Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester VIII Mechanical Engineering

Regular Examination April – June 2015

2ME802 – Production & Operations Management

Time: 3 Hours **Total Marks: 70**

Instruction: 1 All questions are **compulsory**.
2 Figures to the **right** indicate full marks.
3 **Section-I** and **Section-II** must be written in **separate** answer books.
4 Use **HB pencil** only to draw figures and give proper notations.

Section - I

Que.– 1 **(a)** Explain Structure of Linear programing model. **[04]**

(b) Solve the following LP problem using simplex method. **[08]**
Maximize $Z = 3X_1 + 2X_2 + 5X_3$
Subject to
$X_1 + X_2 + X_3 \leq 9$
$2X_1 + 3X_2 + 5X_3 \leq 30$
$2X_1 - X_2 - X_3 \leq 8$
$X_1, X_2, X_3 \geq 0$

OR

Que.– 1 **(a)** Solve the following problem using two phase method. **[08]**
Minimize Z = X1+X2
Subject to
$2X_1 + X_2 \geq 4$
$X_1 + 7X_2 \geq 7$
$X_1, X_2 \geq 0$

(b) Explain Hungarian Method for Assignment Problem. **[04]**

Que.– 2 **(a)** A project consists of 8 activities. Precedence relation and activity times are given. Draw the network and compute the critical path show the slack for each activity in a tabular form. **[06]**

Activity	Immediate Precedence	Activity time (weeks)
P	-	12
Q	-	20
R	-	28
S	R	12
T	P, Q	28
U	T, S	12
V	S	8
W	U, V	8

(b) How CPM and PERT are different? State their applications. **[05]**

OR

Que.– 2 **(a)** The following table gives data on normal time and cost crash time and cost for a project: **[06]**

Activity	Normal		Crash	
	Time (days)	Cost (Rs.)	Time (days)	Cost (Rs.)
1-2	6	60	4	100
1-3	4	60	2	200
2-4	5	50	3	150
2-5	3	45	1	65
3-4	6	90	4	200
4-6	8	80	4	300
5-6	4	40	2	100
6-7	3	45	2	80

The indirect cost per day is Rs. 10.

(i) Draw the network for the project.
(ii) Find the critical path
(iii) Determine minimum total time and corresponding cost.

(b) A company has one surplus truck in each of the cities A, B, C, D and E and one deficit truck in each of the cities a, b, c, d, e and f. The distance between the cities in kilometers is shown in matrix below. Find the assignment of trucks from cities in surplus to cities in deficit so that the total distance covered by the vehicles is minimum. **[05]**

	a	b	c	d	e	f
A	12	10	15	22	18	8
B	10	18	25	15	16	12
C	11	10	3	8	5	9
D	6	14	10	13	13	12
E	8	12	11	7	13	10

Que.– 3 **Attempt any two.** **[12]**

(a) Explain each of the following terms:

(i) LTPD
(ii) AOQL
(iii) Producer's risk
(iv) Customer's risk

(b) Determine an initial basic feasible solution to the following Transportation problem using:

(a) Least cost method

(b) Vogel's approximation method

DESTINATION

ORIGIN	1	2	3	4	Availability
A	7	2	5	5	30
B	4	4	6	5	15
C	5	3	3	2	10
D	4	-1	4	2	20
Requirement	20	25	15	15	

(c) Explain the various methods of sales forecasting. How do you forecast the sales of a new product?

Section – II

Que.– 4 (a) What is unbalanced transportation problem? How will you attempt to solve it? Explain with suitable example. [06]

(b) Find the feasible solution of the following transportation problem using North West corner method. [06]

Factory	Warehouse				Supply
	W1	W2	W3	W4	
F1	14	25	45	5	6
F2	65	25	35	55	8
F3	35	3	65	15	16
Demand	4	7	6	13	

OR

Que.– 4 (a) Explain the rules of constructing the AOA network diagram. [06]

(b) The past data regarding the sales of SPMS for the last five years is given. Using the least square method, fit a straight line, Estimate the sales for the year 1996 and 1997. [06]

Year	1991	1992	1993	1994	1995
Sales ('00)	35	56	79	80	40

Que.– 5 (a) Define the following: [05]

(i) Infeasible Solution
(ii) Feasible solution
(iii) Optimal solution
(iv) Alternative optimal solution
(v) Unbounded solution

(b) A grinding and finishing operation is monitored using a mean and when count 6 sample of 20 observation have been attained and the sample mean and range is compute as below. Determine the control limits and draw the charts and state whether the process is in control or not. (Take $A_2 = 0.18$, $D_3 = 0.41$, $D_4 = 1.59$) [06]

Sample no.	1	2	3	4	5	6
Mean	3.06	3.15	3.12	3.30	3.06	3.09
Range	0.42	0.50	0.41	0.46	0.46	0.49

OR

Que.– 5 (a) Explain the operating characteristics curve. Differentiate between sampling inspection and 100 % inspection. [06]

(b) A person repairing radios finds that the time spent on the radio sets has exponential distribution with mean 20 minutes. If the radios are repaired in the order in which they come in and their arrival is approx. Poisson with an average rate of 15 of 8 hours day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? [05]

Que.– 6 Attempt all. [12]

(a) The Demand for the disposable plastic tubing for a general hospital is 300 units and 350 units for September and October respectively. Using 200 units as demand for September, compute the forecast for the month of November. Assume the value of $\alpha = 0.7$.

(b) What is normal distribution curve? Define control chart and Process Capability. List out the types of assignable cause patterns of variation.

END OF PAPER