Roll No. ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚ **Total No. of Pages : 03**

Total No. of Questions : 15

MBA (2012 & Onward) (Sem.–3)
APPLIED OPERATIONS RESEARCH
Subject Code : MBA-301
Paper ID : [C1169]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A contains SIX questions carrying FIVE marks each and students has to attempt any FOUR questions.**
2. **SECTION-B consists of FOUR Subsections : Units-I, II, III & IV. Each Subsection contains TWO questions each carrying EIGHT marks each and student has to attempt any ONE question from each Subsection.**
3. **SECTION-C is COMPULSORY carrying EIGHT marks.**

SECTION-A

1. Discuss the step involved in the process of decision making.

2. Explain zero Sum two person game with suitable example.

3. What is degeneracy? How it is resolved in case of transportation?

4. Explain the nature of travelling salesman problem.

5. Explain unrestricted variables.

6. What is no passing rule in sequencing problem?

SECTION- B

UNIT-I

7. Given us the following pay- off Matrix :

Course of action

State of nature	Probability	Do not expand Rs.	Expand 200 units Rs	Expand 400 units Rs.
High demand	0.4	2500	3500	5000
Medium demand	0.4	2500	3500	2500
Low demand	0.2	2500	1500	1000

What should be the decision if we use :

(a) Expected monetary value criterion

(b) Maximin criterion

(c) Maximax criterion

(d) Maximax regret criterion

8. Difference between PERT and CPM. Under what circumstances would you consider PERT as opposed to CPM in project management?

UNIT-II

9. Explain :

(a) NWCM

(b) LCEM

(c) VAM

taking suitable example. Which method is most suitable and why?

10. A manufacturing company has four zones A,B,C,D and four sales Engineers P,Q,R,S respectively for assignment. Since the four zones are not equally rich in sales potential, it is estimated that a particular engineer operating in a particular zone will bring the following sales :

Zone A : 420000, Zone B : 336000, Zone C : 294000, Zone D : 462000

The engineers are having different sales ability. Working under the same conditions their yearly sales are proportional to 14,9,11, and 8 respectively. The criteria of maximum expected total sales are to be met by assigning the best engineers to the richest zone, the next to the second richest zone and so on.

Find the optimum assignment and the maximum sales.

UNIT-III

11. Explain the various method of game theory.

12. Using graphical method to minimize the time required to process the following jobs on the machines *i.e.* for each machine specify the job which should be done first. Also calculate the total time elapsed to compete both jobs.

Table

JOB 1 Sequence :	A	B	C	D	E
Time (hrs.)	6	8	4	12	4
JOB 2 Sequence :	B	C	A	D	E
Time (hrs)	10	8	6	4	12

UNIT-IV

13. What are the three strategies of the replacement of items which follow sudden failure mechanism? Explain each of them with example.

14. Repair of a certain machine which breaks down in the factory from time to time requires five operations, which have to be performed in a sequence. The time taken to perform each of these five operations is found to have exponential distribution with mean 5 minutes and is independent of other steps. If these machines break down in passion fashion at an average rate of two per hour and if there is only one man for repairs, what is the average idle time for each machine break down?

SECTION-C

15. CASE STUDY :

The marketing time of nestle India Ltd. requires some household data from 4 different cities before introducing their product. The team has been ordered by the management to perform this job in two days, the coming Saturday and Sunday. So, the team has no option other than to spend half a day in each of the cities. The relevant data are given below :

Day & time	Probability of a household contact	Probability of a household contact	Probability of a household contact	Probability of a household contact
	City 1	City 2	City 3	City 4
Saturday Morning	0.32	0.85	0.16	0.64
Saturday Evening	0.60	0.56	0.95	0.80
Sunday Morning	0.70	0.35	0.40	0.62
Sunday Evening	0.10	0.72	0.64	0.90
Number of households expected to be interviewed	150	100	200	200

Question :

As an expert of OR in the company, you have been requested by the management to suggest the plan, (visiting) to the team in the 4 cities so that the expected response may be optimized.