VIII . ME .CV   S

USN | | | | | | | | | | **10ME/PM81**

Eighth Semester B.E. Degree Examination, June/July 2016
Operations Management

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Define operation management. Draw the operations management system showing input and output model for an international airport. **(06 Marks)**
   b. Briefly explain how service producers differ from goods producers in important aspects of their operations. **(06 Marks)**
   c. With neat schematic sketch, explain the frame work for managing operations. **(08 Marks)**

2 a. Define decision making. Explain the frame work for decision making. **(06 Marks)**
   b. Two assembly robots X and Y working at the same rate together produce 400 filters per day. During a recent day, 40 filters were found defective. given that the filter is defective, there is 0.40 probability it was produced by robot X (i.e., $P_{X/D} = 0.40$). What is the probability that a filter selected at random is : i) Defective ii) Produced by robot Y iii) Defective and produced by robot X iv) Defective or produced by robot X. **(04 Marks)**
   c. Define BEP. Briefly explain the various methods of lowering the breakeven point. **(10 Marks)**

3 a. Briefly explain the following : i) Time series forecasting ii) Forecasting error and tracking signal. **(10 Marks)**
   b. The following table gives the annual shipment (tons) of welded tube by an aluminum producer to machinery manufacturers :

Year	2004	05	06	07	08	09	10	11	12	13	2014
Shipment (tons)	2	3	6	10	8	7	12	14	14	18	19

Use the least square method to develop a linear trend equation for the data given, state the equation and forecast the shipment for 2015. **(10 Marks)**

4 a. Define capacity planning. Explain long-terms and short-term capacity strategies. **(05 Marks)**
   b. The individual component capacities (in units/day) for an assembly line that consists of five activities are shown in the figure below Fig. Q4(b). **(05 Marks)**
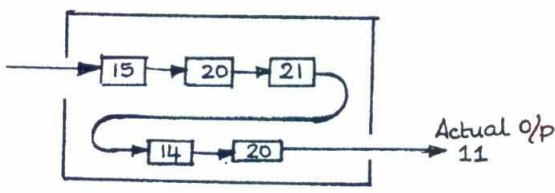

Fig. Q4(b)

   i) What is the system capacity?
   ii) What is the efficiency of the system?

   c. Annual demand for a manufacturing organization capacity is expected to be as follow :

Unit demanded	8000	10000	15000	20000
Probability	0.5	0.2	0.2	0.1

Revenues are ₹35/unit. The existing manufacturing facility has annual fixed cost/operation are ₹2 lakhs. Variable manufacturing cost are ₹7.75/unit, ₹5/unit, ₹5.33/unit & ₹7.42/unit at the 8000, 10000, 15000 and 20000 unit output level respectively. An expanded facility under consideration would require ₹2,50,000 fixed operating cost annually. Variable cost are ₹9.4/unit, ₹5.2/unit, ₹3.8/unit and ₹4.9/unit at the 8000, 10000, 15000, 20000 unit output level receptively. In order to maximize the earnings which size facility should be selected? **(10 Marks)**

PART – B

5   a. List and explain the aggregating planning strategies.   (06 Marks)
    b. Demand forecast for a non automatic washing machine is given in the following table for three periods.

Period	Demand forecast	Limits on sources of capacity		
		Regular	Overtime	Subcontract
1	600	975	225	150
2	1050	975	225	150
3	1600	975	225	150

Initial inventory   = 0
Ending inventory   = 220
Unit production cost (regular)   = ₹ 5000/-
Overtime production cost/unit   = ₹ 8000
Subcontracting cost/unit   = ₹ 12000/-
Back ordering cost   = ₹ 400/unit/period
Inventory carrying cost   = ₹ 100/unit/period
Formulate the aggregate planning problem by transportation method.   (14 Marks)

6   a. Define inventory. Enlist the various reasons for maintaining inventories.   (06 Marks)
    b. Enlist the characteristics of manufacturing model with no shortages.   (04 Marks)
    c. A company purchases 9000 parts of a machine for its annual requirement, ordering one month's usage at a time. Each part cost ₹ 20/-. The ordering cost per order is ₹ 15/- and the carrying charges are 15% of the average inventory per year. Determine the economical purchasing policy for the company. What advice would you offer and how much would it save the company per year?   (10 Marks)

7   a. Define MRP. Explain the fundamental concepts of MRP.   (07 Marks)
    b. Briefly explain MRP – II.   (07 Marks)
    c. A company makes Q model from components R, S and T component R is made from 2 units of component X and one unit of component Y. Component T is made from one unit of component Y and 3 units of component Z.
        i) Draw the product structure tree for the Q–model
        ii) Calculate the gross requirement for each of the components if the company plans to build 100 units of its Q–model, if 150 units component T and 200 units of component R in inventories.   (06 Marks)

8   a. Define supply chain. Explain the components of supply chain in detail.   (08 Marks)
    b. With neat block diagram, explain the various activities of company and supplier.   (08 Marks)
    c. Bull whip effect in supply chains. Explain.   (04 Marks)

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Eighth Semester B.E. Degree Examination, June/July 2016
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 control system. Compare open loop and closed loop control systems with an example for each type. **(08 Marks)**

   b. With a block diagram, explain proportional, proportional plus integral (PI) and proportional plus integral plus derivative (PID) controllers. Mention its characteristics. **(12 Marks)**

2 a. Derive the differential equation and obtain the transfer function $\dfrac{\theta(s)}{E_a(s)}$ for armature controlled DC motor coupled to mechanical load having inertia J and friction coefficient f_0. **(12 Marks)**

   b. Draw the equivalent mechanical system (nodal basis) and write the set of equilibrium equations and obtain force voltage analogy for the system shown in Fig. Q2 (b). **(08 Marks)**
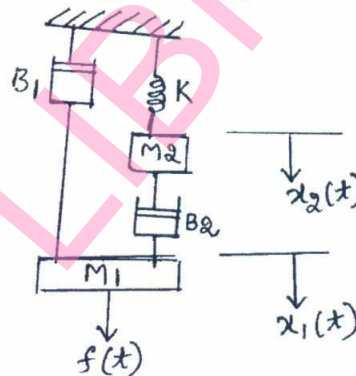

Fig. Q2 (b)

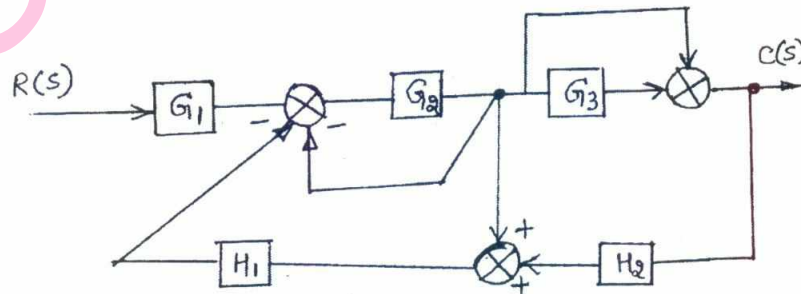3 a. Reduce the block diagram using reduction technique and obtain $\dfrac{C(s)}{R(s)}$. **(10 Marks)**

Fig. Q3 (a)

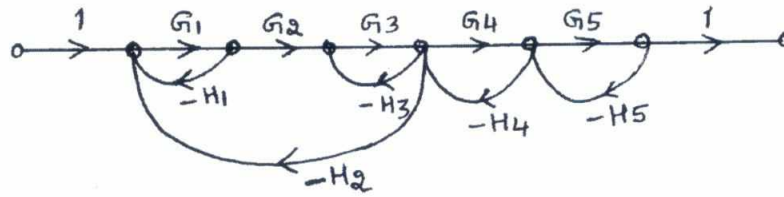3 b. Find the transfer function by using Mason's Gain formula for the signal flow graph shown in the Fig. Q3 (b). **(10 Marks)**

Fig. Q3 (b)

4 a. By applying Routh's criterion discuss the stability of the closed loop system whose characteristic equation is,

$$s^6 + 3s^5 + 4s^4 + 6s^3 + 5s^2 + 3s + 2 = 0$$ **(10 Marks)**

b. For a spring mass damper system shown in the Fig. Q4 (b) – (i) a force of 9.6 Newtons is applied to the mass. The response C(t) is as shown in the Fig. Q4 (b) – (ii). Find the value of M, B and K. **(10 Marks)**
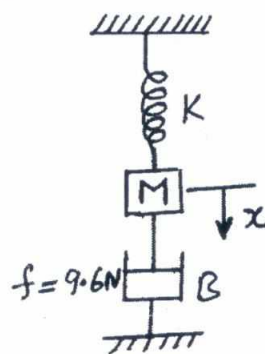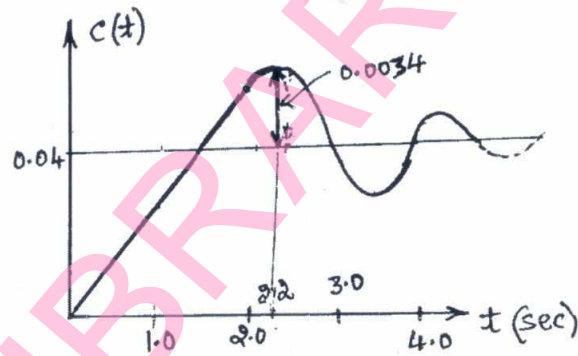

Fig. Q4 (b) – (i)   Fig. Q4 (b) – (ii)

PART – B

5 Sketch the Nyquist plot for the system with $G(s)H(s) = \dfrac{(1+0.5s)}{s^2(1+0.1s)(1+0.02s)}$. Find GM and comment on the stability. **(20 Marks)**

6 Plot the Bode magnitude and phase diagrams for the open loop transfer function,

$G(s)H(s) = \dfrac{100(s+2)}{s(s+4)(s+5)}$ and

Discuss the stability of the closed loop system and find GM and PM. **(20 Marks)**

7 Sketch the complete root locus for the system having $G(s)H(s) = \dfrac{K}{s(s+3)(s^2+3s+11.25)}$ and comment on stability. **(20 Marks)**

8 a. Explain the following:
   i) Lead compensator   ii) Lag compensator **(10 Marks)**
   b. Define the following terms:
   i) State   ii) State variables   iii) State vector   iv) State space
   v) State equation. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2016
Tribology

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting*
at least TWO questions from each part.
2. *Use of machine design data hand book is permitted.*

PART – A

1 a. Derive an expression for the rate of flow through capillary tube based on Hagen-Poiseuille law. State the assumption made in deriving the equation. **(10 Marks)**

 b. With the help of neat sketches explain the working of i) Ostwald viscometer   ii) Saybolt Viscometer. **(10 Marks)**

2 a. What is lightly loaded bearing? Derive petroffs equation for frictional force and co-efficient of friction in lightly loaded bearing. **(10 Marks)**

 b. A lightly loaded bearing has the following specifications: Journal diameter = 25mm, bearing length = 57mm, Radial clearance = 5×10^{-2} mm, Journal speed = 25,000rpm, Radial Load = 910N, Viscosity of the lubricant = 24cp.
 Calculate: i) Coefficient of friction ii) Frictional Torque and   iii) Power loss due to viscous friction. **(10 Marks)**

3 a. Determine i) Load carrying capacity   ii) Frictional force   iii) Coefficient of friction and iv) Power loss due to friction for an idealized full Journal bearing having the following specifications :
 Diameter of the Jouranl = 50mm, length of bearing = 65mm, Speed of the Journal = 1200rpm, Radial clearance = 0.025mm, Average viscosity = 0.01125PaS, Attitude = 0.8. **(10 Marks)**

 b. A partial self contained 120°, centrally loaded bearing has the following specifications :
 Journal diameter = 100mm, Bearing length = 125mm, Journal speed = 400rpm, Radial clearance = 0.0625mm, Minimum film thickness = 6.25×10^{-3} mm, Viscosity of lubricating oil = 0.018Pa.S. Determine i) Load carrying capacity of the bearing   ii) Power loss in the bearing   iii) Maximum pressure in oil film. **(10 Marks)**

4 a. A rectangular plain slider bearing with fixed shoe with no end leakage has the following specifications Bearing length = 90mm, width of shoe = 90mm, Load on the bearing = 7800N, Slider velocity = 250 cm/sec, Indination α = -0.00035 radians, visocity of oil at operating temperature = 40cp. Determine: i) Minimum Film thickness ii) Power loss iii) Co – efficient of friction. **(10 Marks)**

 b. A pivoted shoe of the slider bearing has square shape. The load acting on the bearing is 13344N, velocity of the moving member is 5.08m/sec, and Lubricating oil is SAE 40. The expected mean temperature of oil is 90°C. Permissible minimum oil film thickness is 1.905×10^{-5} m. Find i) Required dimensions of the shoe ii) Coefficient of friction under given operating conditions iii) Power loss.
 Assume inclination of surface corresponds to maximum load carrying capacity, Neglect the effect of end flow from the bearing. **(10 Marks)**

PART – B

5 a. Write notes an oil flow through Journal Bearings with i) Central groove and ii) having a single hole. **(05 Marks)**

   b. Write notes on thermal equilibrium of journal bearings. **(05 Marks)**

   c. An oil ring full Journal bearing is to operate in still air. The bearing diameter is 75mm and the length is 75mm. Bearing is subjected to a load of 5kN and is rotating at 500rpm. Radial clearance is 0.0625mm. The oil is SAE 30. The ambient air temperature is 20°C. Determine the equilibrium temperature and viscosity of oil. **(10 Marks)**

6 a. Derive the expression for rate of flow of oil and load carrying capacity for a hydrostatic step bearing. **(10 Marks)**

   b. A Hydrostatic step bearing has following specifications shaft diameter = 0.150m, Recess diameter = 0.100m, Vertical thrust load = 60kN, Speed of the shaft = 1500 rev/min, Viscosity of the lubricant is 30cp, Minimum oil film thickness = 1.25×10^{-4}m.
   Determine: i) Discharge ii) Power loss due to viscous friction   iii) coefficient of frication. **(10 Marks)**

7 a. List the commonly used bearing material and describe any of the five commonly with respect to their characteristics and advantages. **(10 Marks)**

   b. List any ten desirable properties of typical bearing material and explain any of the five in portent properties in detail. **(10 Marks)**

8 a. Write notes on i) Wear of ceramic materials   ii) Wear measurements and iii) Effect of speed, temperature and pressure on wear. **(10 Marks)**

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

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Eighth Semester B.E. Degree Examination, June/July 2016
Power Plant Engineering

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting*
at least TWO questions from each part.
2. Use of steam tables/cost analysis charts/
TD handbook is permitted.

PART – A

1 a. Explain the working of a spreader stoker with the help of a neat diagram and state its limitations. **(10 Marks)**
   b. Sketch and explain the following pulverized fuel handling systems:
   i) Unit system   ii) Central or bin system   **(10 Marks)**

2 a. Mention the important properties of coal used in power plant applications. **(05 Marks)**
   b. What are the principal advantages of forced circulation boilers? **(05 Marks)**
   c. What are the factors to be considered in selection of a boiler? Explain with a neat diagram, a Velox boiler. **(10 Marks)**

3 a. Explain Draught and give its classification. **(06 Marks)**
   b. Explain the function of a superheater and mention its advantages. **(04 Marks)**
   c. A chimney of 28 m high and the temperature of hot gases inside the chimney is 320°C. The temperature of outside air is 23°C and furnace is supplied with 15 kg of air per kg of coal burnt. Calculate:
   i) Draught in mm of water
   ii) Draught head in meters of hot gases. **(10 Marks)**

4 a. State the applications of diesel engines in power field. **(05 Marks)**
   b. What are the advantages and disadvantages of diesel power plant and gas turbine power plant? **(05 Marks)**
   c. Explain air intake and admission system of diesel power plant with a neat sketch and mention the precautions should be taken care while constructing it. **(10 Marks)**

PART – B

5 a. Hydro projects are developed for what purpose? List the advantages and disadvantages of hydro electric power plants. **(10 Marks)**
   b. The mean monthly discharge at a particular site is given in table below. Draw the hydrograph and the flow duration curve.

Month	Discharge, m^3/s	Month	Discharge, m^3/s
January	200	July	2000
February	450	August	2400
March	600	September	1800
April	1200	October	1200
May	1500	November	800
June	1600	December	400

(10 Marks)

6 a. Explain Pressurized Water Reactor (PWR) power plant with a neat schematic diagram.
                                                                                      (08 Marks)
   b. Write short notes on disposal of radioactive wastes.   **(04 Marks)**
   c. Explain with a neat sketch the elements of the nuclear reactor.   **(08 Marks)**

7 a. Define the following:
       i)   Load factor
       ii) Utility factor
       iii) Capacity factor
       iv) Demand factor
       v)   Diversity factor   **(10 Marks)**
   b. A power station has to supply load as follows:

Time (hrs)	0-6	6-12	12-14	14-18	18-24
Load (MW)	45	135	90	150	75

       i)   Draw the load curve.
       ii) Draw load duration curve.
       iii) Choose suitable generating units to supply the load.
       iv) Calculate the load factor.
       v)   Calculate the plant capacity factor.   **(10 Marks)**

8 a. Name some important remedies to reduce the cost of power generation.   **(05 Marks)**
   b. For what purpose the expenses are made in a construction cost of a power plant? **(05 Marks)**
   c. The capital cost of a power generating equipment in a steam power plant is RS 80×10^6. The useful life of the plant in 30 years and its salvage value is 5% of the capital cost. Determine by the sinking fund method the amount of money to be saved annually for replacement if yearly rate of compound interest is 6%.   **(10 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2016
Automotive Engineering

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a. List advantages of Aluminium alloy pistons.   **(04 Marks)**
    b. With neat sketches, explain the construction and purpose of dry and wet liners.   **(08 Marks)**
    c. Draw the valve timing diagram for a 4 stroke petrol engine indicating clearly the position of following and also briefly explain them. i) IVO   ii) IVC   iii) Ignition   iv) EVO   v) EVC.
                                                                                            (08 Marks)

2   a. What are octane and cetane ratings for gasoline and diesel fuel?   **(04 Marks)**
    b. Explain with sketch working of carter carburetor.   **(08 Marks)**
    c. With a neat sketch explain the working of fuel injector.   **(08 Marks)**

3   a. What are the objectives of super charging?   **(04 Marks)**
    b. With neat sketch explain the working of i) Vane blower   ii) Roots blower.   **(08 Marks)**
    c. What is turbo charger lag and explain how it can be controlled?   **(06 Marks)**
    d. What is super charging?   **(02 Marks)**

4   a. With a schematic diagram explain the working of transistor ignition system.   **(08 Marks)**
    b. With sketch explain the working of vacuum advance.   **(08 Marks)**
    c. What is ignition advance and list the factors affecting ignition advance?   **(04 Marks)**

PART – B

5   a. Explain with neat diagram working of single plate clutch.   **(06 Marks)**
    b. How different speeds are obtained by using planetary gear systems.   **(07 Marks)**
    c. With a neat sketch, explain the working principle of fluid coupling.   **(07 Marks)**

6   a. What is function of differential and explain its operation with neat diagram.   **(10 Marks)**
    b. Explain the working of power steering. Mention the advantages of power steering.   **(10 Marks)**

7   a. With neat sketch, explain the working of telescopic type shock absorber.   **(10 Marks)**
    b. Draw the layout of a pneumatic breake system.   **(08 Marks)**
    c. What is Anti-lock Bracking system (ABS)?   **(02 Marks)**

8   a. Explain various evaporative emission control system.   **(08 Marks)**
    b. Explain i) Air injection system   ii) Air aspirator valve.   **(12 Marks)**

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