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BME-035

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

01090

Term-End Examination

June, 2014

BME-035 : INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH

Time : 3 hours *Maximum Marks : 70*

Note : *All questions carry equal marks. Attempt any **four** questions from Section A and **three** question from Section B.*

SECTION A

*Answer any **four** questions.*

1. (a) Describe the tools and techniques of industrial engineering. 5

(b) How do advancements in IT affect the developments in Industrial Engineering ? 5

2. (a) Why should industrial engineering department be given a high importance in the industry ? 5

(b) What are the different types of productivity ? 5

3. (a) Explain the systematic procedure of method study. *5*

(b) The observed time for an element is 1·2 minutes. The pace rating for the element is 120% and job difficulty is found to be 30%. Find Normal Time of the element. Also find the Standard Time at an allowance of 10%. *5*

4. (a) What are the concepts and principles of PMTS ? *5*

(b) Enumerate the applications of the work sampling technique. *5*

5. (a) Discuss the desirable qualities of a successful product designer. *5*

(b) What is product mix ? Why is it important ? *5*

6. (a) Why is consideration of environment issues very important in the product design related to its 'end of life' phase ? *5*

(b) Prepare a note on the various DFE tools. *5*

SECTION B

*Answer any **three** questions.*

7. A company wants to produce two products A and B which will be kept in a storage area whose capacity is 3000 sq. m. Product A requires 3 sq. m. of space per unit, whereas product B requires 4 sq. m. It takes 5 machine-hours to manufacture a unit of product A, while 8 machine-hours are needed for a unit of product B. There are available 3600 machine-hours during the production period. Also available are 2400 person-hours for finishing the products and a unit of product A takes 4 person-hours for finishing, while a unit of product B needs 3 person-hours. Profit contributions are ₹ 3 per unit of product A and ₹ 6 per unit of product B. In order to maximise the profit for the period, how many units of each product should the company manufacture ? *10*

8. A firm having three factories located in city A, city B and city C supplies goods to four dealers spread all over the country. The production capacity of these factories are 1000, 700 and 900 units per month respectively. The net return per unit product varies for different combinations of dealers and factories which is given in the table below :

Factory	Dealers				Factory capacity
	1	2	3	4	
City A	6	6	6	4	1000
City B	4	2	4	5	700
City C	5	6	7	8	900
Dealer Requirement	900	800	500	400	2600

Determine a suitable allocation to maximise the total/net return. *10*

9. A library wants to improve its service facilities in terms of the waiting time of its borrowers. The library has two counters at present and borrowers arrive according to Poisson distribution with a mean of 10 minutes. The library has relaxed its membership rules and a substantial increase in the number of borrowers is expected. Find the number of additional counters to be provided if the arrival rate is expected to be twice the present value and the average waiting time of the borrowers must be limited to half the present value. *10*

10. Maximise $z = 6x_1 + 9x_2$

subject to $2x_1 + 2x_2 \leq 24$

$x_1 + 5x_2 \leq 44$

$6x_1 + 2x_2 \leq 60$

and $x_1, x_2 \geq 0$ by using simplex method. *10*

11. Write short notes on any ***two*** of the following : *5+5*

(a) Criteria for decision making under uncertainty

(b) Steps in the simulation process

(c) Data Envelopment Analysis