

**B.Tech. MECHANICAL ENGINEERING  
(COMPUTER INTEGRATED  
MANUFACTURING)**

**Term-End Examination**

**December, 2015**

**BME-035 : INDUSTRIAL ENGINEERING AND  
OPERATIONS RESEARCH**

*Time : 3 hours*

*Maximum Marks : 70*

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*Note : Attempt **four** questions from Section A and **three** from Section B. All questions carry equal marks. Assume any missing data suitable.*

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**SECTION A**

*Answer any **four** of the following :*

1. What do you mean by productivity ? Briefly discuss the various ways of improving productivity. 10
2. Explain the meaning of various symbols used for recording in Method Study. Explain the Man-Machine chart with an example of your choice. 10

3. A time study was made of an existing job to develop new time standards. The worker was observed for 30 minutes during which he made 20 units. He was rated at 90% by the analyst. The firm's allowance for rest and personal time is 12%.

(a) What is the standard time for the task ?

(b) If the worker produces 360 units in an eight-hour day, what would be the day's pay, if the base rate is ₹ 60 per standard hour ?

6+4

4. What do you mean by 'standardisation' ? Discuss the benefits of standardisation.

10

5. Describe the ergonomic guidelines to organise the workplace.

10

6. Write short note on any *two* of the following :  $2 \times 5 = 10$

(a) Productivity Measures

(b) Product Life Cycle

(c) Predetermined Motion Time Standards (PMTS)

## SECTION B

Answer any **three** of the following :

7. Objective of a firm is to maximise profit by producing product A and/or product B, both of which have to be processed on two machines 1 and 2. Product A requires 2 hours on both machines 1 and 2, while product B needs 3 hours on machine 1 and only 1 hour on machine 2. There are only 12 and 8 hours available on machines 1 and 2 respectively. The profit per unit is estimated at ₹ 6 and ₹ 7 in case of product A and B respectively.  
Formulate and solve the LPP. 10
8. Describe briefly the queuing model elements.  
Give some applications of the queuing theory. 10
9. A company is producing a single product and is selling it through five agencies situated in different cities. All of a sudden, there is a demand for the product in another five cities not having any agency of the company. The company is faced with the problem of deciding on how to assign the existing agencies to despatch the product to needy cities in such a way that the travelling distance is minimised. The

distance (in km) between the surplus and deficit cities are given in the following distance matrix :

		Deficit cities				
		I	II	III	IV	V
Surplus cities	A	160	130	175	190	200
	B	135	120	130	160	175
	C	140	110	155	170	185
	D	50	50	80	80	110
	E	55	35	70	80	105

Determine the optimal assignment schedule. 10

10. Define Simulation. Explain the Monte-Carlo simulation with a suitable example. 10

11. The payoff matrix of a game is given. Find the solution of the game to the player A and B. 10

		<b>B</b>				
		I	II	III	IV	V
<b>A</b>	I	-2	0	0	5	3
	II	3	2	1	2	2
	III	-4	-3	0	-2	6
	IV	5	3	-4	2	-6