Exam. Code : 108506
Subject Code : 1975

B.Com. 6th Semester

BCG-603 : OPERATIONS RESEARCH

Time Allowed—3 Hours] [Maximum Marks—50

Note :— Attempt ***five*** questions in all, selecting at least ***one*** question from each section. The **fifth** question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. Use Simplex Method to solve the following LP problem :

   Maximize $Z = 30x_1+20x_2$

   Subject to contraints :

   $$-x_1-x_2 \geq -8$$
   $$-6x_1-4x_2 \leq -12$$
   $$5x_1+8x_2 = 20$$
   $$x_1, x_2 \geq 0$$

2. Discuss the development of Operations Research. Discuss characteristics and limitations of operations research.

SECTION—B

3. Discuss the various methods of finding initial feasible solution of a transportation problem. Discuss their merits and demerits.

4. Solve the following Assignment Problem

Operators	Machine			
	A	B	C	D
1	10	5	7	8
2	11	4	9	10
3	8	4	9	7
4	7	5	6	4
5	8	9	7	5

SECTION—C

5. 'Game theory provides a systematic quantitative approach for analysing competitive situations in which the competitors make use of logical processes and techniques in order to determine an optimal strategy for winning.' Comment.

6. On a highway, automobiles arrive for toll tax payments at an average rate of 3 in five minutes as per Poisson distribution. The attendant receives the tax in an average time of one minute per customer. The service time is exponentially distributes. Determine :
   (a) The probability of arrivals of 0 through 5 customers in a ten-minute interval.
   (b) The percentage of time the attendant at the toll gate shall be idle.
   (c) The average time that the attendant is free in his eight-hour duty time.
   (d) The probability of 0 to 5 customers in the system.
   (e) The expected number of customers in the system.
   (f) The expected number of customers waiting in the queue to pay tax.

SECTION—D

7. 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

(i) Draw a PERT network for this project.

(ii) Prepare an activity schedule showing the ES, EF, LS, LF and slack for each activity.

(iii) Find the critical path and the project completion time.

8. Differentiate PERT and CPM. Explain the applications of both.