Sanjay Ghodawat University, Kolhapur 2017-18

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FYMBA	**School of Commerce and Management**	Management
MMC502	**Operation Research**	**Semester – Even (II)**
22 May 2018	**End Semester Examination**	**Time: 3 hrs, Max Marks: 100**

10:30 AM To 1:30 PM

Instructions: 1) All Questions are compulsory.

		Marks	COs

Q.1   A company produces 2 types of pens P1 and P2. Every pen P1 requires twice as much labour time as the second pen P2. If the company produces only pen P2 then it can produce a total of 500 pens per day. The market limits daily sales of pen P1 and P2 to 150 and 250 respectively. The profits on pen P1 and P2 are Rs. 8 and Rs. 5 respectively.

a)   Formulate a linear programming problem for the above situation.   10   CO502.2

b)   Solve it by graphical method to get maximum profit.   10   CO502.2

Q.2   Solve any Two

a)   Define Operation Research as a decision making science. And Discuss its limitations.   10   CO502.1

b)   The owner of a small machine shop has four machines available to assign jobs for the day. Five jobs are offered with expected profit for each mechanic on each jobs, which are as follows: 10   CO502.1

Jobs

Mechanic		I	II	III	IV	V
	M_1	62	78	50	111	82
	M_2	71	84	61	73	59
	M_3	87	92	111	71	81
	M_4	48	64	87	77	80

By using the assignment method, find the assignment of mechanics to the job that will result in maximum profit. Which job should be

declined?

c) A businessman has four alternatives, each of which can be followed by any of the four possible events. The conditional payoffs (in Rs.) for each action-event combination are given below.   10   CO502.1

Action	Payoff conditional on events		
	S_1	S_2	S_3
A_1	3,500	1,500	750
A_2	2,500	2,250	500
A_3	1,500	1,500	1,500

Determine which alternative should be selected if the businessman adopts,

i) Maximax Criterion

ii) Maxinin Criterion
iii) Laplace Principle

iv) Harwich Principle ($\alpha = 0.6$)

v) Minimin Regret Criterion

vi) Minimax Regret Criterion

Q.3   Solve any Two

a) Write a short note on Simplex Algorithm.   10   CO502.2

b) Write the dual of the following primal LPP   10   CO502.2

Maximize $Z = 3x_1 + 5x_2 + 7x_3$

Subject to Constraints,
(i) $x_1 + x_2 + 3x_3 \leq 10$
(ii) $4x_1 - x_2 + 2x_3 \geq 15$

And $x_1, x_2, \geq 0$; x_3 and unrestricted in sign.

c) Determine an initial basic feasible solution to the following transportation problem by using VAM Method: 10   CO502.2

	D_1	D_2	D_3	D_4	Supply
S_1	24	32	41	16	25
S_2	11	24	18	20	15
S_3	28	22	32	14	18
S_4	32	35	40	12	12
Demand	14	26	20	10	

Q.4   Solve any Two

a) Describe the Mathematical formulation of an Assignment Problem with example.   10   CO502.3

b) For a game with the following payoff matrix,   10   CO502.3

Player A	Player B			
	B_1	B_2	B_3	B_4
A_1	-5	4	1	20
A_1	5	5	4	6
A_1	3	-2	0	-5

Determine the best strategies as well as the value of the game for player A and B. Is this game fair and strictly determinable?

c)   Draw the project network and find critical path and corresponding   10   CO502.3
     project Completion time:

Activity	Days		
(i - j)	Optimistic	Most Likely	Pessimistic
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

Q.5   Solve any Two

a)   Explain the following terms in the context of sequencing problems: 10   CO502.4

        i)   Total Elapsed Time and Idle Time
        ii)   Processing Order and Processing Time

b)   Explain the following: 10   CO502.4

        i)   Arrival Pattern
        ii)   Service Discipline

c)   At what average rate must a clerk in a supermarket work in order to   10   CO502.4
     ensure a probability of 0.90 that a customer will not have to wait
     longer than 12 minutes? Customers arrive at the counter on Poisson
     fashion with mean rate of 15 per hour. Service time has exponential
     distribution.

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