

B.C.A. (2010 COURSE SEM- IV : SUMMER - 2018)
SUBJECT: MATHEMATICS – IV (OPERATIONS RESEARCH)

Day : **Tuesday**
 Date : **08/05/2018**

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

S-2018-1737

N.B.:

- 1) Q. 1 is **COMPULSORY**.
- 2) Attempt any **FOUR** questions from Q. 2 to Q. 7.
- 3) Use of non programmable **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.
- 5) Graph papers will be provided if **NECESSARY**.

Q.1 Define Operations research. Discuss the scope and limitations of operations research. (14)

Q.2 A manufacturer produces bicycles and tricycles each of which must be processed through two machines A and B. Machine A has maximum of 120 hours available and machine B has a maximum of 180 hours available. Manufacturing a tricycle requires 6 hours on machine A and 3 hours on machine B. Manufacturing a bicycle required 4 hours on machine A and 10 hours on machine B. If profits are Rs. 45 for a tricycle and Rs. 65 for a bicycle. Formulate and solve LPP graphically. (14)

Q.3 Solve the following transportation problem to get optimum solution. (14)

Destinations Sources	D ₁	D ₂	D ₃	Supply
O ₁	8	16	16	152
O ₂	32	48	32	164
O ₃	16	32	48	154
Demand	144	204	82	

Q.4 A company has six jobs to be processed by six machines. The following table gives the return in rupees when ith job is assigned to jth machine (i, j = 1,2...6). How should the jobs be assigned to the machines so as to maximize the overall return? (14)

Jobs Machines	I	II	III	IV	V	VI
1	9	22	58	11	19	27
2	43	78	72	50	63	48
3	41	28	91	37	45	33
4	74	42	27	49	39	32
5	36	11	57	22	25	18
6	13	56	53	31	17	28

P. T. O.

- Q.5** Jobs 1, 2, 3, 4 are to be processed on each of the five machines A, B, C, D and E in the order ABCDE. Find the total minimum elapsed time if no passing of jobs is permitted. Also find the idle time for each machine. **(14)**

Machines	Jobs			
	1	2	3	4
A	7	6	5	8
B	5	6	4	3
C	2	4	5	3
D	3	5	6	2
E	9	10	8	6

- Q.6** An established company has decided to add a new product to its line. It will buy the product from a manufacturing concern, package it, and sell it to a number of distributors selected on a geographical basis. Market research has indicated the volume expected and the size of sales force required. The steps shown in the following table are to be planned. **(14)**

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessors	-	A	B	A	D	E	-	G	J, H	-	A	C, K	I, L
Duration (days)	6	4	7	2	4	10	2	10	6	13	9	3	5

- i) Draw the network diagram.
 - ii) Indicate the critical path.
 - iii) For each non-critical activity, find the total and free float.
- Q.7** Write short notes on any **TWO** of the following: **(14)**
- a) Decision trees
 - b) Monte Carlo simulation technique
 - c) Simplex method

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