

**BACHELOR OF TECHNOLOGY IN
MECHANICAL ENGINEERING
(COMPUTER INTEGRATED
MANUFACTURING) 01018**

**Term-End Examination
December, 2013**

**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 questions from Section 'B'.

SECTION - A

1. (a) List the various techniques adopted by an industrial engineer. 5
- (b) What is method design ? Explain briefly the PQRST Model and SREDIM techniques. 5
2. (a) Explain the role of industrial engineering system in work study. 5
- (b) What is productivity subsystem ? What is industrial engineer's role in increasing productivity of a firm ? 5
3. (a) What is the relation of industrial engineering department with marketing department ? 5

- (b) Identify the techniques which help in improving productivity in service sector. 5
4. (a) Distinguish between observed time, Normal time and standard time. 5
- (b) Explain the procedure of work sampling and time study for work measurement. 5
5. (a) How can we use the concept of reverse engineering in product design and development ? 5
- (b) What are the technical factors which affect product design ? 5
6. (a) What are the objectives of ergonomic study ? 5
- (b) Explain the impact of the following on working of an operation. 5
- (i) Noise
- (ii) Temperature
- (iii) Humidity
- (iv) Lighting

SECTION - B

7. A coal fed electrical power plant uses two types of coal, i.e, grade A and grade B. The thermal value in terms of steam produced is higher for coal A than For Coal B. Coal A produces 12,000 Kg of steam per ton while Coal B produces 10,000 kg of steam per ton. The Coal A is hard coal. The pulverize unit can handle at most 12 tons of coal per hour whereas it can pulverize upto 20 tons of Coal B per hour. The conveyor loading system has a capacity of 20 tons per hour regardless of which coal is loaded. Emission of pollutants from coal A and B are as follows. 10

Coal	Sulphur Oxides	Particulate emission (Emission/Ton)
A	1700 ppm	0.75 Kg
B	3700 ppm	1.0 Kg

Safe values of the emission as per the air pollution control laws are as follows :

Sulphur oxide emission : 3000 ppm

Particulate emission : 12 kg/hour

for the given grade of coals, its details, and pollutant emission restrictions from point of view of pollution of air, formulate this as a linear programming problem, which could be used to find out the maximum possible output of electricity of the plant.

8. Solve the transportation problem whose unit cost matrix, supply and demand are given below : 10

	D ₁	D ₂	D ₃	D ₄	D ₅	Supply
O ₁	7	7	10	5	11	45
O ₂	4	3	8	6	13	90
O ₃	9	8	6	7	5	96
O ₄	12	13	10	6	3	75
O ₅	5	4	5	6	12	105
Demand	120	80	50	75	85	

9. A and B play a game in which each has three coins a 5P, a 10P and 20 P. Each selects coin without the knowledge of the others choice. If the sum of the coins is odd amount. A wins B's coin. If the sum is even B wins A's coins. Prepare the pay off matrix. Determine the optimal strategies and value of the game. 10

10. An engineering student was frequently absent to the classes in a semester. To safe guard himself, he can choose one of the alternatives given below and the professor also had four strategies. The student has approximated the probable percent of marks in the following pay off matrix against various strategies. 10

The students strategies are showing reasons as :

S₁ : due to ill health S₂ : to attend sister's marriage
 S₃ : went on project work S₄ : attended inter

college celebrations. The professors are

P_1 : Not giving attendance

P_2 : Giving exam tough

P_3 : Evaluating strictly

P_4 : complaining to principal the pay off is

	P_1	P_2	P_3	P_4
S_1	55	53	32	62
S_2	40	30	74	50
S_3	57	54	44	53
S_4	54	54	72	56

10

11. Answer *any two* of the following :

- Write down limitations of games theory.
 - Applications of ANP frame work
 - Describe steps involved in decision making.
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