BME-035

01454

BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

Term-End Examination

June, 2011

BME-035 : INDUSTRIAL ENGINEERING & OPERATIONS RESEARCH

Time : 3 hours *Maximum Marks : 70*

Note : *All questions carry equal marks. Assume any missing data suitably. Attempt FOUR questions from Section A and any THREE questions from Section B.*

SECTION A

Attempt *any four* questions :

1. Define Productivity. What are different indicators for measuring it ? Why in India we have low agricultural productivity. Discuss different elements of Productivity Improvements. Give examples. **2 + 4 + 4**

2. Explain "Work - Sampling" as system for **5 + 5** calculating standard time. Differentiate work - sampling from Time - study with proper example. Use tabular format.

3. List down various tools of method study. Give situations where these tools are useful. Draw a Sample Flow Process Chart. **3 + 3 + 4**

4. Discuss various requirement of a good product **5 + 5** design. Discuss various steps of a New Product Development.

5. What is Design for Environment ? Explain this concepts, its importance with the help of some example. **5 + 2 + 3**

6. Explain the impact of following on working of an operation **3 + 4 + 3**

   (a) Noise

   (b) Temperature and humidity

   (c) Lighting

SECTION B

Attempt *any three* questions :

7. Solve the following problem using graphical **10** method.

   minimize $Z = 200x_1 + 300x_2$

   such that $2x_1 + 3x_2 \geq 1200$

   $100x_1 + 100x_2 \leq 40000$

   $2x_1 + 1.5x_2 \geq 900$

   $x_1 \geq 0$

   $x_2 \geq 0$

8. Solve the following linear programming problem **10** using simplex method and give comments.

   maximize $Z = 3x_1 + 2x_2$

   subject to $x_1 - x_2 \leq 1$

   $x_1 + x_2 \geq 3$

   $x_1 \geq 0$ and $x_2 \geq 0$

9. A car rental firm has one car in each of the five depots D_1, D_2, D_3, D_4 and D_5 and a customer in each of the 5 cities C_1, C_2, C_3, C_4 and C_5. The distance between the depots and cities are given in table below. Assign cars to individual customer so as to minimize the total distance covered. **10**

Depot	Cities				
	C_1	C_2	C_3	C_4	C_5
D_1	140	115	120	30	35
D_2	110	100	90	30	15
D_3	155	90	135	60	50
D_4	170	140	150	60	60
D_5	180	155	165	90	85

10. Describe Markov chain with the help of suitable example. Also provide applications of **Markov** Process especially for Discrete state space. **10**

11. Write short note on *any two* of the following : **5x2=10**

    (a) Goal Programming

    (b) Data Envelopment Analysis

    (c) Game Theory