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BME-035

**BACHELOR OF TECHNOLOGY IN
MECHANICAL ENGG. (COMPUTER
INTEGRATED MANUFACTURING)
[BTME(CIM)]**

Term-End Examination

December, 2019

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

Time : 3 Hours

Maximum Marks : 70

*Note : Attempt any three questions from Section A
and any two questions from Section B. All
questions carry equal marks. Use of scientific
calculator is allowed.*

Section—A

1. (a) Write major contributions of Taylor in the
area of Industrial Engineering. 7

- (b) Write the functions of Industrial Engineering Department during the establishment of an organisation. 7
2. (a) Discuss various measures to improve productivity of a firm. 7
- (b) Explain micro-motion study. 7
3. (a) Explain various allowances provided to the operators working in industry. 7
- (b) Enumerate the applications of the work sampling technique. 7
4. (a) Explain the various important aspects of product design. 7
- (b) Describe the Design for Environment (DFE). How is DFE different from Design for Sustainability (DFS) ? Explain with the help of an example. 7
5. (a) What do you understand by ergonomic design of products ? What are the advantages of ergonomic designing ? 7
- (b) Write a short note on Simulation. 7

Section—B

6. Write short notes on the following : 7×2

(i) Assignment model

(ii) Analytic Hierarchy Process (AHP)

7. A firm is engaged in producing two products A and B. Each unit of product A requires 2 kg of raw material and 4 labour hours for processing, whereas each unit of product B requires 3 kg of raw material and 3 hours of labour, of the same type. Every week, the firm has an availability of 60 kg of raw material and 96 labour hours. One unit of product A sold yields ₹ 40 and one unit of product B sold gives ₹ 35 as profit.

Formulate this problem as a linear programming problem to determine the number of units of each of the products to be produced per week so that the firm can earn the maximum profit. Solve this LPP graphically. 14

8. A firm owns facilities at seven places. It has manufacturing plants at places A, B and C with daily output of 500, 300 and 200 units of an item respectively. It has warehouses at places P, Q, R and S with daily requirements of 180, 150, 350 and 320 units respectively. The

shipping charges per unit on different routes are given below : 14

		To			
		P	Q	R	S
From	A	12	10	12	13
	B	7	11	8	14
	C	6	16	11	7

The firm wants to send the output from various plants to warehouses involving minimum transportation cost. How should it route the product to achieve its objective ?

9. Find the optimal strategies for A and B in the following game. Also obtain the value of the game : 14

		B's strategy		
		b ₁	b ₂	b ₃
A's strategy	a ₁	9	8	-7
	a ₂	3	-6	4
	a ₃	6	7	-7