Bharati Vidyapeeth
(Deemed to be University), Pune
School of Distance Education

Name of the Assignment Setter:		**Mr. Yashwant Kumar**			
Course:	**BBA(CBCS)**	**Class:**	**BBA**	**Semester:**	**Vth**
Subject:	**Introduction to Operations research**				

Q.1)	Attempt **ANY ONE** of the Following **(1000 Words)**		**(10)**
	a)	A carpenter manufactures two wood items, A and B. The total number of items that the carpenter can handle per day at the most, is 24. It takes one hour to make item A and half an hour to make item B. It is assumed that the carpenters can work for a maximum of 16 hours a day. Further, the profit on item A is Rs.300 and that on item B is Rs.100. Formulated this LPP and also calculate the maximum number of both items that can be produced daily to maximize the profit.	
	b)	A company has three plants P_1, P_2, and P_3 which supply to warehouse at W_1, W_2, W_3 and W_4. The monthly plant capacities are 160, 150, and 190 units and the warehouse requirements are 80, 90, 110, and 160 units respectively. The unit transportation costs (in Rs.) are as follows:	
Q.2)	Attempt ANY TWO of the Following (800 Words)		**(12)**

	W_1	W_2	W_3	W_4
F_1	42	48	38	37
F_2	40	49	52	51
F_3	39	38	40	43

a)

The time and cost estimates and precedence relationship of the different activities constituting a project are given below:

Activities	Immediate Predecessor Activities	Time in Normal	Week Crash	Cost in Rs.	
				Normal	Crash
A	-	3	2	8000	19000
B	-	8	6	600	1000
C	B	6	4	10000	12000
D	B	5	2	4000	10000
E	A	13	10	3000	9000
F	A	4	4	15000	15000
G	F	2	1	1200	1400
H	C,E,G	6	4	3500	4500
I	F	2	1	7000	8000

Draw project network diagram and find the Critical Path.

b)

Using graphical method find the maximum value of

$Z = 7 X_1 + 10 X_2$ subject to constraints

(i) $X_1 + X_2 \leq 30000$

(ii) $X_2 \leq 12000$

(iii) $X_1 \geq 6000$

(iv) $X_1 \geq X_2$

(v) $X_1 , X_2 \geq 0$

c) Determine an initial basic feasible solution to the following transportation problem by using NWCR

		Destination				
		D_1	D_2	D_3	D_4	Supply
Source	S_1	21	16	15	3	11
	S_2	17	18	14	23	13
	S_3	32	27	18	41	19
	Demand	6	10	12	15	

d) What is the unbalanced Assignment problem? How is it solved by the Hungarian method?

Q.3) Write Short Notes on (ANY TWO) **(08)**

a) CPM

b) PERT

c) Vogel's Approximation Method

d) Operations research approach.

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