MODEL QUESTIONS

M.Sc. Sem-IV

Paper – ECMATH402(C) (Operations Research)

Long Type Questions

Unit - I

1) Solve $\max. Z = x_1 + 2x_2$

S.t.

$x_1 + x_2 \leq 7$

$2x_1 \leq 11$

$2x_2 \leq 7$

$x_1, x_2 \geq 0$ and are integers

2) Solve $\max. Z = x_1 + x_2$

S.t.

$2x_1 + 5x_2 \leq 16$

$6x_1 + 5x_2 \leq 30$

$x_1, x_2 \geq 0$ and are integers

3) Solve $\max. Z = 7x_1 + 9x_2$

S.t.

$-x_1 + 3x_2 \leq 6$

$7x_1 + x_2 \leq 35$

$x_1, x_2 \geq 0$ and x_1 is an integer

4) Solve $\max. z = 3x_1 + 4x_2$

S.t.

$3x_1 - x_2 \leq 12$

$3x_1 + 11x_2 \leq 66$

$x_1, x_2 \geq 0$ and x_2 is an integer.

5) Describe Branch and Bound Technique to solve an IPP.

6) Use Branch and Bound Technique to solve the following IPP

i) max. $Z = 7x_1 + 9x_2$

S.t.

$$-x_1 + 3x_2 \leq 6$$
$$7x_1 + x_2 \leq 35$$
$$x_1 \leq 7$$
$$x_2 \leq 7$$

$x_1, x_2 \geq 0$ and are integers.

ii) max. $Z = x_1 + x_2$

S.t.

$$3x_1 + 2x_2 \leq 12$$
$$x_2 \leq 2$$

$x_1, x_2 \geq 0$

Unit – II

1) Solve the following NLPP by Lagrangian Multiplier Method

min $Z = x_1^2 + x_2^2 + x_3^2$

S.t.

$$x_1 + x_2 + 3x_3 = 2$$
$$5x_1 + 2x_2 + x_3 = 5$$

$x_1, x_2, x_3 \geq 0$

2) Solve by Lagrangian Multiplier Method

max. $Z = x_1^2 + 4x_1x_2 + x_2^2$

S.t.

$$x_1^2 + x_2^2 = 1$$

and $x_1, x_2 \geq 0$

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3) Solve the NLPP by using Kuhn-Tucker Conds

$$\max. Z = 2x_1^2 + 12x_1x_2 - 7x_2^2$$
s.t.
$$2x_1 + 5x_2 \leq 98$$
$$x_1, x_2 \geq 0$$

4) Solve
$$\max. Z = 10x_1 - x_1^2 + 10x_2 - x_2^2$$
s.t.
$$x_1 + x_2 \leq 9$$
$$x_1 - x_2 \geq 6$$
$$x_1, x_2 \geq 0$$

5) Discuss Wolfe's Method to solve a QPP.

6) Apply Wolfe's method to solve ~~the~~

i) $$\max Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$$
s.t.
$$x_1 + 2x_2 \leq 2$$
$$x_1, x_2 \geq 0$$

ii) $$\max. Z = 2x_1 + x_2 - x_1^2$$
s.t.
$$2x_1 + 3x_2 \leq 6$$
$$2x_1 + x_2 \leq 4$$
$$x_1, x_2 \geq 0$$

Unit - III

Deterministic Models

1) Model I: Economic Lot Size Model with uniform rate of demand Infinite Production Rate and having no shortages.

2) Model II: Economic Lot Size Model with different Rates of Demand in Different Production cycles, Infinite Production rate and having no shortages

3) Model III: Economic Lot Size Model with uniform Rate of Demand, Finite Rate of Replenishment having no shortages.

Deterministic Models with Shortages.

4) Model IV: Fixed Time Model

5) Model V: Economic Lot-Size Model with uniform Rate of Demand Infinite Rate of Production and having Shortages which are to be fulfilled

6) Model VI: Economic Lot-Size Model with uniform Rate of Demand, Finite rate of Production and having Shortages which are to be fulfilled.

Probabilistic Models

1) Model VII : Single Period Model with discontinuous or Instantaneous Demand and Time Independent Costs (No Set-up Cost Model)

2) Model VIII : Single Period Model with uniform Demand (No Set up Cost Model).

Unit - IV

1) Write the Procedure of determination of Critical Path.

2) All activities which together constitute a small engineering project are given in the following table. The table also shows the necessary immediate predecessors for each activity

Activity	Immediate predecessor	Activity duration
A	-	2
B	A	3
C	A	4
D	A	5
E	B	6
F	C, D	3
G	D	4
H	B	7
I	E, F, G	2
J	G	3

a) Construct an activity network.
b) Determine the earliest finish date for the entire project, assuming the project begins at day 0.
c) The total float for each activity.
d) The critical path.
e) The latest start day for activity B.
f) The earliest finish day for activity F.

3). Draw a network diagram on the basis of the following data

Activity	Duration (days)	Activity	Duration (days)
1-2	2	4-8	8
1-4	2	5-6	4
1-7	1	6-9	3
2-3	4	7-8	3
3-6	1	8-9	5
4-5	5	9-10	2

Find the critical path, total duration and slack times.

4) The following table gives the activities in a construction project and time duration

Activity	Preceeding Activity	Normal time (days)
1-2	-	5
1-3	-	4
2-4	1-2	6
3-4	1-3	2
4-5	2-4	1
4-6	2-4, 3-4	7
5-7	4-5	8
6-7	4-6	4
7-8	6-7, 5-7	3

a) Draw the activity network of the project
b) Find the total float and free float for each activity
c) Determine the critical path and the project duration

5). Activity

Activity	Expected duration (weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	3	5	7
1-4	2	2	8
2-5	1	1	1
3-5	3	6	9
4-6	2	5	8
5-6	4	6	14
5-7	3	7	11
6-7	6	8	10

a) Draw the project Network and trace all the possible paths from it. what is the expected project length?

b) Calculate the variance and standard deviation of the project length.

6) Activity

Activity	Estimated duration (weeks)		
	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

a) Draw the project network.

b) Find the expected duration and variance for each activity. what is the expected project length?