

**GANPAT UNIVERSITY**  
**B.TECH SEM. VII- MECHATRONICS ENGINEERING**  
**CBCS REGULAR EXAMINATION NOV/DEC-2014**  
**2MC704 OPERATION MANAGEMENT**

**Time: 3 Hours**

**Total Marks: 70**

**Instructions:**

- 1) All questions are **compulsory**.
- 2) Figures to the **right** indicate full marks.
- 3) Answers to the two sections must be written in **separate** answer books.

**SECTION – I**

- Que:-1 Answer the following questions.** [12]
- (A) Define the term Production planning and control. Explain the need of PPC.
  - (B) Explain the A-B-C approach for inventory control.
  - (C) What is benchmarking? Explain the process of benchmarking.

**OR**

- Que:-1 Answer the following questions.** [12]
- (A) What is sales forecasting? Explain the need of forecasting.
  - (B) Explain the different sampling method.
  - (C) What is statically quality control? Explain the statically quality control techniques.

- Que:-2 Answer the following questions.** [5]
- (A) Explain the following terms.
 

1. Loading	3. AOQL	4. Dispatching
2. Producer's Risk		5. Consumer's Risk
  - (B) What is Quality control? Explain the objective of Quality Control. [3]
  - (C) Explain the purpose of product design. State the requirements of good design. [3]

**OR**

- Que:-2 Answer the following questions.** [05]
- (A) Explain the Operating Characteristics Curve with appropriate points. [05]
  - (B) A nursing home has one year moving average forecasting method to produce particular medicine requirements. The actual demand for the item is shown in table below: [06]

Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand	90	80	65	70	100	85	60	75	90	85	60	75

Using the 12 month moving Average, find the exponential smoothing

forecast for the 13<sup>th</sup> month.

**Que:-3 Attempt All.**

- (A) Using the following data relating to 10 samples of 5 items each, calculate the control limits for mean chart. Draw the chart and plot the values on it.

Samples	Dimensions in Cms.				
	Item 1	Item 2	Item 3	Item 4	Item 5
1	1.01	0.98	0.99	1.00	1.01
2	0.98	0.98	0.98	1.03	1.01
3	1.01	1.02	1.02	1.04	0.98
4	0.97	0.99	1.01	0.95	0.97
5	1.04	1.02	1.01	1.00	1.00
6	1.03	1.01	0.97	0.98	0.99
7	1.00	1.02	0.98	1.01	1.01
8	1.00	1.01	0.99	0.99	0.95
9	0.99	1.02	1.03	1.01	0.97
10	0.96	0.95	1.02	1.03	1.01

- (B) What is total quality management? Explain the different elements of TQM.
- (C) A textile mill buys its raw material from vendor. The annual demand of the raw material is 9000 units. The ordering cost is Rs.100 per order and the carrying cost is 20% of the purchase per unit per month, where the purchase price per unit is Re. find the following
- Economic order quantity (EOQ)
  - total cost w.r.t EOQ
  - number of orders per year
  - time between consecutive two orders

### SECTION – II

**Que:-4 Answer the following questions.**

- (A) A company operates in four territories and four salesmen available for an assignment. The territories are not equally rich in their sales potential. It is estimated that a typical salesman operating in each territory would bring in the following annual sales: [06]

Territory : 1 2 3 4  
 Annual Sales(Rs.) : 1.26,000 1,05,000 84,000 63,000

The four salesmen also in their ability. It is estimated that, working under the same conditions. Their yearly sales would be proportionately as follows:

Salesmen : A B C D  
 Proportion : 7 5 5 4

If the criterion is maximum expected totals sales the intuitive answer is to assign the best salesman to assign the best salesman to reach richest territory the next best salesman it the second richest and so on; verify the this answer by the assignment technique.

(B) Solve the following LP problem using graphical method. [04]

$$\text{Maximize } Z = 2X_1 + 3X_2$$

Subject to constraints

$$X_1 + X_2 \leq 30$$

$$X_2 \geq 3$$

$$0 \leq X_2 \leq 12$$

$$0 \leq X_1 \leq 20$$

$$X_1 \text{ \& } X_2 \geq 0.$$

(C) Define the term with Sketch. 1. Dummy Activities 2. Predecessor Activities [02]

OR

Que:-4 Answer the following questions.

(A) A solicitations firm employs typists on hourly piece-rate basis for their daily work. There are five typists and their charges and speed are different according to an understanding only one job was given to one typist and the typist was paid for a full hour. Even if he worked for a fraction of an hour. Find the least lost cost allocation for the following data. [06]

Typist	Rate per hour	No. of pages typed/hours	Jobs	No. of pages
A	5	12	P	199
B	6	14	Q	175
C	3	8	R	145
D	4	10	S	298
E	4	11	T	178

(B) Solve the following LP problem using graphical method. [04]

$$\text{Maximize } Z = 6x_1 + 8x_2$$

Subject to constraints

$$5x_1 + 10x_2 \leq 60$$

$$4x_1 + 4x_2 \leq 40$$

$$x_1 \text{ \& } x_2 \geq 0.$$

(C) Explain the scope of Operation Management. [02]

Que:-5 Answer the following questions.

(A) Explain Various Properties of LP Solution.

(B) The following table gives data on normal time, and cost and crash time, and cost for a project.

activity	normal		Crash	
	time(weeks)	cost(rs)	time(weeks)	cost(rs)
1-2	3	300	2	400
2-3	3	30	3	30
2-4	7	420	4	580
2-5	9	720	7	810
3-5	5	250	4	300
4-5	0	0	0	0
5-6	6	320	4	410
6-7	4	400	3	470
6-8	13	780	10	900
7-8	10	1000	9	1200

Indirect cost is Rs 50 per week.

Determine the followings.

1. Draw the network diagram for the project and identify the critical path.
2. What are the normal project duration and associated cost?
3. Find out the total float associated with each activity.
4. Crash the relevant activities systematically and determine the optimal project completion time and cost.

OR

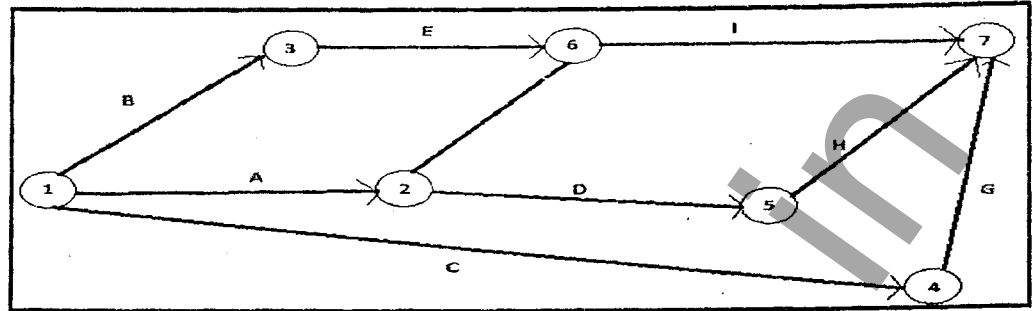
Que:-5 Answer the following questions.

(A) Explain Various Phases of Operation Research. [2]

(B) Explain Hungarian Method for assignment Problem. [3]

(C) The following network diagram represents activities related with a project: [3]

Activities	: A	B	C	D	E	F	G	H	I
Optimistic time :	5	18	26	16	15	6	7	7	3
Pessimistic time :	10	22	40	20	25	12	12	9	5
Most likely time :	8	20	33	18	20	9	10	8	4



Determine the following:

- Expert activity time and variance.
- The earliest and latest expected completion times of each event.
- The critical path.

Que:-6 Attempt any two.

(A) Use the simplex method to solve the following LP problem.

$$\text{Maximize } Z = x_1 + 4x_2 + 5x_3$$

Subject to constraints

$$(i) 3x_1 + 3x_3 \leq 22, \quad (ii) x_1 + 2x_2 + 3x_3 \leq 104, \quad (iii) 3x_1 + 2x_2 \leq 15$$

$$x_1, x_2, x_3 \geq 0.$$

(B) A company has three production facilities  $s_1, s_2,$  and  $s_3$  with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses  $D_1, D_2, D_3$  and  $D_4$  with requirement of 5, 6, 7 and 14 units (in 100s) per week. Respectively, The transportation costs (in rupees) per units between factories to warehouses are given in the table below:

	D1	D2	D3	D4	Capacity
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

Find the initial basic feasible solution using each of following methods and compare their total costs.

- NWCM
- LCM
- VAM

(C) Use the penalty (Big-M) method to solve the following LP problem.

$$\text{Maximize } Z = 5x_1 + 3x_2$$

Subject to constraints

$$(i) 2x_1 + 4x_2 \leq 12, \quad (ii) 2x_1 + 2x_2 = 10, \quad (iii) 5x_1 + 2x_2 \geq 10 \quad \text{and } x_1, x_2 \geq 0.$$

**END OF PAPER**