

Exam. Code : 108505

Subject Code : 8087

B.Com. 5th Semester (Old Sylb. 2017)

OPERATIONS RESEARCH

Paper—BCG-505

Time Allowed—Three Hours] [Maximum Marks—50

SECTION—A

Note :—Attempt any **TEN** parts. Each part carries **1** mark.

1. (i) Define Unrestricted Variables.
- (ii) Differentiate between PERT and CPM.
- (iii) What is an Unbalanced Assignment Problem ?
- (iv) Explain the North West corner method of solving a transportation problem.
- (v) State the rules for constructing a Project Network.
- (vi) Write the limitations of Game Theory.
- (vii) Define and illustrate Merge and Burst events.
- (viii) Define Degeneracy in Transportation Problem.
- (ix) Define Operations Research.

- (x) Define unbounded solution in L.P.P.
- (xi) Write assumptions of queueing theory.
- (xii) Distinguish pure and mixed strategies.

SECTION—B

Note :—Attempt any **TWO** questions. Each question carries **10** marks.

2. Define Operations Research. Discuss its uses in day to day decision making process.
3. Time taken in hours by four mechanics in performing four tasks are as follows :

Tasks	Machines			
	I	II	III	IV
W	9	27	20	12
X	14	29	8	27
Y	39	20	19	16
Z	20	28	26	10

How should the tasks be allocated, one to a person, amongst the four mechanics, so as to minimize the total man hours ?

4. Define L.P.P. Write its applications. Solve the following LPP using Graphical Method :

(a) Minimize $Z = 60x_1 + 80x_2$

Subject to

$$20x_1 + 30x_2 \geq 900$$

$$40x_1 + 30x_2 \geq 1200$$

$$x_1, x_2 \geq 0$$

- (b) Differentiate Transportation problems and Assignment problems.
5. The firm wants to send the output from various plant to warehouses involving minimum transportation cost. A company plan to assign 5 salesmen to five districts in which it operates. Estimates of sales revenue in thousands of Rupees for each salesman in a different district are given in the following table. In your opinion

what should be the placement of salesmen if the objective is to maximize the expected sales revenue ?

Salesman	District				
	D_1	D_2	D_3	D_4	D_5
S_1	40	46	48	36	48
S_2	48	32	36	29	44
S_3	49	35	41	38	45
S_4	30	46	49	44	44
S_5	37	41	48	43	47

SECTION—C

Note :— Attempt any **TWO** questions. Each question carries **10** marks.

6. At a certain petrol pump, customers arrive in a Poisson process with an average time of 5 minutes between arrivals. The time-intervals between services at the petrol pump follow exponential distribution and as such the mean time taken to service a unit is 2 minutes. On the basis of this information you are required to answer the following questions :

(a) What would be the expected average queue length ?

- (b) What would be the average number of customers in the queuing system ?
- (c) How long on an average a customer does wait in the queue ?
- (d) How much time on an average a customer does spend in the system ?
- (e) By how much should the flow of customers be increased to justify the opening of a second service point if the management is willing to open the same provided the customer has to wait for 5 minutes for the service ?
7. Solve the rectangular game whose pay-off matrix for player A is :

	B1	B2	B3
A1	8	-4	-2
A2	9	17	16
A3	10	20	-5

8. (a) "A game refers to a situation of Business Conflict." Comment on the situation.

(b) Differentiate PERT and CPM. How costs are calculated in this ?

9. A project has the following characteristics :

Activity	Preceding Activity	Expected Completion Time (in Weeks)
A	None	5
B	A	2
C	A	6
D	B	12
E	D	10
F	D	9
G	D	5
H	B	9
I	C, E	1
J	G	2
K	F, I, J	3
L	K	9
M	H, G	7
N	M	8

- (a) Draw a PERT network for this project.
- (b) Find the critical path and the project completion time.
- (c) Prepare an activity schedule showing the ES, EF, LS, LF and slack for each activity.