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MBA 4th Sem. Examination, 2014

Operation Research **Paper - 13**

Time : 3 Hrs. Full Marks : 80

1. Answer any five from the following questions $2\times5=10$
   (a) What are the two methods of simulation?
   (b) What are two types of basic feasible solution?
   (c) What is a transportation problem?
   (d) What do you mean by maximization in an assignment problem?
   (e) Define the Saddle Point of a Payoff matix.
   (f) What is a network?
   (g) Write two basic differences between PERT and CPM.
2. Answer any three from the following questions $4\times3=12$
   (a) How is Operation Research (OR) useful to personnel management?
   (b) Solve the following L.P.P by the graphical method.

   Maximize $Z = 100x + 40y$

   Subject to, $5x + 2y \leq 1000$

   $3x + 2y \leq 900$

   $x + 2y \leq 500$

   and $x, y \geq 0$

   (c) Define feasible, basic, non-degenerate solutions of a transportation problem.
   (d) For what type of business can game theory be useful? Explain.
   (e) Construct a network for each of the projects whose activities and their Precedence relationship are given as follows :

Activity	A	B	C	D	E	F	G	H	I	J	K
Predecessor	-	-	-	A	B	B	C	D	E	H,I	F,G

3. Answer any three from the following questions $6\times3=18$
   (a) Define Operation Research (OR). Write a note on the various phases in solving an OR problem.

(b) A paper mill produces two grades of paper, X and Y. Because of raw material restrictions, it cannot produce more than 400 tonnes of grad X and 300 tonnes of grade Y in a week. There are 160 Production hours in a week. It require 0.2 and 0.4 hours to produces a tonne of products X and Y respectively with corresponding profits of Rs. 200 and Rs. 500 per tonne. Formulate this as an LPP to maximize profit and find the optimum product mix.

(c) Find the initial solution to the following transportation problem using Vogel's Approximotion Method (VAM).

		Destination				
		D_1	D_2	D_3	D_4	Supply
Factory	F_1	3	3	4	1	100
	F_2	4	2	4	2	125
	F_3	1	5	3	2	75
	Demand	120	80	75	25	300

(d) What are zero-sum and non-zero-sum games?
Use graphical methods in solving the following game.

$$\begin{array}{c} \\ A \\ \\ \end{array} \begin{array}{c} B \\ \begin{pmatrix} 3 & -3 & 4 \\ -1 & 1 & -3 \end{pmatrix} \end{array}$$

(e) Define 'crashing'. When is crashing preferred? Explain the procedure of crashing a project.

4. Answer any four from the following questions $10\times4 = 40$

(a) Using simplex method solve the following LPP.

Maximize $Z = x_1 + x_2 + 3x_3$

Subject to, $3x_1 + 2x_2 + x_3 \le 3$

$2x_1 + x_2 + 2x_3 \le 2$

$x_1, x_2, x_3 \ge 0$

(b) A marketing manager has 5 salesmen and there are 5 sales district. Considering the capabilities of the salesman and the nature of 12 districts, the estimates made by the marketing manager for the sales per month (in 1000 rupees) for each salesmen in each district would be as follows :

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

Find the assignment of salesmen to the districts that will result in the maximum sales.

(c) Explain the following briefly with examples :

(i) North West Corner Rule

(ii) Least cost method.

(d) Determine the optimum Strategies and the values of the game from Pay-off matrix concerning a 2 person 4×2 game

$$\begin{array}{c} \\ X \\ \\ \\ \\ \end{array} \begin{array}{c} Y \\ \begin{bmatrix} -6 & -2 \\ -3 & -4 \\ 2 & -9 \\ -7 & -1 \end{bmatrix} \end{array}$$

(e) A project schedule has the following characteristics :

Activity	1–2	1–3	2–4	3–4	3–5	4–9	5–6	5–7
Time (days)	4	1	1	1	6	5	4	8
Activity	6–8	7–8	8–10	9–10				
Time (days)	1	2	5	7				

From the above information,

(i) Draw a network diagram.

(ii) Compute the earliest event time and latest event time.

(iii) Determine the critical path and total project duration.

(iv) Compute total, free float for each activity.

(f) Write the steps for finding a solution using the Hungarian method.