

B.C.A. (2010 Course Sem- IV : SUMMER - 2019)
SUBJECT : MATHEMATICS – IV (OPERATION RESEARCH)

Day : Friday
Date : 03/05/2019

S-2019-2102

Time : 10.00 AM TO 01.00 PM
Max. Marks : 70

N.B.

- 1) **Q.1 is COMPULSORY.**
- 2) Solve any **FOUR** questions from Q.2 to Q.7.
- 3) Use of non-programmable calculator is allowed.
- 4) All questions carry **EQUAL** marks.

Q.1 What are the different types of models used in Operation Research? Discuss in detail.

Q.2 A and B are two products to be manufactured unit profits are Rs. 40 and Rs. 35 respectively. Maximum material available is 60 kgs and labour 96 hours. Each unit of A needs 2 kg of material and 3 man hours, whereas each unit of B needs 4 kg of material and 3 man hours. Find optimal level of A and B to be manufactured.

Q.3 Find the optimum basic solution to the degenerate transportation problem.

| From | To | | | Supply |
|--------|----|---|---|--------|
| | A | B | C | |
| X | 7 | 3 | 4 | 2 |
| Y | 2 | 1 | 3 | 3 |
| Z | 3 | 4 | 6 | 5 |
| Demand | 4 | 1 | 5 | |

Q.4 Find the optimal assignment for the following cost matrix.

| Salesmen | Territories | | | |
|----------|-------------|----|----|----|
| | A | B | C | D |
| 1 | 35 | 27 | 28 | 37 |
| 2 | 28 | 34 | 29 | 40 |
| 3 | 35 | 24 | 32 | 33 |
| 4 | 24 | 32 | 35 | 82 |

Q.5 Find the sequence to minimize the total elapsed time (in hours) required to complete the following jobs on two machine $M_1 \rightarrow M_2$

| Machines | Processing Time for jobs | | | | |
|----------|--------------------------|----|---|----|----|
| | A | B | C | D | E |
| M_1 | 4 | 13 | 7 | 12 | 6 |
| M_2 | 3 | 15 | 5 | 6 | 11 |

P.T.O.

Q.6

Consider the following schedule of activities and related information for the construction of a new plant

| Activity | Expected Time | | Expected Cost (Rs. 00,000's) |
|----------|---------------|----------|------------------------------|
| | Months | Variance | |
| 1-2 | 4 | 1 | 5 |
| 2-3 | 2 | 1 | 3 |
| 3-6 | 3 | 1 | 4 |
| 2-4 | 6 | 2 | 9 |
| 1-5 | 2 | 1 | 2 |
| 5-6 | 5 | 1 | 12 |
| 4-6 | 9 | 5 | 20 |
| 5-7 | 7 | 8 | 7 |
| 7-8 | 10 | 16 | 14 |
| 6-8 | 1 | 1 | 4 |

Calculate :

- a) The critical path
- b) Expected cost of construction of the plant
- c) Expected time require to build the plant
- d) The standard deviation of the expected time

Q.7

Write short notes on any **TWO** of the following:

- a) Decision model
- b) Expected opportunity loss
- c) Decision making under risk

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