National Testing Agency

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Operations Research

Group Number :	1
Group Id :	94091821
Group Maximum Duration :	0
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Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	100
Is this Group for Examiner? :	No

Operations Research-1

Section Id :	94091837
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory

Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	94091869
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 9409181247 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Given a system of m simultaneous linear equations in n unknowns ($m < n$), the number of basic variables will be

1. m
2. n
3. $n - m$
4. $n + m$

Options :

9409184375. 1

9409184376. 2

9409184377. 3

9409184378. 4

Question Number : 2 Question Id : 9409181248 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Unbounded solution in an LPP is

1. where the objective function can be decreased indefinitely.
2. where the objective function is maximized.
3. where the objective function can be increased or decreased indefinitely.
4. where the objective function can be increased indefinitely.

Options :

9409184379. 1

9409184380. 2

9409184381. 3

9409184382. 4

Question Number : 3 Question Id : 9409181249 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The dual of the dual of an LPP is the

1. primal.
2. dual.
3. primal and dual both.
4. none of these

Options :

9409184383. 1

9409184384. 2

9409184385. 3

9409184386. 4

Question Number : 4 Question Id : 9409181250 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Revised simplex method

1. is the streamlined version of the simplex method.
2. is very convenient to do work on the desk.
3. does not permit the computation of large size LPP.
4. none of these

Options :

9409184387. 1

9409184388. 2

9409184389. 3

9409184390. 4

Question Number : 5 Question Id : 9409181251 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

In dual simplex iteration,

1. the entering vector is chosen first.
2. the departing vector is chosen first.
3. at least one $z_j - c_j$ value is negative.
4. none of these

Options :

9409184391. 1

9409184392. 2

9409184393. 3

9409184394. 4

Question Number : 6 Question Id : 9409181252 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The solution of a transportation problem with m rows and n columns is feasible if the number of positive allocations is

1. $m + n$
2. mn
3. $m + n - 1$
4. $m + n + 1$

Options :

9409184395. 1

9409184396. 2

9409184397. 3

9409184398. 4

Question Number : 7 Question Id : 9409181253 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

An optimal solution of an assignment problem can be obtained only if

1. each row and column has only one zero element.
2. each row and column has at least one zero element.
3. the data are arranged in a square matrix.
4. none of these

Options :

9409184399. 1

9409184400. 2

9409184401. 3

9409184402. 4

Question Number : 8 Question Id : 9409181254 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Players apply mixed strategy in a game if

1. there is no saddle point.
2. there is a saddle point.
3. it is a simultaneous move game.
4. none of these

Options :

9409184403. 1

9409184404. 2

9409184405. 3

9409184406. 4

Question Number : 9 Question Id : 9409181255 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

While solving a 2 x *n* game graphically, the extreme point of the envelop considered is

1. minimax point
2. maximin point
3. neither maximin point nor minimax point
4. both maximin point and minimax point

Options :

9409184407. 1

9409184408. 2

9409184409. 3

9409184410. 4

Question Number : 10 Question Id : 9409181256 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

In a 2 jobs and *n* machines problem, a line at 45^0 on the graph represents

1. Job 2 is idle.
2. Job 1 is idle.
3. both jobs are idle.
4. both jobs are under processing.

Options :

9409184411. 1

9409184412. 2

9409184413. 3

9409184414. 4

Question Number : 11 Question Id : 9409181257 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

A machine is replaced when the average running cost

1. is not equal to the current running cost.
2. till the current period is greater than that of the next period.
3. of the current period is greater than that of the next period.
4. of the current period is less than that of the next period.

Options :

9409184415. 1

9409184416. 2

9409184417. 3

9409184418. 4

Question Number : 12 Question Id : 9409181258 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The lead time is the time

1. to place orders for materials.
2. of receiving materials.
3. between receipt of materials and using materials
4. between placing the order and receiving the materials.

Options :

9409184419. 1

9409184420. 2

9409184421. 3

9409184422. 4

Question Number : 13 Question Id : 9409181259 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

In purchase inventory model, optimum lot size is

1. $\sqrt{\frac{2c_3R}{pI}}$
2. $\sqrt{\frac{2c_3R}{c_1pI}}$
3. $\sqrt{\frac{2c_1R}{pI}}$
4. $\sqrt{\frac{2c_1R}{c_3pI}}$

Options :

9409184423. 1

9409184424. 2

9409184425. 3

9409184426. 4

Question Number : 14 Question Id : 9409181260 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Newsboy model is

1. single period model.
2. multi-period model.
3. single or multi-period model.
4. all of these

Options :

9409184427. 1

9409184428. 2

9409184429. 3

9409184430. 4

Question Number : 15 Question Id : 9409181261 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

In queue designation ($a / b / c$) : (d / f), what does c represent

1. arrival pattern
2. service pattern
3. number of service channels
4. capacity of the system

Options :

9409184431. 1

9409184432. 2

9409184433. 3

9409184434. 4

Question Number : 16 Question Id : 9409181262 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The critical path satisfies the conditions

1. $E_i = L_i$ and $E_j = L_j$
2. $L_j - E_i = L_i - L_j$
3. $L_j - E_i = L_i - E_j = d$ (constant)
4. all of the above

Options :

9409184435. 1

9409184436. 2

9409184437. 3

9409184438. 4

Question Number : 17 Question Id : 9409181263 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The technique of Dynamic Programming was developed by

1. Taylor
2. Gilberth
3. Richard Bellman
4. Bellman and Clarke

Options :

9409184439. 1

9409184440. 2

9409184441. 3

9409184442. 4

Question Number : 18 Question Id : 9409181264 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

While applying the cutting plane method, dual simplex is used to maintain

1. optimality
2. feasibility
3. both optimality and feasibility
4. none of these

Options :

9409184443. 1

9409184444. 2

9409184445. 3

9409184446. 4

Question Number : 19 Question Id : 9409181265 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The K-T sufficient conditions for a maximization NLPP of maximizing f(**x**), subject to h(**x**) ≤ 0 and **x** ≥ **0** are

1. f(**x**) is concave and h(**x**) is convex
2. f(**x**) is convex and h(**x**) is convex
3. f(**x**) is concave and h(**x**) is concave
4. f(**x**) is convex and h(**x**) is concave

Options :

9409184447. 1

9409184448. 2

9409184449. 3

9409184450. 4

Question Number : 20 Question Id : 9409181266 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Which method of solving a Quadratic Programming Problem (QPP) is based on modified simplex method?

1. Fletcher's method
2. Beale's method
3. Wolfe's method
4. Frank-Wolfe method

Options :

9409184451. 1

9409184452. 2

9409184453. 3

9409184454. 4

Operations Research-2

Section Id :	94091838
Section Number :	2
Section type :	Offline
Mandatory or Optional :	Mandatory

Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	30
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	94091870
Question Shuffling Allowed :	No

Question Number : 21 Question Id : 9409181267 Question Type : SUBJECTIVE

Correct Marks : 3

Solve the following LP problem by graphical method:

Max $z = 10x_1 + 15x_2$

subject to $x_1 + x_2 \geq 2,\ 3x_1 + 2x_2 \leq 6;\ x_1, x_2 \geq 0.$

Question Number : 22 Question Id : 9409181268 Question Type : SUBJECTIVE

Correct Marks : 3

Given the LPP:

Max $z = 2x_1 + 3x_2 + 4x_3$

subject to $x_1 - 5x_2 + 3x_3 = 7,\ \ 2x_1 - 5x_2 \leq 3,\ \ 3x_2 - x_3 \geq 5;\ \ x_1, x_2 \geq 0$ and x_3 is unrestricted in sign. Formulate the dual of the LPP.

Question Number : 23 Question Id : 9409181269 Question Type : SUBJECTIVE

Correct Marks : 3

Determine an initial basic feasible solution to the following transportation problem using Vogel's approximation method:

	Destination				
	D_1	D_2	D_3	D_4	Supply
Source S_1	21	16	25	13	11
Source S_2	17	18	14	23	13
Source S_3	32	27	18	41	19
Demand	6	10	12	15	

Question Number : 24 Question Id : 9409181270 Question Type : SUBJECTIVE

Correct Marks : 3

A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that, when he starts production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for a year is Rs. 2 and the setup cost of a production run is Rs. 1,800. How frequently should production run be made?

Question Number : 25 Question Id : 9409181271 Question Type : SUBJECTIVE

Correct Marks : 3

Solve the following game problem and determine the value of the game:

- 4	6
2	- 3

Question Number : 26 Question Id : 9409181272 Question Type : SUBJECTIVE

Correct Marks : 3

The following table shows the machine time (in hours) for 5 jobs to be processed on 2 different machines:

Job	:	1	2	3	4	5
Machine A	:	3	7	4	5	7
Machine B	:	6	2	7	3	4

Passing is not allowed. Find the optimal sequence in which the jobs should be processed so that the total elapsed time is minimized.

Question Number : 27 Question Id : 9409181273 Question Type : SUBJECTIVE

Correct Marks : 3

If for a period of 2 hours in a day (8-10 A.M.) trains arrive at the yard every 20 minutes but the service time continues to remain 36 minutes, then calculate for this period:

(i) the probability that the yard is empty and (ii) the average queue length, on the assumption that the line capacity of the yard is limited to 4 trains only.

Question Number : 28 Question Id : 9409181274 Question Type : SUBJECTIVE

Correct Marks : 3

A project consists of a series of tasks labeled A, B. .....,H, I with the following relationships (W < X, Y, means X and Y cannot start until W is completed; X, Y < W means W cannot start until both X and Y are completed). With this notation, construct the network diagram having the following constraints:

A < D, E; B, D < F; C < G; B < H; F, G < I.

Question Number : 29 Question Id : 9409181275 Question Type : SUBJECTIVE

Correct Marks : 3

Write down the basic differences between PERT and CPM.

Question Number : 30 Question Id : 9409181276 Question Type : SUBJECTIVE

Correct Marks : 3

Write down the Kuhn-Tucker (KT) necessary conditions for the problem:

Maximize $f(\mathbf{x}) = x_1^3 - x_2^2 + x_1x_3^2$

subject to $x_1 + x_2^2 + x_3 = 5, \quad 5x_1^2 - x_2^2 - x_3 \geq 2; \quad x_1, x_2, x_3 \geq 0.$

Operations Research-3

Section Id :	94091839
Section Number :	3
Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	7
Number of Questions to be attempted :	5
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	94091871
Question Shuffling Allowed :	No

Question Number : 31 Question Id : 9409181277 Question Type : SUBJECTIVE

Correct Marks : 10

Use revised simplex method to solve the LPP:

Maximize $z = x_1 + x_2$

subject to $3x_1 + 2x_2 \leq 6, \quad x_1 + 4x_2 \leq 4; \; x_1, x_2 \geq 0.$

Question Number : 32 Question Id : 9409181278 Question Type : SUBJECTIVE

Correct Marks : 10

Use branch and bound method to solve the LPP:

Maximize $z = x_1 - x_2$

subject to $x_1 + 2x_2 \leq 4$, $6x_1 + 2x_2 \leq 9$; $x_1, x_2 \geq 0$ and are integers.

Question Number : 33 Question Id : 9409181279 Question Type : SUBJECTIVE

Correct Marks : 10

Solve the game graphically whose payoff matrix for the player A is given below:

	Player B				
Player A	-5	5	0	- 1	8
	8	- 4	-1	6	- 5

Question Number : 34 Question Id : 9409181280 Question Type : SUBJECTIVE

Correct Marks : 10

A newspaper boy buys newspapers every day and sells some or all of them. He cannot return unsold newspapers. Let c_1 be the cost price and c_2 be the selling price of each newspaper. Determine the number of newspapers that should be procured every day so as to maximize his expected profit, when the demand is uncertain.

Question Number : 35 Question Id : 9409181281 Question Type : SUBJECTIVE

Correct Marks : 10

Use Dynamic Programming to show that

$z = p_1 \log p_1 + p_2 \log p_2 + \ldots\ldots\ldots + p_n \log p_n$

subject to $p_1 + p_2 + \ldots\ldots + p_n = 1$ and $p_j \geq 0$, $j = 1, 2, \ldots, n$

is minimum when $p_1 = p_2 = \ldots\ldots = p_n = 1/n$.

Question Number : 36 Question Id : 9409181282 Question Type : SUBJECTIVE

Correct Marks : 10

Solve the following QPP by Beale's method:

Maximize $z = 10x_1 + 25x_2 - 10x_1^2 - x_2^2 - 4x_1x_2$

subject to $x_1 + 2x_2 + x_3 = 10$, $x_1 + x_2 + x_4 = 9$; $x_1, x_2, x_3, x_4 \geq 0$

Question Number : 37 Question Id : 9409181283 Question Type : SUBJECTIVE

Correct Marks : 10

A project schedule has the following characteristics:

Activity	Time (months)	Activity	Time (months)
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		

Construct a network diagram and find the critical path and total project duration.