

**BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING EXAMINATION, 2017****(3<sup>rd</sup> Year, 2<sup>nd</sup> Semester)****INDUSTRIAL MANAGEMENT**

Time: Three hours

Full Marks: 100

Answer any *five* questions. Assume suitable data, if needed

1. a) Draw an organization chart for *line & staff* organization structure. Explain the same. Discuss about advantages and disadvantages of this type of organization structure. (10)
- b) Discuss three important plant location factors. (6)
- c) State about F.W. Taylor's idea about *duties of management*. (4)

**OR**

Develop a *cause and effect* diagram for the problem of taper in straight turning while making a pin on lathe in workshop class. (4)

2. a) The annual demand of an item is 90000 units. The cost of placing an order is Rs. 100 and carrying costs are: i) holding cost of Rs. 1.40 per unit per year and ii) interest charge of 4% of purchase price per unit per year – both charged on average inventory. The purchase price per unit is Rs. 10. Determine the *economic order quantity*. Deduce the formula used, mentioning the assumptions made. What is the *total annual stocking cost* for the item? (10)

b) A company produces and sales a single product whose selling price is Rs. 16 per unit and the variable cost is Rs 12 per unit. If the fixed costs of the company are estimated as Rs. 120000, how many units of product must be produced to break even and how many to make a profit of Rs. 40000? What would be profit (or loss) if 35000 units are produced and sold? (10)

**OR**

Discuss about i) JIT production and ii) MRPI and MRP II (5) + (5)

3. a) A company purchases maximum 3600 units of a product in total, having two varieties A and B. The variety A occupies 3 cubic feet and costs Rs. 9. The variety B occupies 1 cubic feet and costs Rs. 13. The funds available are Rs. 39000 and space available is 6000 cubic feet. The company gets profit of Rs. 3 per unit and Rs. 4 per unit for the varieties A and B respectively. The problem is to find the quantities A and B so that total profit is maximized. Formulate and solve the above linear programming problem graphically, using graph paper. (10)

[ Turn over

b) Solve the following linear programming problem graphically with necessary comments (if required) about the solution. Use graph paper.

$$\text{Maximize } Z = 2x_1 + 6x_2$$

Subject to:

$$4x_1 + 3x_2 \leq 12$$

$$2x_1 + x_2 \geq 8$$

$$x_1 \geq 0$$

$$x_2 \geq 0 \quad (5)$$

c) State about *responsibility, authority and unity of command* in an organization. (5)

4. . Answer **any four** of the followings: (5x4 = 20)

i) State about the potential benefits to an organization of implementing a quality management system as per ISO 9001-2015.

ii) Discuss about design and development inputs and outputs as per ISO 9001-2015.

iii) What is meant by *total quality management*? Explain its significance and important features.

iv) What is *method study*? State about the steps involved in method study.

v) Discuss about *crashing* in network scheduling.

vi) State about the idea of *risk based thinking* as per ISO 9001-2015.

vii) Illustrate the concepts of *job evaluation* and *merit rating*.

5. a) The sales in number of units for a particular item K in last five periods, starting from period 1 are 110, 121, 116, 124 and 135 respectively. What will be the 4-period moving average forecast for the period 6? If in the 6<sup>th</sup> period, actual sales become 141 units, what will be the 4-period moving average forecast for the period 7? (5)

b) For the sales data given in Q. 5 a , what will be the 3-period **weighted moving average** forecast for the period 6, if the most recent data is weighted twice as heavily as each of the previous two periods, weighting of each of the previous two periods being 0.25? (5)

c) 15 samples of cloth of equal length were examined in order to locate defects (non-conformities) in them. The numbers of non-conformities observed were: 2, 3, 5, 1, 6, 3, 5, 7, 3, 2, 5, 9, 4, 6 and 5. Construct C- chart for these data. (Use graph paper). Draw relevant conclusions.(10)

OR

Construct the risk analysis table for a gear manufacturing unit having lathe, milling machine and slotting machine - for ISO 9001-2015 quality management system, suggesting its mitigation. **(10)**

6. a) Construct the network diagram to conform to the following relationships:

Activity	Immediate predecessor(s)
A	None
B	None
C	None
D	A,B
E	B,C
F	D,E

Completion of F is the completion of the project. **(5)**

b) A project consists of eight activities: 10-20, 10-30, 20-40, 20-50, 40-50, 30-60, 50-60 and 60-70. The durations of the activities are 9, 14, 4, 14, 6, 6, 5, and 2 weeks respectively. Draw the network diagram, determine the critical path and find the project duration. Find earliest and latest event times of each event (show sample calculations). Find total float, free float and independent float of **each of the activities**. **(15)**

7. a) What is meant by *plant layout*? Name and discuss about any one type of plant layout. **(5)**

b) Name and define three important parameters by which accuracy of a forecasting model can be checked or measured. **(6)**

c) State about applications of linear programming. **(4)**

d) Give the basic idea about *time study*. **(5)**

8. Write short notes on **any four** of the followings: **(5x4 = 20)**

i) Preventive maintenance

ii) Agile manufacturing

iii) Delphi method of forecasting

iv) Transportation model in linear programming

v) Sub-patterns in time series of forecasting

vi) Quality control circle

vii) Queuing theory

viii) Failure mode effect analysis (FMEA)