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Operations Research

Group Number :	1
Group Id :	512452179
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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 :	512452843
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20

Number of Questions to be attempted :	20
Section Marks :	20
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452914
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 51245215273 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Graphical method can be used to solve an LPP when there is/are only

1. One variable
2. More than one variable
3. Two variables
4. More than two variables

Options :

51245248473. 1
51245248474. 2
51245248475. 3
51245248476. 4

Question Number : 2 Question Id : 51245215274 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In the optimal Simplex table, $z_j - c_j = 0$ indicates

1. Infeasible solution
2. Unbounded solution
3. Alternative solution
4. Cycling

Options :

51245248477. 1

51245248478. 2
51245248479. 3
51245248480. 4

Question Number : 3 Question Id : 51245215275 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If at least one of the basic variables is zero in BFS of an LPP then it is called

1. Degenerate solution
2. Non-degenerate solution
3. Infeasible solution
4. Unbounded solution

Options :
51245248481. 1
51245248482. 2
51245248483. 3
51245248484. 4

Question Number : 4 Question Id : 51245215276 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If a primal variable is unrestricted in sign, then the corresponding dual constraint is of

1. ' ≤ ' type
2. ' ≥ ' type
3. ' = ' type
4. None of the above

Options :
51245248485. 1
51245248486. 2
51245248487. 3
51245248488. 4

Question Number : 5 Question Id : 51245215277 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Dual simplex method is applicable to the LPPs that start with

1. An infeasible solution
2. An infeasible but optimum solution
3. A feasible solution
4. A feasible and optimum solution

Options :

51245248489. 1
51245248490. 2
51245248491. 3
51245248492. 4

Question Number : 6 Question Id : 51245215278 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The dummy source or destination in a transportation problem is created to

1. Satisfy rim conditions
2. Prevent solution to become degenerate
3. Solve the balanced transportation problem
4. None of the above

Options :

51245248493. 1
51245248494. 2
51245248495. 3
51245248496. 4

Question Number : 7 Question Id : 51245215279 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

To improve an initial BFS by Stepping Stone method, the number of loops required is

1. One
2. More than one
3. Same as unoccupied cells
4. Same as occupied cells

Options :
51245248497. 1
51245248498. 2
51245248499. 3
51245248500. 4

Question Number : 8 Question Id : 51245215280 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If the payoff matrix of a game is transposed then

1. Value of the game does not change
2. Saddle point of the game, if exists, changes
3. Optimal strategies for both the players do not change
4. None of the above

Options :
51245248501. 1
51245248502. 2
51245248503. 3
51245248504. 4

Question Number : 9 Question Id : 51245215281 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

When a game problem is transformed into LPP from maximizing player's point of view, then the LPP is a

1. Maximization problem
2. Minimization problem
3. Maximization problem or minimization problem
4. None of the above

Options :
51245248505. 1
51245248506. 2
51245248507. 3
51245248508. 4

Question Number : 10 Question Id : 51245215282 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If a job is having minimum processing time under both the machines, then the job is placed in

1. Any one (first or last) position
2. Available last position
3. Available first position
4. Both first and last positions

Options :
51245248509. 1
51245248510. 2
51245248511. 3
51245248512. 4

Question Number : 11 Question Id : 51245215283 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In replacement theory, if the probability of failure reduces gradually then the failure mode is said to be

1. Regressive
2. Retrogressive
3. Progressive
4. Recursive

Options :
51245248513. 1
51245248514. 2
51245248515. 3
51245248516. 4

Question Number : 12 Question Id : 51245215284 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

At Economic Order Quantity (EOQ),

1. Annual purchase cost = annual ordering cost
2. Annual carrying cost = annual shortage cost
3. Annual ordering cost = annual carrying cost
4. Annual shortage cost = annual purchase cost

Options :
51245248517. 1
51245248518. 2
51245248519. 3
51245248520. 4

Question Number : 13 Question Id : 51245215285 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In JIT (Just-In-Time) system, the following is assumed to be zero

1. Ordering cost
2. Transportation cost
3. Purchase cost
4. Carrying cost

Options :
51245248521. 1
51245248522. 2
51245248523. 3
51245248524. 4

Question Number : 14 Question Id : 51245215286 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

When the operating characteristic of the queue system is dependent on time, it is said to be

1. Steady state
2. Explosive state
3. Transient state
4. All of the above

Options :
51245248525. 1
51245248526. 2
51245248527. 3
51245248528. 4

Question Number : 15 Question Id : 51245215287 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In steady-state difference equations of the Queue Model $(M/E_k/1):(\infty/FCFS)$,

1. $P_0 = 1+\rho k$
2. $P_0 = 1 - \rho k$
3. $P_0 = 1 - \rho/k$
4. $P_0 = 1 - k/\rho$

Options :
51245248529. 1
51245248530. 2
51245248531. 3
51245248532. 4

Question Number : 16 Question Id : 51245215288 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Crash-time schedule gives

1. Highest cost and longest duration
2. Lowest cost and longest duration
3. Highest cost and shortest duration
4. None of the above

Options :
51245248533. 1
51245248534. 2
51245248535. 3
51245248536. 4

Question Number : 17 Question Id : 51245215289 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In Dynamic Programming, the problem is divided into subproblems. Each sub-problem is known as

1. Stage
2. State
3. Part
4. None of the above

Options :
51245248537. 1
51245248538. 2
51245248539. 3
51245248540. 4

Question Number : 18 Question Id : 51245215290 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In the cutting plane algorithm, each cut involves the introduction of

1. An equality constraint
2. Less than or equal to constraint
3. Greater than or equal to constraint
4. An artificial variable

Options :
51245248541. 1
51245248542. 2
51245248543. 3
51245248544. 4

Question Number : 19 Question Id : 51245215291 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Quadratic Programming is concerned with the NLPP of optimizing the quadratic objective function, subject to

1. Linear inequality constraints
2. Non-linear inequality constraints
3. Non-linear equality constraints
4. No constraint

Options :
51245248545. 1
51245248546. 2
51245248547. 3
51245248548. 4

Question Number : 20 Question Id : 51245215292 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In each iteration in Beale's method, the objective function is expressed in terms of

1. Basic variables only
2. Mixed of basic and non-basic variables
3. Non-basic variables only
4. None of the above

Options :
51245248549. 1
51245248550. 2
51245248551. 3
51245248552. 4

Operations Research-2

Section Id : 512452844
Section Number : 2

Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
Section Marks :	30
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452915
Question Shuffling Allowed :	No

Question Number : 21 Question Id : 51245215293 Question Type : SUBJECTIVE
Correct Marks : 3

Solve the following LP problem by graphical method:

Max $z = 3x_1 + 5x_2$

subject to $x_1 + 2x_2 \geq 10$, $x_1 \geq 5$, $x_2 \leq 10$; $x_1, x_2 \geq 0$.

Question Number : 22 Question Id : 51245215294 Question Type : SUBJECTIVE
Correct Marks : 3

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

Destination

	D_1	D_2	D_3	D_4	Supply
Source S_1	20	22	17	4	120
Source S_2	24	37	9	7	70
Source S_3	32	37	20	15	50
Demand	60	40	30	110	

Question Number : 23 Question Id : 51245215295 Question Type : SUBJECTIVE
Correct Marks : 3

Use Hungarian method to solve the following assignment problem:

	Job I	Job II	Job III	Job IV
Person A	20	25	22	28
Person B	15	18	23	17
Person C	19	17	21	24
Person D	25	23	24	24

Question Number : 24 Question Id : 51245215296 Question Type : SUBJECTIVE
Correct Marks : 3

Derive the optimal economic lot size formula

$$Q = \sqrt{\frac{2c_3DP}{c_1(P-D)}}$$

in the usual notations when the rate of replenishment is finite.

Question Number : 25 Question Id : 51245215297 Question Type : SUBJECTIVE
Correct Marks : 3

Use dominance principle and solve the following game whose payoff matrix is

	Player B		
Player A	1	7	2
	6	2	7
	0	1	6

Question Number : 26 Question Id : 51245215298 Question Type : SUBJECTIVE
Correct Marks : 3

A book binder company has one printing machine and one binding machine. There are manuscripts of a number of different books. Processing times for printing and binding are given in the following table. Determine the sequence in which books should be processed on the machines so that the total time required is minimized.

Book	Printing time (in hrs.)	Binding time (in hrs.)
A	5	2
B	1	6
C	9	7
D	3	8
E	10	4

Question Number : 27 Question Id : 51245215299 Question Type : SUBJECTIVE
Correct Marks : 3

The rate of arrival of customers at a public telephone booth follows a Poisson distribution with an average time of 10 minutes between one customer and the next. The duration of a phone call is assumed to follow an exponential distribution with a mean time of 3 minutes.

What is the probability that a person arriving at the booth will have to wait?

What is the average length of the non-empty queues that form from time to time?

Question Number : 28 Question Id : 51245215300 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 : 51245215301 Question Type : SUBJECTIVE
Correct Marks : 3

State Bellman's principle of optimality and explain it by an illustrative example.

Question Number : 30 Question Id : 51245215302 Question Type : SUBJECTIVE
Correct Marks : 3

Examine $z = 6x_1x_2$ for maxima and minima under the requirement $2x_1+x_2 = 10$.

Operations Research-3

Section Id :	512452845
Section Number :	3
Section type :	Offline
Mandatory or Optional :	Mandatory
Number of Questions :	7
Number of Questions to be attempted :	5
Section Marks :	50
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	512452916

Question Shuffling Allowed : No

Question Number : 31 Question Id : 51245215303 Question Type : SUBJECTIVE
Correct Marks : 10

Solve the following LPP by simplex method:

Maximize $z = 2x_1 + 3x_2$

subject to $x_1 + x_2 \leq 8$, $x_1 + 2x_2 = 5$, $2x_1 + x_2 \leq 8$; $x_1, x_2 \geq 0$.

Question Number : 32 Question Id : 51245215304 Question Type : SUBJECTIVE
Correct Marks : 10

Solve the following LPP by dual simplex method:

Maximize $z = -2x_1 - 3x_2 - x_3$

subject to $2x_1 + x_2 + 2x_3 \geq 3$, $3x_1 + 2x_2 + x_3 \geq 4$; $x_1, x_2, x_3 \geq 0$.

Question Number : 33 Question Id : 51245215305 Question Type : SUBJECTIVE
Correct Marks : 10

Use Bellman's principle of optimality to solve the problem:

$z = y_1 y_2 \ldots\ldots y_n$

subject to the constraints

$y_1 + y_2 + \ldots + y_n = c\ (\neq 0)$,

$y_j \geq 0$ for $j = 1,2,\ldots,n$.

Question Number : 34 Question Id : 51245215306 Question Type : SUBJECTIVE
Correct Marks : 10

Use Gomory's cutting plane method to solve the I.P.P.:

Maximize $z = x_1 + x_2$

subject to $3x_1 + 2x_2 \leq 5$, $x_2 \leq 2$; $x_1, x_2 \geq 0$ and are integers.

Question Number : 35 Question Id : 51245215307 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.

Question Number : 36 Question Id : 51245215308 Question Type : SUBJECTIVE
Correct Marks : 10

Use Kuhn-Tucker conditions to solve the following NLPP:

Maximize $z = 8x_1 + 10x_2 - x_1^2 - x_2^2$

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

Question Number : 37 Question Id : 51245215309 Question Type : SUBJECTIVE
Correct Marks : 10

Use Beale's method to solve the QPP:

Maximize $z = 6x_1 + 3x_2 - x_1^2 + 4x_1x_2 - 4x_2^2$

subject to $x_1 + x_2 \leq 3$, $4x_1 + x_2 \leq 9$; $x_1, x_2 \geq 0$.