Seat No _____

T.Y.B.C.A. Examination
Operations Research (306)
March/April 2016

Time 3.00 Hrs CODE - Y6618 **100 Marks**

Q-1 Answer the following [20]

(a) Discuss views of organizations about of OR.

(b) Explain Scientific Method of OR

OR

Q-1 Answer the following [20]

(a) Discuss the origin and development of OR.

(b) What are the various phases of Operations Research? Explain

Q-2 Answer the following [20]

(a) Explain Model formulation with example

(b) Max $Z = 80X_1 + 160X_2$

Subject to constraints

1) $4X_1 + 6X_2 \leq 96$
2) $2X_1 \leq 30$
3) $2X_2 \leq 20$

$X_1, X_2 \geq 0$

Solve above LPP using graphical method

OR

Q-2 Answer the following [20]

(a) Explain Graphical method to solve LPP.

(b) Max $Z = 120X_1 + 80X_2$

Subject to constraints

1) $2X_1 \leq 50$
2) $2X_2 \leq 70$
3) $4X_1 + 2X_2 \leq 120$

$X_1, X_2 \geq 0$

Solve above LPP using Simplex method

Q-3 Do as directed [20]

a) A department of a company has five programmers with five projects to be performed. The time (in hours) that each programmer takes to perform each project is given in the effectiveness matrix.

		Programmer				
		I	II	III	IV	V
Projects	A	5	2.5	6.5	7.5	8
	B	1.5	4.5	9	6.5	3
	C	5	3.5	1	1	1
	D	3.5	5.5	4.5	3.5	6
	E	3.5	4.5	2.5	2	6

How should project be allocated, one per programmer, so as to minimize the total man-hours?

b) A machine operator processes four types of items on his machine and he must choose a sequence for them. The set-up cost per change depends on the items currently on machine and the set-up to be made according to the following table.

		To City			
		A	**B**	**C**	**D**
From City	**A**	∞	4	7	3
	B	4	∞	6	3
	C	7	6	∞	7
	D	3	3	7	∞

If he processes each of the items once and only once each week, then how should he sequence the item on his machine? Use the method of travelling salesman.

OR

Q-3 Determine an optimal solution to the following transportation problem by using MODI method. [20]

		Retailers				
		R1	**R2**	**R3**	**R4**	**Supply**
Warehouse	**W1**	10	12	17	27	200
	W2	11	19	18	14	300
	W3	24	15	22	16	500
	Demand	100	300	400	200	

Q-4 Do as directed. [20]

a) Write short a note on Forward path method and Backward Pass Method.

b) Define terms: Slack of an event, Slack on an activity, Free Float, Total Float, Independent Float

OR

Q-4 Do as directed. [20]

Activity	Durations (days)	Immediate Predecessors
A	10	----
B	5	A
C	3	B
D	2	C
E	1	A
F	8	E
G	6	E
H	4	E
I	2	H,L
J	10	K
K	4	D,F,G
L	2	J
M	1	H, L

a) Draw the network diagram showing the interrelations between the various activities of the project.

b) Calculate the minimum time that the renovations can take from the design stage (CPM).

c) Calculate the 'independent float' that is associated with the non-critical activities in the network diagram.

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Q-5 Do as directed. [20]

a) Explain Replacement with types of failure.

b) We have five jobs, each of which must be processed on the three machines A,B and C, in the order ABC. Processing times in hours are given below.

	J1	J2	J3	J4	J5
Machine A	10	2	18	6	20
Machine B	4	12	14	16	8
Machine C	2	4	6	8	10

Determine a sequence for the five jobs that will minimize the elapsed time T. also calculate idle time for Machine A, B and C.

OR

Q-5 Do as directed. [20]

a) Assumptions in sequencing problem.

b) The data collected in running a machine, the cost of which is Rs. 1,20,000 are given below.

Year	1	2	3	4	5
Resale Value(Rs)	84,000	60,000	40,400	28,000	18,000
Cost of spares(Rs)	8,000	8,000	8,880	10,700	12,800
Cost of labour(Rs)	28,000	32,000	36,000	42,000	25,000

Determine the optimum period for replacement of the machine.

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