Total No. of Questions : 4] **SEAT No. :**

P807 **[Total No. of Pages : 3**

[5315]-407
T.Y. B.Sc.
MATHEMATICS (Semester - IV)
MT - 347 (A) : Optimization Techniques
(2013 Pattern) (Paper - IV)

Time : 2 Hours] ***[Max. Marks : 40***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) Attempt any five of the following : **[10]**

a) Define the term Game.

b) What are the type of failure in the replacement problem.

c) In a game of matching coins, player A wins Rs.2 if there are two heads, nothing if there are two tails and losses Rs. 1 when there is one head and one tail. Determine the pay-offmatrix.

d) Examine the following functions for extreme point.

$f(x) = x^4 + x^2$

e) Draw the network for the following relationship.

Event number :	0	1	2,3	4	5	6
Preceded by : start event	0	1	2,3	3	4,5	

f) Give any two characteristics of two person zero sum game.

g) What do you mean by no passing rule in sequencing problem?

Q2) Attempt any two of the following : **[10]**

a) We have a nine jobs each of which has to go through the machines M_1 and M_2 in the order $M_1 - M_2$. Processing time (in hours) are given as:

Jobs :	J_1	J_2	J_3	J_4	J_5	J_6	J_7	J_8	J_9
Mahine M_1:	2	5	4	9	6	8	7	5	4
Machine M_2:	6	8	7	4	2	9	3	8	11

Determine a sequence of these jobs that will minimize the total elapsed time.

Also find the idle time for machine M_2.

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b) A fleet owner finds from his past records that the cost per year of an auto whose purchase price is Rs. 10,000 are given below.

Year :	1	2	3	4	5	6	7	8
Running Cost(Rs.) :	15,00	1900	2300	2900	3600	4500	5500	
Resale Value (Rs) :	5000	2500	1250	600	400	400	400	

Determine the optimum period of replacement

c) Solve the following non-linear programming problem by lagranges method.

$f(x) = 2x_1^2 - 24x_1 + 2x_2^2 - 8x_2 + 2x_3^2 - 12x_3 + 200$

Q3) a) Attempt any two of the following : **[10]**

Solve the following game using graphical method and find the value of the game.

		B			
		B_1	B_2	B_3	B_4
A	A_1	1	4	–2	–3
	A_2	2	1	4	5

b) Construct a network of project whose activities and their precedence relationship are as given below.

Activity	A	B	C	D	E	F
Predecessor	-	A	A	B	C	D,E

c) Using dominance rule. Find the optimal strategies for player A and player B in the following game. Also determine the value of game.

		Player B			
		B_1	B_2	B_3	B_4
Player A	A_1	19	6	7	5
	A_2	7	3	14	6
	A_3	12	8	18	4
	A_4	8	7	13	–1

Q4) Attempt any one of the following : **[10]**

a) A project consist of a series of tasks labeled A,B,C, --- H, I in the following relationships (constraints) A < D, E; B, D < F; C < G; B<H; F, G < I.

The time (in days) for each task is given below

Task	:	A	B	C	D	E	F	G	H	I
Time (in days)	:	23	8	20	16	24	18	19	4	10

a) Draw a network diagram for the project

b) Find a critical path and project completion time.

b) The data for a PERT network is given in the following table.

Predecessors event i		Successors event j	Time estimates to	tm	tp
10	-	20	6	9	12
10	-	50	4	7	8
20	-	30	14	17	20
20	-	40	7	10	13
20	-	50	3	5	9
30	-	70	13	18	25
40	-	60	10	14	16
40	-	70	12	15	18
50	-	60	9	11	12
60	-	70	17	20	25

i) Draw a network for the project

ii) Compute the expected project completion time.