **(10 Marks)**
   b. Explain the working principle mechanical fuel pump with neat sketch. **(06 Marks)**
   c. Explain briefly (i) Octane number   (ii) Cetane number **(04 Marks)**

3 a. What are the objectives of super charging? Explain with neat sketch working principle of vane blower. **(10 Marks)**
   b. Write the comparison between turbo charging and mechanical super charging. **(06 Marks)**
   c. Explain briefly : (i) Inter cooler   (ii) Turbo charger lag. **(04 Marks)**

4 a. Explain the construction and working principle of battery ignition system with neat circuit diagram. **(10 Marks)**
   b. Write the difference between battery and magneto coil ignition system. **(05 Marks)**
   c. With sketch explain the working principle of vacuum advance. **(05 Marks)**

PART – B

5 a. Explain with diagram the working principle of centrifugal clutch. **(08 Marks)**
   b. Explain with neat sketch working principle of fluid coupling. **(08 Marks)**
   c. What are the functions of transmission? **(04 Marks)**

6 a. With a neat sketch, explain the working of Hotch Kiss Drive. **(08 Marks)**
   b. Define the following terms : (i) Camber   (ii) Castor   (iii) King pin inclination
      (iv) Toe In and Toe Out. **(08 Marks)**
   c. What are the functions of differential? **(04 Marks)**

7 a. With neat sketch, explain the working principle of Air Suspension system. **(08 Marks)**
   b. What are the advantages and disadvantages of Hydraulic braking system. **(08 Marks)**
   c. Differentiate between Drum and Disc brakes. **(04 Marks)**

8 a. Explain the working principle of exhaust gas re-circulation (EGR) system with neat sketch. **(08 Marks)**
   b. Explain the controlling of crank case emission with a sketch. **(08 Marks)**
   c. What is catalytic convertor? How they are helpful in reducing exhaust gas emission? **(04 Marks)**

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