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Eighth Semester B.E. Degree Examination, June / July 2014
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. Give the classification of production systems. **(06 Marks)**
   b. Explain in brief the functions of operations management. **(06 Marks)**
   c. Define productivity. List the various factors affecting productivity. **(08 Marks)**

2 a. What is Decision Making? What are the steps involved in decision making? **(06 Marks)**
   b. Briefly explain the characteristics of operations decision and the frame work for decisions. **(08 Marks)**
   c. What is break even analysis? Explain. **(06 Marks)**

3 a. What is forecasting? List the steps involved in forecasting process. **(05 Marks)**
   b. Briefly explain the various factors affecting forecasting. **(05 Marks)**
   c. A company believes that its annual profit depend on its expenditure for research. The information for the preceding 6 years is given in the table below. Estimate the profit when the expenditure for research is 6 units. Also compute the values for slope and intercept. **(10 Marks)**

Expenditure for Research (X)	2	3	5	4	11	5	6
Annual profit (Y)	20	25	34	30	40	31	⬚

4 a. Define : i) Design capacity　ii) System capacity and　iii) Capacity planning. **(06 Marks)**
   b. What are the factors influencing plant location? **(06 Marks)**
   c. An automobile component manufacturer has the plan of buying a moulding machine which can manufacture 17000 parts / year. The moulding m/c 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 mould each part and the plant operates for 2000 hours/year. If the mould machines are used for 60% of the time and are 90% efficient, what is the output of moulding machines / hour　iii) How many moulding machines would be required. **(08 Marks)**

PART - B

5 a. Briefly explain the following with the help of a flow chart :
   i) Aggregate planning　　ii) Master scheduling. **(08 Marks)**
   b. A firm has developed the following demand forecast in units for an item which is influenced by seasonal factors :

Month	Jan	Feb	March	April	May	June	July	Aug
Forecast Demand	270	220	470	670	450	270	200	370
Cumulative Demand	270	490	960	1630	2080	2350	2550	2920

Suppose that the firm estimates that it costs Rs 150/unit to increase the production rate, Rs 200/unit to decrease the production rate, Rs 50/unit per month to carry the items on inventory and Rs 100 per unit if subcontracted. Compare the cost incurred if pure strategies are followed. **(12 Marks)**

1 of 2

6   a. What do you mean by inventory? What are the types of inventories?   **(04 Marks)**

        b. What are the major costs associated with inventories? What are the reasons for carrying inventories?   **(06 Marks)**

        c. A producer of photo equipment buys lenses from a supplier at 100 dollars each. The producer requires 125 lenses/year and the ordering cost is 18 dollars/order. Carrying costs/unit year are estimated to be 20 dollars each. The supplier offers a 6% discount for purchases of 50 lenses and an 8% discount for purchases of 100 or more lenes at one time. What is the most economical amount to order at a time?   **(10 Marks)**

7   a. Define Materials Requirement planning. What are the basic inputs for MRP?   **(06 Marks)**

        b. What are the benefits and limitations of MRP?   **(08 Marks)**

        c. Briefly explain the following : i) MRP - II   ii) ERP.   **(06 Marks)**

8   a. Briefly explain the importance of purchasing and supply chain management.   **(06 Marks)**

        b. Write a note on Make or Buy decision.   **(05 Marks)**

        c. Briefly explain the following :
            i) Vendor development.
            ii) E – procurement.
            iii) Concept of tenders.   **(09 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2014
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. Distinguish between open-loop and closed loop systems with examples. (05 Marks)
    b. Explain the requirements of a control system. (05 Marks)
    c. Explain following controller. State its characteristics:
        i)   Proportional plus derivative control action
        ii) Proportional plus integral plus derivative control action. (10 Marks)

2   a. Write the equilibrium equations for the mechanical system shown in Fig.Q2(a), hence obtain the F-I analogous system.
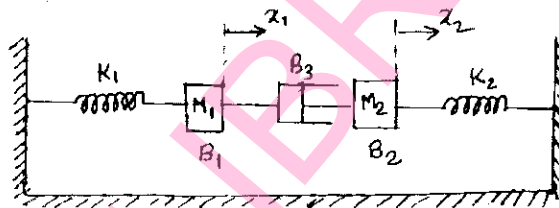

Fig.Q2(a) (10 Marks)

    b. Obtain the transfer function of field controlled DC motor. (10 Marks)

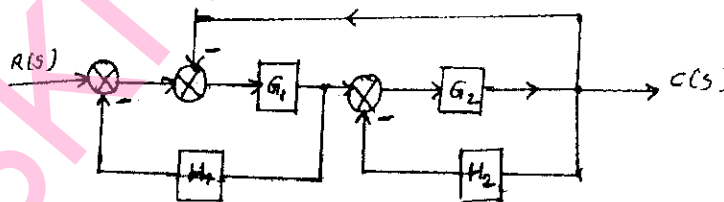3   a. Reduce the block diagram and obtain its transfer function $\dfrac{C(s)}{R(s)}$.

Fig.Q3(a) (10 Marks)

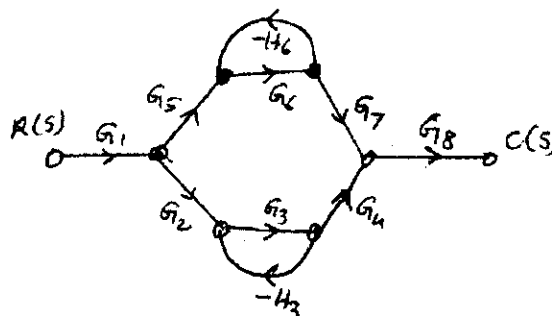   b. Find $\dfrac{C(s)}{R(s)}$ by Mason's gain formula.

Fig.Q3(b) (10 Marks)

4   a.   Obtain an expression for time response of the first order system subjected to unit step input.

   (08 Marks)

   b.   Determine the damping ratio and natural frequency for the system whose maximum overshoot response is 0.2 and peak time is 1 sec. Find rise time and settling time.   **(06 Marks)**

   c.   State whether the system is stable or unstable $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$ using Routh's stability criterion.   **(06 Marks)**

PART – B

5   a.   Sketch the polar plot of TF $G(s)H(s) = \dfrac{1}{(1+5s)(1+10s)}$.   **(06 Marks)**

   b.   Sketch the Nyquist plot for a system, whose transfer function, $G(s)H(s) = \dfrac{K}{s(s+4)(s+8)}$. Determine the range of values of K for which the system is stable.   **(14 Marks)**

6   For a system $G(s)H(s) = \dfrac{242(s+5)}{s(s+1)(s^2+5s+121)}$, sketch the Bode plot. Find ω_{pc} and ω_{gc}, GM, PM. Comment on stability.   **(20 Marks)**

7   For a unity feedback system, $G(s)H(s) = \dfrac{K}{s(s+4)(s+2)}$, sketch the rough nature of the root locus, showing all details on it.   **(20 Marks)**

8   a.   What is compensation? How are compensators classified?   **(06 Marks)**

   b.   Write notes on:
   i)   Lead compensator
   ii)   Lag compensator   **(08 Marks)**

   c.   A system is governed by the differential equation $\dfrac{d^3y}{dt^3} + 6\dfrac{d^2y}{dt^2} + 11\dfrac{dy}{dt} + 10y = 8u(t)$ where y is the output and u is the input of the system. Obtain a state space representation of the system.   **(06 Marks)**

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10ME831

Eighth Semester B.E. Degree Examination, June/July 2014
Tribology

Time: 3 hrs.   Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting*
at least TWO questions from each part.
2. *Use of tribology data handbook is permitted.*

PART – A

1   a.   Distinguish between:
        i)   Dynamic and kinematic viscosity
        ii) Fluidity and viscosity
        iii) Newtonian and non-Newtonian fluid
        iv) Mineral oil and vegetable oil (for lubrication)
        v)   Full and partial journal bearing.   **(10 Marks)**
    b.   Sketch and explain working of any two viscosity measuring apparatus types. Add a note on
        the effect of temperature and pressure on viscosity of a fluid.   **(10 Marks)**

2   a.   State Petroff's law and explain its significance.   **(05 Marks)**
    b.   Describe Tower's experiments and conclusions drawn.   **(05 Marks)**
    c.   A lightly loaded journal bearing has the following specifications:
        Diameter of journal = 50 mm   Bearing length = 80 mm
        Diametral clearance ratio = 0.002   Radial load = 750 N
        Viscosity = 10 cP   Speed = 4000 rpm
        Determine: i) Frictional torque,   ii) Coefficient of friction,   iii) Power loss.   **(10 Marks)**

3   a.   Explain the significance of Sommer field number in distinguishing bearings.   **(05 Marks)**
    b.   Draw a typical pressure distribution curve for an idealized full journal bearing and explain
        the significance of zones.   **(05 Marks)**
    c.   A full journal bearing has the following specifications:
        Diameter of journal = 75 mm   Length of bearing = 60 mm
        Oil film temperature = 96°C   Radial clearance = 0.05 mm
        Oil film thickness = 7.9×10^{-3} mm   Lubricating oil is SAE 20.
        Lubricant is delivered to the bearing under a pressure through a single inlet pressure hole in
        an unloaded bearing region. Determine inlet pressure required if the rate of oil flow through
        the bearing must be 312 mm^3/sec in order to control bearing temperature.   **(10 Marks)**

4   a.   Distinguish a pivoted shoe slider bearing from a fixed shoe slider bearing.   **(05 Marks)**
    b.   Discuss locating centre of pressure in fixed show slider bearing.   **(05 Marks)**
    c.   A pivoted shoe of the slider bearing has square shape. The load acting on the bearing is
        13.34 kN velocity of the moving member is 5.08 m/sec. Lubricating oil is SAE 40. The
        expected mean temperature of oil film 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 in the bearing under given operating condition
        iii) Power loss.
        Assume that inclination of surface corresponds to maximum load carrying capacity. Neglect
        effect of end flow of oil.   **(10 Marks)**

PART – B

5 a. How do you distinguish between bearings from the standpoint of cooling conditions? Explain the categories with equations that are applicable under each. **(05 Marks)**

  b. Write a note on flow of lubricant through a journal bearing having a single hole. **(05 Marks)**

  c. The main bearing for a stationary slow speed steam engine has the following data:
     Journal dia – 20 cms   Maximum load on the piston = 80 kN,
     Engine speed – 200 rpm   Diamteral clearance ratio = 0.0009.
     Determine the heat generated and heat dissipated given the operating temperature is 65°C and ambient temperature is 25°C. Take absolute viscosity as 60×10^{-3} PaS, heat capacity = 11.36×10^{-3} KW/m^{2}K, length of the bearing = πx diameter of journal (L – πd). **(10 Marks)**

6 a. State the principles, advantages, disadvantages and applications of hydrostatic lubrication. **(05 Marks)**

  b. Explain the two main systems of hydrostatic lubrication. **(05 Marks)**

  c. A hydrostatic circular thrust bearing has the following data:
     Shaft dia – 300 mm   Dia of pocket = 200 mm
     Shaft speed – 100 rpm   Pressure at the pocket = 500 kN/m^2
     Film thickness = 0.07 mm   Viscosity of lubricant = 0.05 PaS.
     Determine: i) Load carrying capacity, ii) Oil flow rate, iii) Power loss due to friction. **(10 Marks)**

7 a. What properties are expected of bearing materials? List them. **(05 Marks)**

  b. What are conformability and embedability with respect to bearing materials? Explain. **(05 Marks)**

  c. List the commonly used bearing materials. Explain any five of them with respect to their typical properties and advantages. **(10 Marks)**

8 Write explanatory notes on:
  a. Wear of ceramic materials
  b. Surface engineering
  c. Wear measurements
  d. Improved design of a tribological component
  e. Advanced material's use in tribology application. **(20 Marks)**

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Eighth Semester B.E. Degree Examination, June/July 2014
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. Draw a general layout of a steam power plant, showing the different circuits and system and explain them. **(10 Marks)**
   b. Explain with a neat sketch of chain grate stoker. **(06 Marks)**
   c. Write the merits and demerits of pulverized coal. **(04 Marks)**

2 a. What are the requirements of good coal handling plant? **(04 Marks)**
   b. Explain with neat sketch: i) Benson boiler, ii) Loeffler boiler **(12 Marks)**
   c. What are characteristics of a good ash handling plant? **(04 Marks)**

3 a. Explain the forced, induced, balanced draught chimneys. **(06 Marks)**
   b. Explain with sketch: i) Air preheater, ii) Superheater. **(08 Marks)**
   c. Calculate the mass of flue gases flowing through the chimney when the draught produced is equal to 1.9 cm of water. Temperature of flue gases is 290°C and ambient temperature is 20°C. The flue gases formed per kg of fuel burnt are 23 kg. Neglect the losses and take the diameter of the chimney as 1.8 m. **(06 Marks)**

4 a. Explain with neat sketch the air intake system and exhaust system of diesel power plant. **(12 Marks)**
   b. Sketch and explain the layout of a diesel engine power plant. **(08 Marks)**

PART – B

5 a. Explain the following:
      i) Water hammer   ii) Pumped storage plant   iii) Surge tank on ground level **(12 Marks)**
   b. What are the advantages and disadvantages of hydro-electric plants? **(08 Marks)**

6 a. Give the classification of nuclear reactors. **(06 Marks)**
   b. Sketch and explain gas cooled reactor and also list its advantages. **(10 Marks)**
   c. What are safety measures for nuclear power plants? **(04 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. A base load power station and standby power station share a common load as follows:
      Base load station annual output $= 180 \times 10^6$ KWh; Base load station capacity $= 42$ Mw;
      Maximum demand on base load station $= 36$ MW; Standby station capacity $= 22$ MW;
      Standby station annual output $= 17 \times 10^6$ KWh; Maximum demand (peak load) on standby station $= 18$ MW.
      Determine the following for both power stations:
      i) Load factor   ii) Capacity (or plant) factor. **(08 Marks)**

8 a. Explain the performance and operating characteristics of power plant. **(08 Marks)**
   b. Give the requirements of Tariff. **(04 Marks)**
   c. What are different types of tariffs? Explain any two of them. **(08 Marks)**

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Eighth Semester B.E. Degree Examination, June / July 2014
Foundry Technology

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Define degassing. Name various methods used for degassing. Explain any two of them with sketches. **(10 Marks)**
   b. With a neat sketch, explain strip fluidity text. **(06 Marks)**
   c. Briefly explain the factors affecting fluidity. **(04 Marks)**

2 a. Explaint the need for directional solidification in castings. List the various methods used to achieve directional solidification in a casting. Explain any two methods. **(10 Marks)**
   b. Explain the following:
     i) Design for minimum casting stress.
     ii) Design for metal flow.
     iii) Design for low cost.
     iv) Design for casting soundness. **(10 Marks)**

3 a. Sketch and explain :
     i) Slow cooling curve for pure metal and alloy.
     ii) Rapid cooling curve for pure metal and alloy. **(10 Marks)**
   b. Discuss briefly with a neat sketch progressive solidification and the factor, affecting progressive solidification. **(10 Marks)**

4 a. What are the various functions of a riser? What is feeding distance of a riser? Sketch and explain open and blind risers. **(10 Marks)**
   b. What are the functions of a gating systems? Sketch and explain any two types of gates. **(10 Marks)**

PART – B

5 a. Explain with neat figures the steps involved in V-moulding process. What are its advantages and limitations? **(10 Marks)**
   b. Explain the working principle of water cooled cupola with a neat figure. **(10 Marks)**

6 a. Explain melting procedure of steel in electric arc furnace. **(08 Marks)**
   b. Discuss effect of any four alloying elements on the properties of steel. **(04 Marks)**
   c. Discuss production method of Malleable Iron and Spheroidal Graphite Iron. **(08 Marks)**

7 a. Explain melting procedure and casting characteristics of magnesium base alloys in a foundry. **(10 Marks)**
   b. Explain the casting characteristics and properties of alluminum alloys. **(10 Marks)**

8 a. Sketch and explain rotary – type Shakeouts used in foundry. **(10 Marks)**
   b. Explain the need for modernization. What are the advantages of mechanisation? Discuss the different areas of foundry mechanization. **(10 Marks)**

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Eighth Semester B.E. Degree Examination, June / July 2014
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. Compute wet and dry liners in automotive engines. (04 Marks)
   b. What are the functions of piston rings and explain with diagram the operation of piston rings? (08 Marks)
   c. Sketch any two type piston design to keep heat away from lower part of piston. (08 Marks)

2 a. What is Octane and Cetane ratings for gasoline and diesel fuel? (04 Marks)
   b. Explain with sketch working of cartels carburetor. (08 Marks)
   c. Explain with diagram working of A.C mechanical fuel pump (08 Marks)

3 a. Distinguish between supercharging and turbocharging. (04 Marks)
   b. What is turbo charger lag and explain how it can be controlled? (06 Marks)
   c. Explain different methods of supercharging. (10 Marks)

4 a. Draw neat circuit diagram of battery ignition system and explain functions of various devices in circuit. (10 Marks)
   b. With neat circuit diagram, explain the principles of electronic ignition system. (06 Marks)
   c. What is ignition advance and list the factors affecting ignition advance? (04 Marks)

PART - B

5 a. Mention any four requirements of clutch for transmission of torque. (03 Marks)
   b. Explain with neat diagram working of single plate clutch. (07 Marks)
   c. Explain with diagram working of constant mesh gear box and mention its advantages over sliding mesh gear box. (10 Marks)

6 a. What is the function of differential and explain its operation with neat diagram. (10 Marks)
   b. What is camber and mention the effects of positive camber? (06 Marks)
   c. Mention the advantages of power steering. (04 Marks)

7 a. Explain with schematic diagram the air suspension system. Mention its advantages and disadvantages. (10 Marks)
   b. Explain with diagram, the working of hydraulic braking system. (08 Marks)
   c. What is Anti – lock Bracking system (ABS)? (02 Marks)

8 a. Briefly explain crankcase emissions controlling. (04 Marks)
   b. Explain with diagram the Exhaust Gas Circulation System (EGR). (08 Marks)
   c. What is catalytic converter? How they are helpful in reducing exhaust gas emission? Explain the 3 – way catalytic converter system. (08 Marks)

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