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BME-035

B.Tech. MECHANICAL ENGINEERING (COMPUTER INTEGRATED MANUFACTURING)

00752

Term-End Examination

December, 2017

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 any* ***three*** *questions from Section B. Use of scientific calculators is allowed.*

SECTION A

1. (a) How is broad-spectrum innovation different from continuous innovation ? *5*

(b) What are the various elements of productivity improvement ? *5*

2. (a) What do you understand by work sampling ? How do you recognise it as a work measurement technique ? *5*

(b) What is a Therblig ? What is its significance in method study ? *5*

3. (a) Discuss the factors affecting product design. 5

(b) Write the major contributions of Taylor in the area of industrial engineering. 5

4. (a) List out the guidelines for lifting and carrying workloads with reference to ergonomic studies. 5

(b) What are the major goals of technology management ? 5

5. (a) How does AHP help in prioritising the alternatives ? 5

(b) Give the advantages and limitations of simulation. 5

6. (a) Distinguish between the terms minimax and maximin with reference to rectangular games, with the help of suitable examples. 5

(b) How is time standard established in PMTS ? 5

SECTION B

7. Two children Srija and Himaja, who have some 25 paise coins and some 50 paise coins, play a game. Each draws a coin from their bags without knowing the other's choice. If the sum of the coins' value drawn by both is even Srija wins, otherwise Himaja wins. Find the best strategy for each player and also find the value of the game. *10*

8. The manager of an oil refinery has to decide on the optimal mix of two possible blending processes of which the inputs and outputs per production run are given as follows :

Process	Inputs		Outputs	
	Crude oil A	Crude oil B	Gasoline X	Gasoline Y
I	5	3	5	8
II	4	5	4	4

The maximum amounts of crude oil A and B available are 200 units and 150 units respectively. Market requirements show that at least 100 units of petrol X and 80 units of petrol Y must be produced. The profit per production run from processes I and II are ₹ 300 and ₹ 400 respectively. Formulate the problem as a linear programming model and solve it. *10*

9. Use degeneracy principles to solve the following LPP : 10

$$\text{Maximise } z = 3x_1 + 9x_2$$

$$\text{subject to} \quad x_1 + 4x_2 \leq 8;$$

$$x_1 + 2x_2 \leq 4;$$

$$x_1, x_2 \geq 0$$

10. There are five jobs each to be assigned to 5 machines and the associated cost matrix is as follows :

Jobs	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	2	11	15

Find the optimum assignment and the associated cost using the assignment technique. 10

11. Determine the optimum basic feasible solution to the following transportation problem : 10

To

		A	B	C	Available
	1	50	30	220	1
From	2	90	45	170	3
	3	250	200	50	4
	Required	4	2	2	