

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

Term-End Examination

00672

June, 2019

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

Time : 3 hours

Maximum Marks : 70

*Note : Attempt any **four** questions from Section A and any **three** questions from Section B. All questions carry equal marks. Assume any missing data suitably. Use of scientific calculator is permitted.*

SECTION A

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

1. What is the difference between production and productivity ? Discuss various factors affecting productivity. 10
2. Define method study. Explain the systematic procedure of method study. 10
3. Define standard time. Explain various allowances provided to the operators for the purpose of calculating standard time. 10

4. Discuss the various factors affecting product design. 10
5. Describe the ergonomic conditions and guidelines for body postures to get best output of work. 10
6. Write short notes on any *two* of the following topics : $2 \times 5 = 10$
- (a) Micro-Motion Study
 - (b) SIMO Chart
 - (c) Predetermined Motion Time Standards (PMTS)
 - (d) Work Sampling

SECTION B

Answer any *three* of the following :

7. A company produces two types of hats, type 1 and type 2. Labour time required to manufacture type 1 hat is two times more than type 2 hat. If all hats are of the second type only, the company can produce a total of 500 hats a day. The market limits daily sales of the first and second type to 150 and 250 hats. The profits per hat are ₹ 8 for type 1 and ₹ 5 for type 2. Formulate the problem as linear programming model in order to determine the number of hats to be produced of each type so as to maximize the profit. Solve the LPP using graphical method. 10
8. Explain the general transportation problem in matrix form. Write the steps involved in Vogel's Approximation Method (VAM). 10
9. Explain the following in the context of Queuing models : 10
- (a) Arrival pattern
 - (b) Queue discipline
 - (c) Service channel
 - (d) Kendal's notation

10. Solve the following game with Saddle Point method :

		Player B	
		Plans (choices)	
		P	Q
		L	- 3
Player A Plans (choices)	M	- 2	4
	N	2	3

Also discuss the minimax and maximin principle to find the saddle point. 10

11. Write short notes on any *two* of the following topics : 2×5=10

- (a) Application of Simulation in Industrial Engineering
 - (b) Analytic Hierarchy Process (AHP)
 - (c) The Minimax Regret Criterion for Decision Making
 - (d) Goal Programming
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