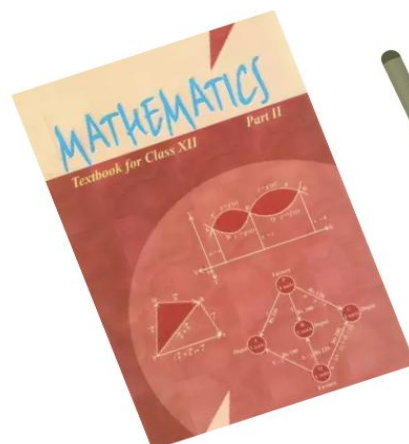
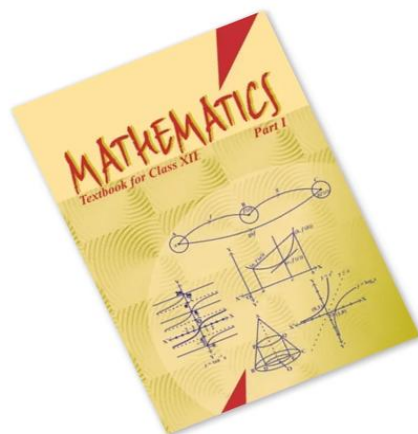


KENDRIYA VIDYALAYA SANGATHAN



CLASS 12
MATHEMATICS
2025 - 26

MINIMUM LEVEL
OF LEARNING



ZONAL INSTITUTE OF EDUCATION AND TRAINING
MYSURU

COURSE DIRECTOR

Ms. MENAXI JAIN

DIRECTOR, ZIET MYSURU

LIST OF TEACHERS AND OTHER OFFICIALS INVOLVED IN THE PREPARATION OF MINIMUM LEVEL OF LEARNING MATERIAL

ACADEMIC COORDINATOR	Shri. K P SUDHAKARAN	PRINCIPAL, KV No.1, CPCRI KASARAGOD
ZIET COORDINATOR	Shri. D. SREENIVASULU	TRAINING ASSOCIATE MATHEMATICS, ZIET MYSURU
EDITED AND COMPILED BY	Shri. JASEER K P	PGT(MATHS) PM SHRI KV No.2, MANGALORE, BENGALURU REGION
	Smt. SOLLY P J	PGT(MATHS) PM SHRI KV No2 JALAHALLI, BENGALURU REGION

CONTENT CREATORS

S.NO	NAME OF THE TEACHER	NAME OF THE KV	REGION
1	Dr MUGITHI SREEDHAR	PM SHRI KV BALLARI	BENGALURU
2	MRS. SWAPNA SETHU	PM SHRI KV No.1 CALICUT	ERNAKULAM
3	MR. KALAGATOORI BALAJI	PM SHRI KV DHARWAD	BENGALURU
4	MR. V ESWARAN	PM SHRI KV HEBBAL	BENGALURU
5	MR. K SENGUTTUVAN	PM SHRI KV No.2 AFS TAMBARAM	CHENNAI
6	MR. A M VIJAYAN	PM SHRI KV DGQA	CHENNAI
7	MR. R RAVI KUMAR	PM SHRI KV No.1 GOLCONDA	HYDERABAD
8	MR. RAGAMPETA VAMAN RAO	PM SHRI KV KARIMNAGAR	HYDERABAD
9	MR. SUBHASH A B	PM SHRI KV NO 1 JALAHALLI WEST	BENGALURU
10	MRS. L. SURYA CHANDRA	PM SHRI KV AFS BEGUMPET	HYDERABAD
11	MRS BEENA JOSEPH	PM SHRI KV CRPF PALLIPURAM	ERNAKULAM

CHAPTER - 1

RELATIONS AND FUNCTIONS

MULTIPLE CHOICE QUESTIONS

1. A relation R on set $G =$ All the students in a certain mathematics class are defined as,
 $R = (x, y): x$ and y have the same mathematics teacher. Which of the following is true about R ?
(A) R is reflexive and transitive but not symmetric.
(B) R is transitive and symmetric but not reflexive.
(C) R is reflexive and symmetric but not transitive.
(D) R is an equivalence relation
2. For real x , let $f(x) = x^3$. Then
(A) f is one-one but not onto on R
(B) f is onto on R but not one-one.
(C) f is one-one and onto on R
(D) f is neither one-one nor onto on R
3. Let L denotes the set of all straight lines in a plane. Let a relation R be defined by lRm if and only if l is perpendicular to $m \forall m \in L$. Then R is:
(A) reflexive (B) symmetric (C) transitive (D) None of these
4. A relation R on set $A = \{x : x \in Z \text{ and } 0 \leq x \leq 10\}$ as $R = (x, y): x = y$ is given to be an equivalence relation. The number of equivalence classes is
(A) 1 (B) 2 (C) 10 (D) 11

ASSERTION REASON QUESTIONS

1. Assertion (A): Let Z be the set of integers. A function $f: Z \rightarrow Z$ defined as
 $f(x) = 3x - 5, \forall x \in Z$ is a bijective.
Reason (R): A function is bijective if it is both surjective and injective.
2. Let $X = \{0, 2, 4, 6, 8\}$. P is a relation on X defined by $P = \{(0, 2), (4, 2), (4, 6), (8, 6), (2, 4), (0, 4)\}$.
Assertion (A): The relation P on set X is a transitive relation.
Reason (R): The relation P has a subset of the form $\{(a, b), (b, c), (a, c)\}$ where $a, b, c \in X$
3. Assertion(A): The relation $R = \{(x, y): x + y \text{ is a prime number and } x, y \in N\}$ is not a reflexive relation.
Reason(R): The number $2n$ is composite for all natural numbers n .
4. Assertion(A): The relation R in the set $A = \{1, 2, 3, 4, 5, 6\}$ defined as
 $R = \{(x, y): y \text{ is divisible by } x\}$ is not an equivalence relation.
Reason(R): The relation R will be an equivalence relation, if it is reflexive, symmetric and transitive.

VERY SHORT ANSWER QUESTIONS

1. Let $A = \{a, b, c\}$ and the relation R be defined on A as follows:
 $R = \{(a, a), (b, c), (a, b)\}$. Then, write minimum number of ordered pairs to be added in R to make R reflexive and transitive.
2. Let $A = \{1, 2, 3\}$, $B = \{4, 5, 6, 7\}$ and let $f = \{(1, 4), (2, 5), (3, 6)\}$ be a function from A to B . State whether f is one-one or not. Justify your answer.

3. Let $A = \{1, 2, 3, 4\}$. Let R be the equivalence relation on $A \times A$ defined by $(a, b)R(c, d)$ iff $a + d = b + c$. Find the equivalence class $[(1, 3)]$
4. If $A = \{1, 2, 3, 4\}$, define relations on A which have properties of being
- reflexive, transitive but not symmetric.
 - symmetric but neither reflexive nor transitive.

SHORT ANSWER QUESTIONS

- Check whether the relation S in the set of real numbers R defined by $S = \{(a, b); a - b + \sqrt{2} \text{ is an irrational number}\}$ is reflexive, symmetric or transitive.
- Given a non-empty set X , consider $P(X)$ which is the set of all subsets of X . Define the relation R in $P(X)$ as follows: For subsets A, B in $P(X)$, ARB if and only if $A \subset B$. Is R an equivalence relation on $P(X)$? Justify your answer.
- A relation R in set $G = \{\text{All the countries in the world}\}$ is defined as $R = \{(x, y); x \text{ and } y \text{ share a common boundary}\}$. Determine whether R is reflexive, symmetric and transitive. Hence, conclude if R is an equivalence relation.

CASE BASED STUDY QUESTIONS

- Let A be the set of 30 students of class XII in a school. Let $f : A \rightarrow N$, N is the set of natural numbers such that the function $f(x) = \text{Roll Number of student } x$. On the basis of the given information, answer the following:
 - Is f a bijective function?
 - Give reasons to support your answer to (i)
 - Let R be a relation defined by the teacher to plan the seating arrangement of students in pairs, where $R = \{(x, y); x, y \text{ are roll numbers of students such that } y = 3x\}$. List the elements of R . Is the relation R reflexive, symmetric and transitive? Justify your answer.
- Students of a school are taken to a railway museum to learn about railways heritage and its history. An exhibit in the museum depicted many rail lines on the track near the railway station. Let L be the set of all rail lines on the railway track and R be the relation on L defined by $R = \{(l_1, l_2); l_1 \text{ is parallel to } l_2\}$. On the basis of the above information answer the following questions:
 - Find whether the relation R is symmetric or not.
 - Find whether the relation R is transitive or not.

(a) If one of the rail lines on the railway track is represented by the equation $y = 3x + 2$, then find the set of rail lines in R related to it. (OR)

(b) Let S be the relation defined by $S = \{(l_1, l_2); l_1 \text{ is perpendicular to } l_2\}$. Check whether the relation S is symmetric and transitive.
- A class room teacher is keen to assess the learning of her students the concept of "relations" taught to them. She writes the following five relations each defined on the set $A = \{1, 2, 3\}$.

$$R_1 = \{(2, 3), (3, 2)\} \quad R_2 = \{(1, 2), (1, 3), (3, 2)\} \quad R_3 = \{(1, 2), (2, 1), (1, 1)\}$$

$$R_4 = \{(1, 1), (1, 2), (3, 3), (2, 2)\} \quad R_5 = \{(1, 1), (1, 2), (3, 3), (2, 2), (2, 1), (2, 3), (3, 2)\}$$

The students are asked to answer the following questions about the above relations:

The students are asked to answer the following questions about the above relations:

- (i) Identify the relation which is reflexive, transitive but not symmetric.
 (ii) Identify the relation which is reflexive and symmetric but not transitive.
 (iii) Identify the relations which are symmetric but neither reflexive nor transitive.

Or

What pairs should be added to the relation R_2 to make it an equivalence relation?

ANSWERS

MULTIPLE CHOICE QUESTIONS

- 1.(D) 2.(C) 3.(B) 4.(D)

ASSERTION REASON QUESTIONS

1. (D) 2.(D) 3.(C) 4.(A)

VERY SHORT ANSWER QUESTIONS

- (1). $(b, b), (c, c), (a, c)$
 (2). Both one-one and onto
 (3) $\{(1,3), (2,4)\}$
 (4) (i) $R_1 = \{(1,1), (2,2), (3,3), (4,4), (1,2)\}$.
 (ii) $R_2 = \{(1,2), (2,1), (2,3), (3,2)\}$

SHORT ANSWER QUESTIONS

- (1). Reflexive, not symmetric, not transitive
 (2) Reflexive, not symmetric, transitive
 (3). Reflexive, symmetric but not transitive. R is not an equivalence relation.

CASE BASED STUDY QUESTIONS

- 1.(i) No, (ii) Not onto (iii) not refl, symmetric, Transitive.
 2. (i) Symmetric (ii) transitive (iii) $y=3x+c$ (OR) symmetric, not transitive.
 3. (i) R_4 (ii) R_5 (iii) R_1 (iv) $(1,1), (2,2), (3,3), (2,1), (3,1), (2,3)$.

CHAPTER - 2

INVERSE TRIGONOMETRIC FUNCTIONS

MULTIPLE CHOICE QUESTIONS

- The value of $\cos\left(\tan^{-1}\left(\frac{3}{4}\right)\right)$ is
a) $\frac{3}{5}$ b) $\frac{2}{5}$ c) $\frac{4}{5}$ d) None of the above
- If $\cos^{-1}x - \sin^{-1}x = 0$, then the value of x is
a) 0 b) 1 c) $\frac{1}{\sqrt{2}}$ d) $\frac{\sqrt{3}}{2}$
- The value of $\cos^{-1}(\sin x) + \sin^{-1}(\cos x)$ is :
a) $\frac{\pi}{2}$ b) $\pi -$ c) $\pi - 2x$ d) $\frac{\pi}{2} - x$
- If $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$, then the value of $\cos^{-1}x + \cos^{-1}y$ is:
a) $\frac{\pi}{6}$ b) $\frac{\pi}{3}$ c) π d) 2π
- The value of $\sin^{-1}\left(\sin\left(\frac{\pi}{3}\right)\right) + \cos^{-1}\left(\cos\left(\frac{2\pi}{3}\right)\right)$ is
a) π b) $\frac{\pi}{2}$ c) $\frac{3\pi}{4}$ d) $\frac{4\pi}{3}$

SHORT ANSWER QUESTIONS

- Find the value of $\sin^{-1}\left[\cos\frac{33\pi}{5}\right]$
- Find the domain of $\sin^{-1}(x - 2)$
- Find the principal value of $\cot^{-1}\left(\frac{-1}{\sqrt{3}}\right)$
- Find the value of $\sin^{-1}\left[\sin\frac{13\pi}{7}\right]$
- Find the value of $\cos^{-1}\left[\cos\frac{-7\pi}{3}\right]$

ANSWERS:

MULTIPLE CHOICE QUESTIONS

1. c 2. c 3. c 4. b 5. a

SHORT ANSWER QUESTIONS

1. $-\frac{\pi}{10}$ 2. $x \in [0, 2]$ 3. $\frac{2\pi}{3}$ 4. $-\frac{\pi}{7}$ 5. $\frac{\pi}{3}$

CHAPTER - 3

MATRICES

MULTIPLE CHOICE TYPE QUESTIONS

1. A and B are two matrices such that $AB = A$ and $BA = B$ then B^2 is
(a) A (b) B (c) 0 (d) I
2. $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$, then A^{2026} is
(a) 2025A (b) 2026A (c) $2^{2025}A$ (d) $2^{2024}A$
3. A is a 3×4 matrix. A matrix B is such that $A'B$ and BA' are defined. Then the order of B is
(a) 4×3 (b) 3×3 (c) 4×4 (d) 3×4
4. If $\begin{bmatrix} 2x-1 & 3x \\ 0 & y^2-1 \end{bmatrix} = \begin{bmatrix} x+3 & 12 \\ 0 & 35 \end{bmatrix}$, then the value of $x - y$ is
(a) 2 or 10 (b) -2 or 10 (c) 2 or -10 (d) -2 or -10
5. If $A = \begin{bmatrix} 0 & 1 & c \\ -1 & a & -b \\ 2 & 3 & 0 \end{bmatrix}$ is a skew-symmetric matrix then find the value of $a + 2b + c$.

VERY SHORT ANSWER TYPE QUESTIONS

1. Write the number of all possible matrices of order 2×2 with each entry 1, 2 or 3.
2. Find a matrix B such that $\begin{bmatrix} 6 & 5 \\ 5 & 6 \end{bmatrix} B = \begin{bmatrix} 11 & 0 \\ 0 & 11 \end{bmatrix}$
3. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $A^2 + 7I = kA$, then find k.
4. Solve: $\begin{bmatrix} x & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x \\ 5 \end{bmatrix} = O$
5. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$ is written as $B + C$, where B is a symmetric matrix and C is a skew-symmetric matrix, then find B.

SHORT ANSWER TYPE QUESTIONS

1. Find the matrix X such that:
$$X \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$$
2. Let $2x+5y-1=0$ and $3x+2y-7=0$ represent the equations of two lines on which the ants are moving on the grounds. Using matrix method find a point common to the paths of the ants.
3. If $A = \begin{bmatrix} 3 & -5 \\ -4 & 2 \end{bmatrix}$, then find $A^2 - 5A - 14I = O$. Hence, obtain A^3 .
4. If X and Y are 2×2 matrices, then solve the following:
$$2X+3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix} \text{ and } 3X+2Y = \begin{bmatrix} -2 & 2 \\ 1 & -5 \end{bmatrix}$$

5. Let $A = \begin{bmatrix} 1 \\ 4 \\ -2 \end{bmatrix}$ and $C = \begin{bmatrix} 3 & 4 & 2 \\ 12 & 16 & 8 \\ -6 & -8 & -4 \end{bmatrix}$ be two matrices. Then, find a matrix B such that $AB = C$.

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1. b 2. a 3. d 4. b 5. a

VERY SHORT ANSWER TYPE QUESTIONS

1. $3^4=81$ 2. $B = \begin{bmatrix} 6 & -5 \\ -5 & 6 \end{bmatrix}$ 3. $k = 5$ 4. $x = 5$ or $x = -3$ 5. $B = \begin{bmatrix} 1 & 1 \\ 1 & 3 \end{bmatrix}$

SHORT ANSWER TYPE QUESTIONS

1. $X = \begin{bmatrix} 1 & -2 \\ 2 & 0 \end{bmatrix}$ 2. Point = (3, -1) 3. $A^3 = \begin{bmatrix} 187 & -195 \\ -156 & 148 \end{bmatrix}$
 4. $X = \begin{bmatrix} -2 & 0 \\ -1 & -3 \end{bmatrix}$ and $Y = \begin{bmatrix} 2 & 1 \\ 2 & 2 \end{bmatrix}$ 5. $B = \begin{bmatrix} 3 & 4 & 2 \end{bmatrix}$

CHAPTER - 4

DETERMINANTS

MULTIPLE CHOICE TYPE QUESTIONS

- If $A = \begin{bmatrix} -2 & 0 & 0 \\ 1 & 2 & 3 \\ 5 & 1 & -1 \end{bmatrix}$, then find the value of $|A (\text{adj.}A)|$ is
 a) 100I b) 10I c) 1000 d) 10
- If A and B are two square matrices each of order 3 with $|A| = 3$ and $|B| = 5$, then find $|2AB|$
 a) 30 b) 125 c) 15 d) 225
- If $\begin{vmatrix} 2x & 5 \\ 12 & x \end{vmatrix} = \begin{vmatrix} 6 & -5 \\ 4 & 3 \end{vmatrix}$, find x.
 a) ± 7 b) 7 c) -7 d) 3
- If for a matrix $A = \begin{bmatrix} x & -2 \\ -2 & x \end{bmatrix}$ and $|A^3| = 125$, find x.
 a) ± 3 b) -3 c) ± 2 d) 2
- If A is asquare matrix of order 3 x 3, then $|KA|$
 a) 3k b) $k|A|$ c) $k^2|A|$ d) $k^3|A|$

VERY SHORT ANSWER TYPE QUESTIONS

- If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$ then find the value of x
- If A and B are square matrices of order 3 such that $AB = 6I$. If $|A| = 12$ find $|B|$

3. If for any 2×2 square matrix, $A(\text{adj}A) = \begin{bmatrix} 8 & 0 \\ 0 & 8 \end{bmatrix}$, then find $|A|$
4. A square A is invertible if A is non-singular. If $A = \begin{bmatrix} 2 & P & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$, then for which value of P , A^{-1} exists.
5. If A is a 3×3 invertible matrix, then what will be the value of K if $|A^{-1}| = |A|^K$

SHORT ANSWER TYPE QUESTIONS

1. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $A^{-1} = kA$, find k .
2. Compute the ad joint of the matrix A given by $A = \begin{bmatrix} 1 & 4 & 5 \\ 3 & 2 & 6 \\ 0 & 1 & 0 \end{bmatrix}$ and verify $A(\text{adj}A) = |A|I$.
3. Using determinants, find the area of ΔPQR with vertices $P(3,1), Q(9,3)$ and $R(5,7)$.
4. If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ then verify that $(AB)^{-1} = B^{-1}A^{-1}$
5. If $A = \begin{bmatrix} 2x & 0 \\ x & x \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$, find the value of x .

LONG ANSWER TYPE QUESTIONS

1. If $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$, find A^{-1} and hence solve the system of linear equations $x + 2y + z = 4, -x + y + z = 0$ and $x - 3y + z = 2$.
2. Given $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$, find AB . Hence, solve the system of linear equations $x - y + z = 4, x - 2y - 2z = 9$ and $2x + y + 3z = 1$
3. If A is a 3×3 invertible matrix, show that for any scalar, $K \neq 0$, $(KA)^{-1} = \frac{1}{K} A^{-1}$. Hence calculate $(3A)^{-1}$, where $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.
4. If $A = \begin{bmatrix} 1 & -2 & 0 \\ 2 & 1 & 3 \\ 0 & -2 & 1 \end{bmatrix}$, find A^{-1} . Using A^{-1} solve the system of linear equations $x - 2y = 10, 2x + y + 3z = 8$ and $-2y + z = 7$
5. If $A = \begin{bmatrix} 3 & 2 \\ 5 & -7 \end{bmatrix}$, then find A^{-1} and use it to solve the following system of equations $3x + 5y = 11$ and $2x - 7y = -3$

CASE STUDY BASED QUESTIONS

1. Three students, Neha, Rani and Sam go to a market to purchase stationery items. Neha buys 4 pens, 3 note pads and 2 erasers and pays Rs.60. Rani buys 2 pens, 4 note pads and 6 erasers for Rs.90. Sam pays Rs.70 for 6 pens, 2 notepads and 3 erasers.

Based upon the above information answer the following questions:

- a) Form the equations required to solve the problem of finding the price of the each item, and express it in the matrix form $AX = B$
- b) Find $|A|$ and confirm if it is possible to find A^{-1}

- c) Find A^{-1} , if possible and write the formula to find X
(OR)

Find $A^2 - 8I$, where I is an identity matrix.

2. A school wants to allocate students into three clubs Spots, Music and Drama under the following conditions:

- the number of students in spots club should be equal to the sum of the numbers of students in music and drama club.
- The number of students in music club should be 20 more than half the number of students in sports club.
- The total number of students to be allocated in all the three clubs are 180.

Find the number of students allocated to different clubs, using matrix method.

3. Abdul threw a basketball in the direction of the basketball hoop which traversed a parabolic path in a vertical plane as shown below.

The equation of the path traversed by the ball is $y = ax^2 + bx + c$ with respect to a xy-co-ordinate system in the vertical plane. The ball transversed through the point (10,16), (20,22) and (30,25). The basketball hoop is at a horizontal distance of 70 feet from Abdul. The height of the basketball hoop is 10 feet from the floor to the top edge of the rim.

- Form the equations
- Find the determinant of the matrix
- Find the inverse of the matrix

(OR)

Find the equation of the parabola

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1. c 2. C 3. a 4. a 5. d

VERY SHORT ANSWER TYPE QUESTIONS

- $x = 2$
- $|B| = 18$
- $|A| = 8$
- A^{-1} exists iff $5P + 8 \neq 0$, i.e. $P \neq -\frac{8}{5}$
- $K = -1$

SHORT ANSWER TYPE QUESTIONS

- $k = \frac{1}{19}$
- $adjA = \begin{pmatrix} -6 & 5 & 14 \\ 0 & 0 & 9 \\ 3 & -1 & -10 \end{pmatrix}$ and $|A| = 9$
- Area of $\Delta PQR = 16$
- Verification

5. $x = \frac{1}{2}$

LONG ANSWER TYPE QUESTIONS

1. $A^{-1} = \frac{1}{10} \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & 5 \\ 1 & -2 & 3 \end{bmatrix}$ and $x = 2, y = -1, z = 1$

2. $AB = 8I$. and $x = 3, y = -2, z = -1$

3. $(3A)^{-1} = \frac{1}{12} \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{bmatrix}$

4. $A^{-1} = \frac{1}{11} \begin{bmatrix} 7 & 2 & -6 \\ -2 & 1 & -3 \\ -4 & 2 & 5 \end{bmatrix}$ and $x = 4, y = -3, z = 1$

5. If $A = -\frac{1}{31} \begin{bmatrix} -7 & -2 \\ -5 & 3 \end{bmatrix}$ and $x = \frac{71}{31}$ and $y = \frac{64}{31}$

CASE BASED TYPE QUESTIONS

1. From the three purchases:

Neha: $4p + 3n + 2e = 60$

Rani: $2p + 4n + 6e = 90$

Sam: $6p + 2n + 3e = 70$

(a) In matrix form $AX = B$ with

$$A = \begin{bmatrix} 4 & 3 & 2 \\ 2 & 4 & 6 \\ 6 & 2 & 3 \end{bmatrix}, X = \begin{bmatrix} p \\ n \\ e \end{bmatrix}, B = \begin{bmatrix} 60 \\ 90 \\ 70 \end{bmatrix}.$$

(b) so A is invertible and A^{-1} exists.

(c) $A^{-1} = \begin{bmatrix} 0 & -\frac{1}{10} & \frac{1}{5} \\ \frac{3}{5} & 0 & -\frac{2}{5} \\ -\frac{2}{5} & \frac{1}{5} & \frac{1}{5} \end{bmatrix}.$

The solution is given by $X = A^{-1}B$. Calculating,

$$X = \begin{bmatrix} p \\ n \\ e \end{bmatrix} = \begin{bmatrix} 5 \\ 8 \\ 8 \end{bmatrix}.$$

So the prices are: pen = ₹5, notepad = ₹8, eraser = ₹8.

(OR)

If you prefer the other option, here is $A^2 - 8I$:

$$A^2 - 8I = \begin{bmatrix} 26 & 28 & 32 \\ 52 & 26 & 46 \\ 46 & 32 & 25 \end{bmatrix}.$$

2. Sports = 90, Music = 65 and Drama = 25

3. (a) $100a+10b+c = 16$, $400a+20b+c=22$ and $900a+30b+c=25$

(b) $|A| = -2000$

$$(c) A^{-1} = \begin{bmatrix} \frac{1}{200} & -\frac{1}{100} & \frac{1}{200} \\ -\frac{1}{4} & \frac{2}{5} & -\frac{3}{20} \\ 3 & -3 & 1 \end{bmatrix}.$$

(OR)

Equation of Parabola is $-\frac{3}{200}x^2 + \frac{21}{20}x + 7$

CHAPTER - 5

CONTINUITY AND DIFFERENTIABILITY

MULTIPLE CHOICE TYPE QUESTIONS

1. If $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \begin{cases} \frac{\cos 3x - \cos x}{x^2} & , \text{for } x \neq 0 \\ \alpha & , \text{for } x = 0 \end{cases}$ is continuous at $x = 0$, then α is equal to

A) -2 B) -4 C) -6 D) -8

2. The set of points where the function $f(x) = |3x - 2|$ is differentiable, is

A) $\mathbb{R}$ B) $\mathbb{R} - \left\{\frac{3}{2}\right\}$ C) $\mathbb{R} - \left\{\frac{2}{3}\right\}$ D) none of these

3. The value of k for which the function $f(x) = \begin{cases} x^2, & x \geq 0 \\ kx, & x < 0 \end{cases}$ is differentiable at $x = 0$

A) 1 B) 2 C) any real number D) 0

4. If $y = (\cos x^2)^2$, then dy/dx is

A) $-4x \sin 2x^2$ B) $-x \sin x^2$ C) $-2x \sin 2x^2$ D) $-x \cos 2x^2$

5. If $x = t^2$ and $y = t^3$, then $\frac{d^2y}{dx^2}$ is equal to

A) $\frac{3}{2}$ B) $\frac{3}{4t}$ C) $\frac{3}{2t}$ D) $\frac{3t}{2}$

VERY SHORT ANSWER TYPE QUESTIONS

1. If $y = f(x^2)$ and $f'(x) = (e^{\sqrt{x}})$, find $\frac{dy}{dx}$.

2. If $f(x) = \begin{cases} \frac{\sin 5x}{x}, & \text{if } x \neq 0 \\ \frac{k}{3}, & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$, then find the value of k .

3. Let $y = f\left(\frac{1}{x}\right)$ and $f'(x) = x^3$. What is the value of $\frac{dy}{dx}$ at $x = \frac{1}{2}$?

4. Show that $f(x) = |x-3|$, x is a real number is continuous but not differentiable at $x=3$.

5. If $x \sin(a + y) + \sin a \cos(a + y) = 0$, prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

SHORT ANSWER TYPE QUESTIONS

- Examine the continuity of the function $f(x) = \begin{cases} 3x + 5, & x \geq 2 \\ x^2, & x < 2 \end{cases}$ at $x=2$
- If $a(\theta + \sin\theta)$, $y = a(1 - \cos\theta)$ Find $\frac{dy}{dx}$.
- If $y = x^{\cos x} + \sin x^{\tan x}$, Find $\frac{dy}{dx}$.
- If $\sin(\log x)$, prove that $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = 0$.
- If $x^3 + y^3 = 3axy$, find $\frac{dy}{dx}$

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1. B 2. C 3. D 4. C 5. D

VERY SHORT ANSWER TYPE QUESTIONS

- $\frac{dy}{dx} = 2xe^{|x|}$.
- $k = 15$.
- $\frac{dy}{dx}$ at $x = \frac{1}{2}$ is -32

SHORT ANSWER TYPE QUESTIONS

- $f(x)$ is not continuity function
- $\frac{dy}{dx} = \tan \frac{\theta}{2}$.
- $\frac{dy}{dx} = x^{\cos x} \left(-\sin x \log x + \frac{\cos x}{x} \right) + \sin x^{\tan x} (1 + \sec^2 x \cdot \log(\sin x))$
- $\frac{dy}{dx} = \frac{ay - x^2}{y^2 - ax}$

CHAPTER - 6

APPLICATIONS OF DERIVATIVES

MULTIPLE CHOICE QUESTIONS

- The point on the curve $6y = x^3 + 2$ where y-coordinate is changing 2 times as fast as x-coordinate is
 (a) $(2, \frac{5}{3})$ (b) $(4, 11)$ (c) $(1, \frac{1}{2})$ (d) $(0, \frac{1}{3})$
- The rate of change in radius of a circle whose area is increasing at the rate $44 \text{ cm}^2/\text{sec}$ when the radius of circle is 7 cm .
 (a) 1 cm/sec (b) 2 cm/sec (c) 3 cm/sec (d) 4 cm/sec
- On the set of real numbers, the function $f(x) = x^3 - 3x^2 + 3x - 100$ is

- (a) decreasing (b) increasing (c) neither increase nor decrease (d) constant
4. Which of the following functions never decrease.
 (a) $\cot x$ (b) x^2 (c) e^x (d) $-\tan x$
5. The maximum value of $\tan x$ is
 (a) 1 (b) 0 (c) does not exist (d) n

VERY SHORT ANSWER QUESTIONS

- Find the local maxima and local minima, of the function $f(x) = \sin x - \cos x$, $0 < x < 2\pi$. Also, find the local maximum and local minimum values
- The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. Find the rate at which the area increases, when the side is 10 cm
- A stone is dropped into a quiet lake and waves move in circles at a speed of 4cm per second. At the instant, when the radius of the circular wave is 10 cm, how fast is the enclosed area increasing?
- Show that of all the rectangles with a given perimeter, the square has the largest area.
- Find the value of 'a' for which $f(x) = \sin x + \cos x + ax - 7$ is decreasing on R

SHORT ANSWER QUESTIONS

- Sand is pouring from a pipe at the rate of $12 \text{ cm}^3/\text{s}$. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when the height is 4 cm?
- The volume of a sphere is increasing at the rate of $8\text{cm}^3/\text{s}$. Find the rate at which its surface area is increasing when the radius of the sphere is 12 cm?
- Find the absolute maximum and absolute minimum values of the function f given by $f(x) = \sin^2 x - \cos x$, $x \in [0, \pi]$.
- Find the intervals in which the following function $f(x) = x^3 + \frac{1}{x^3}$ is (a) increasing (b) decreasing
- Prove that $y = \frac{4\sin\theta}{(2+\cos\theta)} - \theta$ is an increasing function in $\left[0, \frac{\pi}{2}\right]$

LONG ANSWER QUESTIONS

- Show that the volume of the largest cone that can be inscribed in a sphere of radius R is $\frac{8}{27}$ of the volume of the sphere.
- A wire of length 36 cm is to be cut into two pieces. One of the pieces is to be made in the form of a square and the other in the form of an equilateral triangle. Find the length of each piece so that the sum of the areas of the two be minimum.
- Show that height of the cylinder of greatest volume which can be inscribed in a right circular cone of height h and semi vertical angle α is one-third that of the cone and the greatest volume of cylinder is $\frac{4}{27}\pi h^3 \tan^2 \alpha$

CASE STUDY BASED QUESTIONS

- A carpenter needs to make a wooden cuboidal box, closed from all sides, which has a square base and fixed volume. Since he is short of the paint required to paint the box on completion, he wants the surface area to be minimum.

On the basis of above information, answer the following questions (1+1+2)

- Taking the length = breadth = x m and height = y m, express the surface area (S) of the box in terms of x and its volume (V), which is constant.
 - Find $\frac{dS}{dx}$
 - (a) Find a relation between x and y such that the surface area (S) is minimum
- OR



(b) If surface area (S) is constant, the volume (V) = $\frac{1}{4}(SX - 2x^3)$, x being the edge of base.

Show that volume (V) is maximum for $x = \sqrt{\frac{S}{6}}$

2. Camphor is a waxy, colour less solid with aroma that evaporates through the process of sublimation, if left in the open at room temperature.

A cylindrical camphor tablet whose height is equal to its radius (r) evaporates when exposed to air such that the rate of reduction of its volume is $\frac{dV}{dt} = 3$ cubic mm/sec. let S is the surface area and t is the time in sec.



Based upon the above information, answer the following questions (2+2)

- Write the rate of change in the radius when radius is 5mm.
 - Find the rate of change in its surface area when radius is 10mm
3. A small town is analysing the pattern of a new street light installation. The lights are set up in such a way that the intensity of light at any point x meters from the start of the street can be modelled by $f(x) = e^x \sin x$, where x is in metres.

Based on the above, answer the following (2+2)

- Find the intervals on which the $f(x)$ is increasing or decreasing, $x \in [0, \pi]$.
- Verify, whether each critical point when $x \in [0, \pi]$ is a point of local maximum or local minimum or a point of inflection.

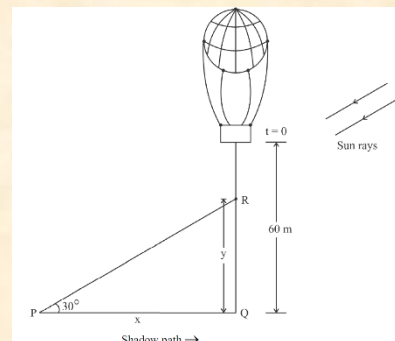


4. A sandbag is dropped from a balloon at a height of 60 metres.

When the angle of elevation of the sun is 30° , the position of the sandbag is given by the equation $y = 60 - 4.9t^2$, where y is the height of the sandbag is above the ground and t is the time in seconds.

On the basis of the above information, answer the following questions: (1+1+2)

- Find the relation between x and y , where x is the distance of the shadow at P from the point Q and y is the height of the sandbag above the ground.
- After how much time will the sandbag be 35 metres above the ground?
- (a) Find the rate at which the shadow of the sandbag is travelling along the ground when the sandbag is at a height of 35 metres.



OR

- (b) How fast is the height of the sandbag decreasing when 2 seconds have elapsed?

5. In order to set up a rainwater harvesting system, a tank to collect rainwater is to be dug. The tank should have a square base and a capacity of 250 m^3 . The cost of land is Rs. 5,000 per square metre and the cost of digging increases with depth and for the whole tank, it is Rs. $40,000 h^2$, where the depth of the tank is in metres, x is the side of the square base of the tank in metres.

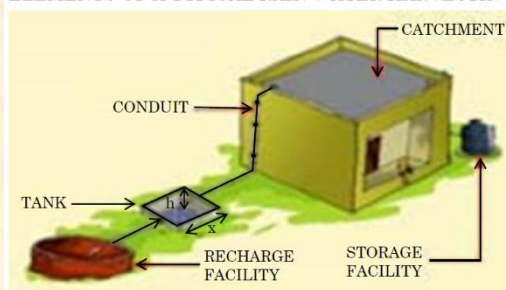
Based on the above information, answer the following questions: (1+1+2)

- Find the total cost C of digging the tank in terms of x .
- Find $\frac{dC}{dx}$.
- (a) Find the value of x for which cost C is minimum.

OR

- (b) Check whether the cost function $C(x)$ expressed in terms of x is increasing or not, where $x > 0$

ELEMENTS OF A TYPICAL RAIN WATER HARVESTING SYSTEM



ANSWERS

MULTIPLE CHOICE QUESTIONS

1. A 2. A 3. B 4. C 5. C

VERY SHORT ANSWER QUESTIONS

1. $x = \frac{3\pi}{4}$ is a local maximum. $x = \frac{7\pi}{4}$ is a local minimum.

Local maximum at $x = \frac{3\pi}{4}$ with value $\sqrt{2}$.

Local minimum at $x = \frac{7\pi}{4}$ with value $-\sqrt{2}$.

- Rate of increase of area = $10\sqrt{3} \text{ cm}^2/\text{sec}$
- Rate of increase of area = $80\pi \text{ cm}^2/\text{sec}$
- $a \leq -2$.

SHORT ANSWER QUESTIONS

- Height is increasing at $48\pi \text{ cm/sec}$ when $h = 4 \text{ cm}$.
- Surface area of the sphere is increasing at $\frac{4}{3} \text{ cm}^2/\text{s}$ when the radius is 12 cm .
- Absolute maximum value: $f\left(\frac{2\pi}{3}\right) = \frac{5}{4}$.

Absolute minimum value: $f(0) = -1$.

- (a) Increasing on $(-\infty, -1)$ and $(1, \infty)$.
(b) Decreasing on $(-1, 0)$ and $(0, 1)$.

LONG ANSWER QUESTIONS

2. Length of two pieces of wire are $\frac{144\sqrt{3}}{9+4\sqrt{3}}$ and $\frac{324}{9+4\sqrt{3}}$

CASE STUDY BASED QUESTIONS

1.

(i) Surface area (S) of the box $= 2x^2 + \frac{4V}{x}$

(ii) $\frac{dS}{dx} = 4x - \frac{4V}{x^2}$

(iii) (a) Find Surface area is minimum when $x = V^{1/3}$ (i.e. the box is a cube).

2. (i) Rate of change of radius $= \frac{1}{25\pi}$ mm/sec

(ii) Rate of change in its surface area $= \frac{4}{5}$ mm²/sec

3. $f(x)$ is increasing on $[0, \frac{3\pi}{4})$ and $f(x)$ is decreasing on $(\frac{3\pi}{4}, \pi]$.

(i) $x = 0$: local minimum (endpoint, $f(0) = 0$).

$x = \frac{3\pi}{4}$: interior local maximum.

$x = \pi$: local minimum (endpoint, $f(\pi) = 0$).

4.

(i) $x = y\sqrt{3}$

(ii) $t = \frac{5\sqrt{10}}{7}$ sec

(iii) (a) shadow is moving toward the reference point Q; the speed is $7\sqrt{30}$ m/s.

OR

(iii) (b) -19.6 m/s

5. (i) $C(x) = 5000x^2 + \frac{2.5 \times 10^9}{x^4}$

(ii) $\frac{dC}{dx} = 10000x - \frac{10^{10}}{5}$

(iii) (a) $x = 10$, Minimum cost Rs 750000

OR

(b) $C(x)$ is decreasing on $(0, 10)$ and $C(x)$ is increasing on $(10, \infty)$.

CHAPTER - 7

INTEGRALS

MULTIPLE CHOICE QUESTIONS

1. If $\int_0^a \frac{dx}{1+4x^2} = \frac{\pi}{8}$, then a is
a) $\frac{1}{2}$ b) $\frac{1}{3}$ c) 2 d) 3
2. $\int \frac{dx}{\sin^2 x \cos^2 x}$ is equal to
a) $\tan x + \cot x + c$ b) $(\tan x + \cot x)^2 + C$
c) $\tan x - \cot x + C$ d) $(\tan x - \cot x)^2 + C$
3. $\int_{-1}^1 \frac{|x|}{x} dx$, $x \neq 0$ is
a) -1 b) 0 c) 1 d) 2
4. If $\int \frac{2\sqrt{x}}{x^2} dx = k2^{\frac{1}{x}} + C$, then k is
a) $-\frac{1}{\log 2}$ b) $-\log 2$ c) -1 d) 1
5. If $\int \frac{3e^x - 5e^{-x}}{4e^x + 5e^{-x}} dx = ax + b \log|4e^x + 5e^{-x}| + C$, then
a) $a = -\frac{1}{8}$, $b = \frac{7}{8}$ b) $a = \frac{1}{8}$, $b = \frac{7}{8}$ c) $a = -\frac{1}{8}$, $b = -\frac{7}{8}$ d) $a = \frac{1}{8}$, $b = -\frac{7}{8}$

VERY SHORT ANSWER QUESTIONS

6. Evaluate, $\int \frac{e^{5\log x} - e^{4\log x}}{e^{3\log x} - e^{2\log x}} dx$
7. Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{\cos \theta} \sin^3 \theta d\theta$
8. Evaluate, $\int \frac{\cos 2x - \cos 2\theta}{\cos x - \cos \theta} dx$
9. Evaluate $\int_2^8 \frac{\sqrt{10-x}}{\sqrt{x} + \sqrt{10-x}} dx$.
10. Find, $\int \frac{dx}{2\sin^2 x + 5 \cos^2 x}$,

SHORT ANSWER QUESTIONS

11. Evaluate $\int \tan^8 x \sec^4 x dx$
12. Find $\int x^2 \tan^{-1} x dx$

13. Evaluate $\int_0^1 f(x)dx$, where $f(x) = |x+1|+|x|+|x-1|$

14. Evaluate, $\int_0^{\frac{\pi}{4}} \log(1 + \tan x) dx$

15. Evaluate: $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$

16. Evaluate, $\int \frac{x+3}{(x+4)^2} e^x dx$

17. Find $\int_{-1}^1 \frac{x^3 + |x| + 1}{x^2 + 2|x| + 1} dx$

18. Prove that, $\int_1^3 \frac{dx}{x^2(x+1)} = \frac{2}{3} + \log \frac{2}{3}$

19. Prove that, $\int_0^{\frac{\pi}{2}} \sin^3 x dx = \frac{2}{3}$

20. Integrate, $\frac{\cos x}{(1-\sin x)(2-\sin x)}$

LONG ANSWER TYPE QUESTIONS

21. Find $\int [\sqrt{\cot x} + \sqrt{\tan x}] dx$

22. Evaluate, $\int_0^1 x^2(1-x)^n dx$

23. Evaluate, $\int_0^{\pi/4} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$

24. Evaluate, $\int_0^1 \cot^{-1}(1-x+x^2) dx$.

25. Evaluate, $\int \frac{1}{\sqrt{2x+3} + \sqrt{2x-3}} dx$.

ANSWERS

1. a 2. c 3. d 4. a 5. c

6. $\frac{x^3}{3} + C$ 7. $\frac{8}{21}$ 8. $2(\sin x + x \cos \theta) + C$ 9. 3

10. $\frac{1}{\sqrt{10}} \tan^{-1} \left(\frac{\sqrt{2} \tan x}{\sqrt{5}} \right) + C$ 11. $\frac{\tan^{11} x}{11} + \frac{\tan^9 x}{9} + C$

12. $\frac{x^3}{3} \tan^{-1} x - \frac{x^2}{6} + \frac{1}{6} \log |1+x^2| + C$ 13. $\frac{19}{2}$ 14. $\frac{\pi}{8} \log 2$ 15. $\frac{1}{2} \pi (\pi - 2)$

16. $\frac{e^x}{x+4} + C$ 17. $2 \log 2$ 20. $\log \left| \frac{2-\sin x}{1-\sin x} \right| + C$ 21. $\sqrt{2} \tan^{-1} \left(\frac{\tan x - 1}{\sqrt{2} \tan x} \right) + C$

22. $\frac{2}{(n+1)(n+2)(n+3)}$ 23. $\frac{1}{40} \log 9$ 24. $\frac{\pi}{2} - \log 2$ 25. $\frac{1}{18} [(2x+3)^{3/2} - (2x-3)^{3/2}] + C$.

CHAPTER – 8

APPLICATION OF INTEGRATION

SHORT ANSWER QUESTIONS

1. Find the smaller area enclosed by the circle $x^2 + y^2 = 4$ and the line $x + y = 2$.
2. Using integration, find the area of ΔABC , the coordinates of whose vertices are A (2, 5), B (4, 7) and C (6, 2).
3. Using integration, find the area of the triangular region whose sides have the equations
 $y = 2x + 1, y = 3x + 1$ and $x = 4$
4. Find the area of the region in the first quadrant enclosed by the x-axis, the line $y = x$ and the circle $x^2 + y^2 = 64$
5. Find area of the region bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

LONG ANSWER QUESTIONS

1. Find the area enclosed between the parabola $4y = 3x^2$ and the straight line $3x - 2y + 12 = 0$
2. Find the area of the minor segment of the circle $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$
3. The area between $x = y^2$ and $x = 4$ is divided into two equal parts by the line $x = a$, find the value of a
4. Find the area of the region bounded by $y^2 = 9x, x = 2, x = 4$ and the x-axis in the first quadrant
5. Using integration, find the area of the region bounded by the lines $2x + y = 4, 3x - 2y = 6$ and $x - 3y + 5 = 0$

ANSWERS

SHORT ANSWER QUESTIONS

- 1) $(\pi - 2)$ sq. units
- 2) 7 sq. units
- 3) 8 sq. units
- 4) 8π sq. units
- 5) πab sq. units

LONG ANSWER QUESTIONS

- 1) 27 sq units
- 2) $A = 2 \int_{\frac{a}{\sqrt{2}}}^a \sqrt{a^2 - x^2} dx = \frac{a^2}{2} \left(\frac{\pi}{2} - 1 \right)$
- 3) $a = 4^{\frac{2}{3}}$
- 4) $16 - 4\sqrt{2}$ sq units
- 5) $\frac{7}{2}$ sq units

CHAPTER - 9

DIFFERENTIAL EQUATIONS

MULTIPLE CHOICE QUESTIONS

- The general solution of the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ is:
a) $\tan^{-1}(y-x) + c$ b) $\tan^{-1} y + \tan^{-1} x + c$
c) $\tan^{-1} \frac{y}{2} - \tan^{-1} \frac{x}{2} = c$ d) $\tan^{-1} y = \tan^{-1} x + C$
- The integrating factor for solving the differential equation $\tan x \frac{dy}{dx} + y = x^2$ ($x \neq 0$)
a) e^x b) $\tan x$ c) $\sin x$ d) $\frac{1}{\sin x}$
- If m and n are the degree and order respectively of the differential equation $1 + \left(\frac{dy}{dx}\right)^3 = \frac{d^2y}{dx^2}$, then $m + n =$
a) 1 b) 2 c) 4 d) 3
- Which of the following is not a homogeneous function of x and y ?
a) $y^2 - xy$ b) $x - 3y$ c) $\sin^2 \frac{y}{x} - \frac{y}{x}$ d) $\tan x - \sec y$
- If p and q are respectively the order and degree of the differential equation $\frac{d}{dx} \left(\frac{dy}{dx}\right)^3 = 0$ then $p - q =$
a) 1 b) 2 c) 3 d) 4
- The integrating factor of the differential equation $\frac{dx}{dy} = \frac{-(1+\sin x)}{x+y \cos x}$ is
a) $\log \cos x$ b) $1 + \sin x$ c) $e^{1+\sin x}$ d) $e^{\log \cos x}$

SHORT ANSWER TYPE QUESTIONS

- Solve the differential equation $2xy \frac{dy}{dx} = x^2 + 3y^2$.
- Solve the differential equation $x \cos \left(\frac{y}{x}\right) \frac{dy}{dx} = y \cos \left(\frac{y}{x}\right) + x$.
- Solve the differential equation $y + \frac{d}{dx}(xy) = x(\sin x + x)$.
- Find the particular solution of the differential equation $\frac{dy}{dx} = y \cot 2x$ and given that $y\left(\frac{\pi}{4}\right) = 2$
- Solve the differential equation $(\tan^{-1} y - x)dy = (1 + y^2)dx$

ANSWERS

MULTIPLE CHOICE QUESTIONS

1. d) 2) c) 3) d) 4) d) 5) a) 6) b)

SHORT ANSWER TYPE QUESTIONS

- 1) $x^2 + y^2 = Cx^3$ 2) $\sin \frac{y}{x} = \log|x|$ 3) $yx^2 = -x^2 \cos x + 2(x \sin x + \cos x) + \frac{x^4}{4} + c$
4) $y = 2\sqrt{\sin 2x}$ 5) $x = \tan^{-1} y - 1 + C e^{-\tan^{-1} y}$

CHAPTER – 10

VECTOR ALGEBRA

MULTIPLE CHOICE TYPE QUESTIONS

- The angle between the vectors $\vec{a} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{b} = \hat{i} + \hat{j} + \hat{k}$ is
 (a) $\frac{\pi}{6}$ (b) $\cos^{-1}\left(\frac{1}{3}\right)$ (c) $\frac{\pi}{2}$ (d) π
- The projection of the vector $\vec{a} = 2\hat{i} + 3\hat{j} + 2\hat{k}$ on the vectors $\vec{b} = \hat{i} + 2\hat{j} + \hat{k}$ is
 (a) $\frac{5}{3}\sqrt{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\sqrt{6}$
- The value of $(\hat{i} \times \hat{j}) \cdot \hat{k} + (\hat{j} \times \hat{k}) \cdot \hat{i} + (\hat{k} \times \hat{i}) \cdot \hat{j}$ is
 (a) 0 (b) -1 (c) 1 (d) 3
- If $|\vec{a} + \vec{b}| = 60$, $|\vec{a} - \vec{b}| = 40$ and $|\vec{a}| = 22$ then $|\vec{b}| =$
 (a) 36 (b) 22/60 (c) 46 (d) None of these
- The value of the expression $|\vec{a} \times \vec{b}|^2 + (\vec{a} \cdot \vec{b})^2$ is
 (a) $\vec{a} \cdot \vec{b}$ (b) $|\vec{a}| \cdot |\vec{b}|$ (c) $|\vec{a}|^2 |\vec{b}|^2$ (d) $(\vec{a} \cdot \vec{b})$
- The value of μ such that the vectors $\vec{a} = 2\hat{i} + \mu\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$ are orthogonal is
 (a) 0 (b) 1 (c) $\frac{3}{2}$ (d) $-\frac{5}{2}$
- If $\vec{a}$ and $\vec{b}$ are unit vectors, then what is the angle between $\vec{a}$ and $\vec{b}$ for $(\sqrt{3}\vec{a} - \vec{b})$ is an unit vector.
 (a) 30° (b) 45° (c) 60° (d) 90°
- The area of a parallelogram whose one diagonal is $2\hat{i} + \hat{j} - 2\hat{k}$ and one side is $3\hat{i} + \hat{j} - \hat{k}$ is
 (a) $\sqrt{2}$ (b) $3\sqrt{2}$ (c) $4\sqrt{2}$ (d) $6\sqrt{2}$
- Let A vector equally inclined to axes is
 (a) $\hat{i} + \hat{j} + \hat{k}$ (b) $\hat{i} - \hat{j} + \hat{k}$ (c) $\hat{i} - \hat{j} - \hat{k}$ (d) $-\hat{i} + \hat{j} - \hat{k}$
- The value of λ so that the vectors $-\hat{i} - 4\hat{j} + 4\hat{k}$ and $2\hat{i} + 8\hat{j} - \lambda\hat{k}$ are parallel
 (a) -8 (b) 8 (c) 2 (d) -2

VERY SHORT ANSWER TYPE QUESTIONS

- Let the vectors $\vec{a}$ and $\vec{b}$ such $|\vec{a}| = 3$ and $\vec{b} = \frac{\sqrt{2}}{3}$, then $\vec{a} \times \vec{b}$ is a unit vector, find the angle between $\vec{a}$ and $\vec{b}$.
- Find a unit vector perpendicular to each of the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ where $\vec{a} = 3\hat{i} + 2\hat{j} + 2\hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} - 2\hat{k}$.
- If the sum of the two unit vector is a unit vector, prove that the magnitude of their difference is $\sqrt{3}$.
- If $\vec{a}, \vec{b}$ and $\vec{c}$ be three vectors such that $|\vec{a}| = 3$, $|\vec{b}| = 4$ and $|\vec{c}| = 5$ and each one of them being perpendicular to the sum of the other two, find $|\vec{a} + \vec{b} + \vec{c}|$.

5. If the position vectors of the points A and B are $2\hat{i} + 3\hat{j} - \hat{k}$ and $3\hat{i} + 2\hat{j} + \hat{k}$ then find the vector of magnitude 6 units in the direction of $\overrightarrow{AB}$

SHORT ANSWER TYPE QUESTIONS

- Find the vector of magnitude 6 which is perpendicular to both the vectors $2\hat{i} - \hat{j} + 2\hat{k}$ and $4\hat{i} - \hat{j} + 3\hat{k}$
- If $|\vec{a}| = 2$, $|\vec{b}| = 5$ and angle between them is 60° , find $|\vec{a} - \vec{b}|$.
- If $\vec{a} = 2\hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$ are such that $\vec{a} + \lambda\vec{b}$ is perpendicular to $\vec{c}$, then find the value of λ .
- If $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ and $|\vec{a}| = 3$, $|\vec{b}| = 5$ and $|\vec{c}| = 7$ then what is the angle between $\vec{a}$ and $\vec{b}$.
- Using vectors find area of triangle with vertices (1,2,3), (2,-1,4) and (4,5,-1).

Find the position vector of a point R which divided the line segment joining the points P and Q with position vectors $\hat{i} + 2\hat{j} - \hat{k}$ and $-\hat{i} + \hat{j} + \hat{k}$ respectively in the ratio 2:1
i) internally ii) externally.

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1. B, 2. A, 3. D, 4. C, 5. C, 6. D, 7. A, 8. B, 9. A, 10. B

VERY SHORT ANSWER TYPE QUESTIONS:

1. $\theta = \frac{\pi}{4}$, 2. $\pm \frac{(2i-2j-k)}{3}$, 3. Proving answer, 4. $5\sqrt{2}$, 5. $\sqrt{6}(i - j + 2k)$

SHORT ANSWER TYPE QUESTIONS:

1. $\pm(-i + 2j + 2k)$, 2. $\sqrt{19}$, 3. 8, 4. $\theta = \frac{\pi}{3}$, 5. $\frac{(-i+4j+k)}{3}$, $-3i + 3k$

CHAPTER – 11

THREE-DIMENSIONAL GEOMETRY

MULTIPLE CHOICE TYPE QUESTIONS

- If α, β, γ be the angles which a line makes with the positive direction of co-ordinate axes, then $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma =$
(A) 2 (B) 1 (C) 3 (D) 0
- The direction cosines of the line $x = y = z$ are
(A) $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$ (B) $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}$ (C) 1, 1, 1 (D) None of these
- Perpendicular distance of the point (3, 4, 5) from the y-axis, is
(A) 5 (B) $\sqrt{41}$ (C) 4 (D) $\sqrt{34}$
- The angle between the lines $\frac{x}{1} = \frac{y}{0} = \frac{z}{-1}$ and $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$ is

- (A) $\cos^{-1} \frac{1}{5}$ (B) $\cos^{-1} \frac{-1}{5}$ (C) $\cos^{-1} \frac{1}{2}$ (D) $\cos^{-1} \frac{1}{4}$
5. Equation of x-axis is
 (A) $\frac{x}{1} = \frac{y}{1} = \frac{z}{1}$ (B) $\frac{x}{0} = \frac{y}{1} = \frac{z}{1}$ (C) $\frac{x}{1} = \frac{y}{0} = \frac{z}{0}$ (D) $\frac{x}{0} = \frac{y}{0} = \frac{z}{1}$
6. The point of intersection of the lines $\frac{x-5}{3} = \frac{y-7}{-1} = \frac{z+2}{1}$, $\frac{x+3}{-36} = \frac{y-3}{2} = \frac{z-6}{4}$ is
 (A) $21, \frac{5}{3}, \frac{10}{3}$ (B) (2,10,4) (C) (-3,3,6) (D) (5,7,-2)
7. The equation of a line passing through the point $(-3, 2, -4)$ and equally inclined to the axes, are
 (A) $x - 3 = y + 2 = z - 4$ (B) $x + 3 = y - 2 = z + 4$
 (C) $\frac{x+3}{1} = \frac{y-2}{2} = \frac{z+4}{3}$ (D) None of these
8. The equation to the straight line passing through the points $(4, -5, -2)$ and $(-1, 5, 3)$ is
 (A) $\frac{x-4}{1} = \frac{y+5}{-2} = \frac{z+2}{-1}$ (B) $\frac{x+1}{1} = \frac{y-5}{2} = \frac{z-3}{-1}$ (C) $\frac{x}{-1} = \frac{y}{5} = \frac{z}{3}$ (D) $\frac{x}{4} = \frac{y}{-5} = \frac{z}{-2}$
9. The coordinates of the foot of the perpendicular drawn from the point $(2, 5, 7)$ on the x-axis are given by
 (A) (0, 0, 7) (B) (0, 5, 0) (C) (2, 0, 0) (D) (0, 5, 7)
10. The reflection of the point (α, β, γ) in the xy-plane is
 (A) $(\alpha, \beta, 0)$ (B) $(0, 0, \gamma)$ (C) $(-\alpha, -\beta, \gamma)$ (D) $(\alpha, \beta, -\gamma)$

VERY SHORT ANSWER TYPE QUESTIONS

- Find the value of $a + b$, if the points $A(2, a, 3)$, $B(3, -5, b)$ and $C(-1, 11, 9)$ are collinear.
- Show that the lines $\frac{x-5}{7} = \frac{y+2}{-5} = \frac{z}{1}$ and $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$ are perpendicular to each other.
- Find the equation of a line in vector and cartesian form which passes through the point $(1, 2, 3)$ and is parallel to the vector $3\hat{i} + 2\hat{j} - 2\hat{k}$.
- If the equation of a line AB is $\frac{3-x}{-3} = \frac{y+2}{-2} = \frac{z+2}{6}$, Find the direction cosines of the line parallel to AB.
- Find vector equation of the line parallel to y-axis and passing through origin.

SHORT ANSWER TYPE QUESTIONS

- Find the Co-ordinates of the point where the line through the point $(5, 1, 6)$ and $(3, 4, 1)$ crosses the YZ-plane.
- Find the point on the line $\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2}$ at a distance $3\sqrt{2}$ from the point $(1, 2, 3)$.
- If A, B are points $(2, 3, -6)$ and $(3, -4, 5)$, find the angle that OA makes with OB where O is origin.

9. Find the angle between the lines whose direction ratios are a, b, c and b-c, c-a, a-b.
10. A line makes acute angles of α , β and γ with the coordinate axes respectively such that $\cos \alpha \cos \beta = \cos \beta \cos \gamma = \frac{2}{9}$, and $\cos \gamma \cos \alpha = \frac{4}{9}$. Then, find the value of $\cos \alpha + \cos \beta + \cos \gamma$.

LONG ANSWER TYPE QUESTIONS

1. Find Image of the point (1, 6, 3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$.
2. Find the magnitude (shortest distance) and equation of the line of the shorter distance between the lines: $\vec{r} = (\lambda - 1)\hat{i} + (\lambda + 1)\hat{j} - (\lambda + 1)\hat{k}$ and $\vec{r} = (1 - \mu)\hat{i} + (2\mu + 1)\hat{j} - (\mu + 2)\hat{k}$.
3. Find the equation of the perpendicular and coordinates of the foot of the perpendicular drawn from the point P (1, 8, 4) of the line joining the points R (0, -1, 3) and S(2, -3, 1).
4. Show that the lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ intersect each other. Find the point of intersection also.
5. Find the equation of the line passing through the point (2, 1, 3) and perpendicular to the lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3}$ and $\frac{x}{-3} = \frac{y}{2} = \frac{z}{5}$.

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1. A, 2. A, 3. D, 4. B, 5. C, 6. A, 7. B, 8. A, 9. C, 10. D

VERY SHORT ANSWER TYPE QUESTIONS

1. 0, 2. PROVEN, 3. $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \mu(3\hat{i} + 2\hat{j} - 2\hat{k})$, 4. $(\frac{3}{7}, \frac{-2}{7}, \frac{6}{7})$
5. $\frac{x}{0} = \frac{y}{1} = \frac{z}{0}$

SHORT ANSWER TYPE QUESTIONS

1. $(0, \frac{17}{2}, \frac{-13}{2})$, 2. $(-2, -1, 3)$, $(\frac{56}{17}, \frac{43}{17}, \frac{111}{17})$, 3. $\frac{-18\sqrt{2}}{35}$, 4. $\frac{\pi}{2}$, 5. $\frac{5}{3}$

LONG ANSWER TYPE QUESTIONS

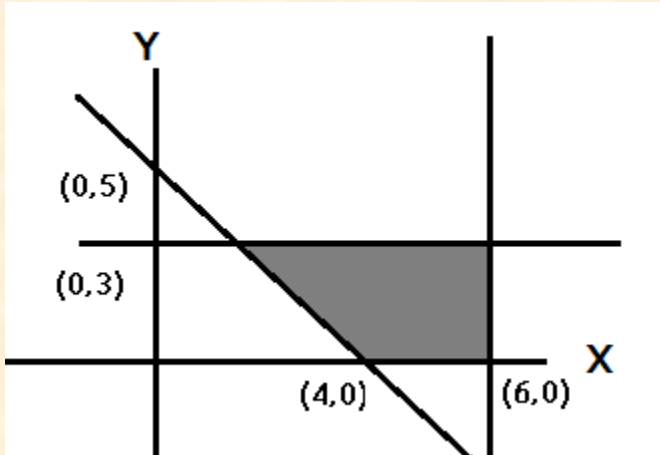
1. (1, 3, 5), 2. $\frac{1}{\sqrt{14}}$, $\frac{7x+6}{10} = \frac{7y-8}{5} = \frac{7z+8}{-9}$, 3. $\frac{x-1}{-4} = \frac{y-8}{-7} = \frac{z-4}{2}$, $(-3, 2, 6)$
4. $(\frac{1}{2}, \frac{-1}{2}, \frac{-3}{2})$, 5. $\frac{x-2}{2} = \frac{y-1}{-7} = \frac{z-3}{4}$

CHAPTER – 12

LINEAR PROGRAMMING PROBLEM

MULTIPLE CHOICE TYPE QUESTIONS

1. The constraints of the LPP represented by the following figure is



- (a) $5x + 4y \geq 20$, $x \leq 6$, $y \geq 3$, $x \geq 0$, $y \geq 0$
(b) $5x + 4y \leq 20$, $x \leq 6$, $y \geq 3$, $x \geq 0$, $y \geq 0$
(c) $5x + 4y \geq 20$, $x \leq 6$, $y \leq 3$, $x \geq 0$, $y \geq 0$
(d) $5x + 4y \geq 20$, $x \geq 6$, $y \leq 3$, $x \geq 0$, $y \geq 0$

2. Which of the following statement is correct

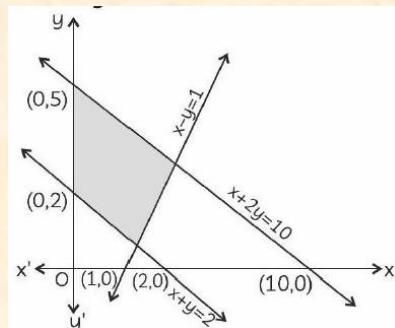
- (a) every LPP admits an optimal solution
(b) If a L.P.P admits two optimal solutions it has an infinite number of optimal solutions
(c) A L.P.P admits unique optimal solution
(d) (0,0) is the only optimal solution.

3. Which of the points A(80,10), B(20,20), C(60,60) D(20,25) lie in the feasible region of the constraints given below.

$$x + 5y \leq 200, 2x + 3y \leq 134, x \geq 0, y \geq 0$$

- (a) Points A,B,and C only (b) Points B,C and D only (c) only points A and D (d) only points B and D

4. The feasible region corresponding to the linear constraints of a Linear Programming Problem is given below.



Which of the following is not a constraint to the given Linear Programming Problem?

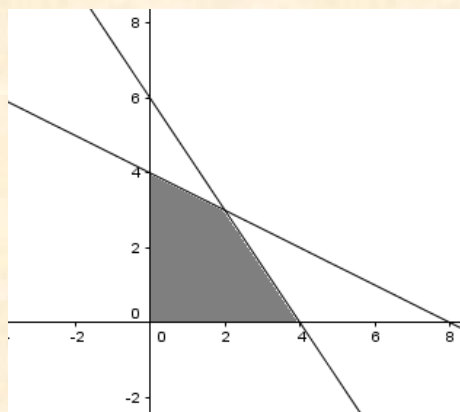
- (a) $x + y \geq 2$ (b) $x + 2y \leq 10$ (c) $x - y \geq 1$ (d) $x - y \leq 1$

ASSERTION-REASON QUESTIONS

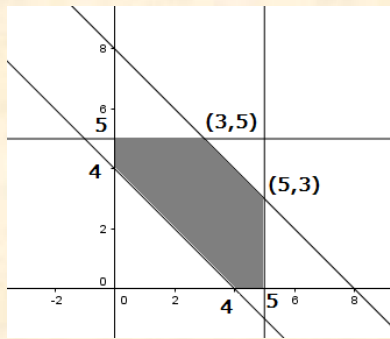
1. ASSERTION: Corner points of a feasible region are (0,6), (3,2) and (3,0) for a LPP with objective function $Z = 11x + 7y$, and maximum value of Z is 47.
REASON: Optimal value of an objective function occurs only at corner points if they exist.
2. ASSERTION: For the bounded feasible region of a LPP if minimum value of the objective function exists at two consecutive corner points, then the LPP has infinitely many optimal solution.
REASON: If minimum value exists at two consecutive vertices of a bounded feasible region, then every point of the segment joining those two vertices will give same value for the objective function.
3. ASSERTION: If the open half plane represented by $ax + by > M$ has no point common with the unbounded feasible region then M is the maximum value of z otherwise z has no maximum value.
REASON: A solution that also satisfies the non negativity restriction of a LPP is called the feasible region.
4. ASSERTION: The point (3, -4) is a feasible solution of LPP with constraints $2x + 3y \leq 0$ and $3x - 2y \leq 10$.
REASON: Feasible solutions should satisfy all constraints of LPP.

VERY SHORT ANSWER QUESTIONS

1. Shown below is the feasible region of maximization problem whose objective function is given by $z = 5x + 3y$.

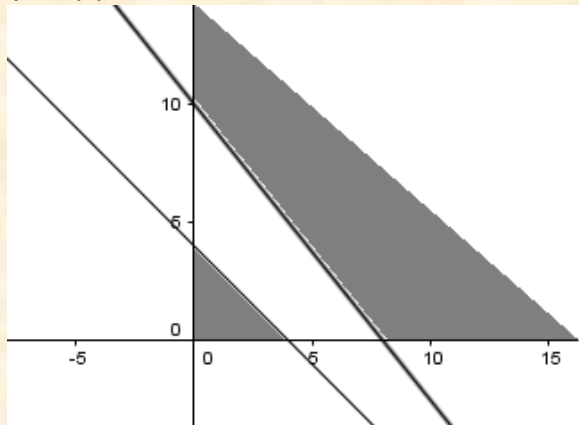


- (i) List all the constraints the problem is subjected to. (ii) Find the optimal solution of the problem.
2. If the objective function of the LPP is $z = x - 7y + 200$, feasible region is given below.

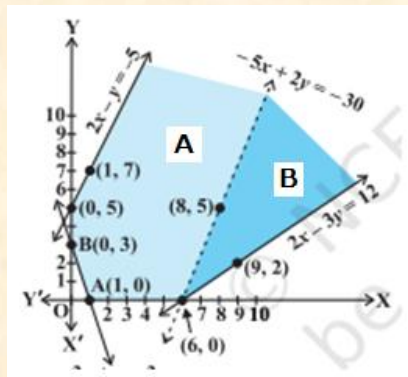


Find the difference between the optimal values of Z .

3. The feasible region of a LPP is as given below. Find the number of optimal solutions for the LPP and justify your answer.



4. For a LPP, in the figure given below, the shaded portion A and B together represents the feasible region of the LPP, the minimum value of the objective function under unbounded feasible region is (-30) . The shaded region B represents the inequality $ax + by < (-30)$, $ax + by$ is the objective function then find the number of optimal solution does the LPP have?



SHORT ANSWER QUESTIONS

1. Minimize $Z = 20x + 10y$

Subject to $x + 2y \leq 40, 3x + y \geq 30, 4x + 3y \geq 60, x, y \geq 0$

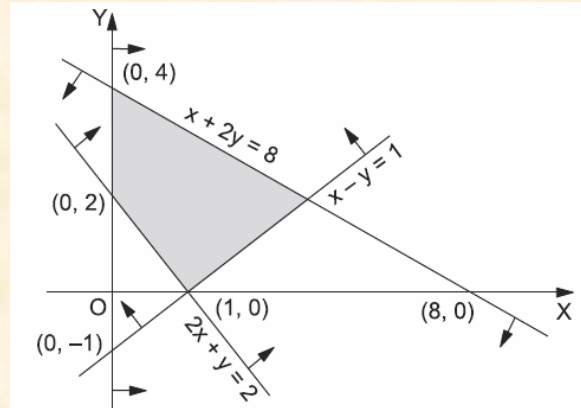
2. Minimize $Z = 6x + 3y$

Subject to $4x + y \geq 80, x + 5y \geq 115, 3x + 2y \leq 150, x, y \geq 0$

3. Maximize $Z = 600x + 400y$

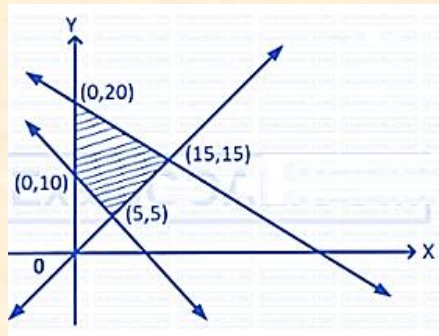
Subject to $x + 2y \leq 12, 2x + y \leq 12, x + 1.25y \geq 5$ & $0 \leq x, 0 \leq y$

4. Find the linear constraints of LPP whose feasible region is given below. Find the minimum value and optimal solutions of the objective function $Z=10x+5y$

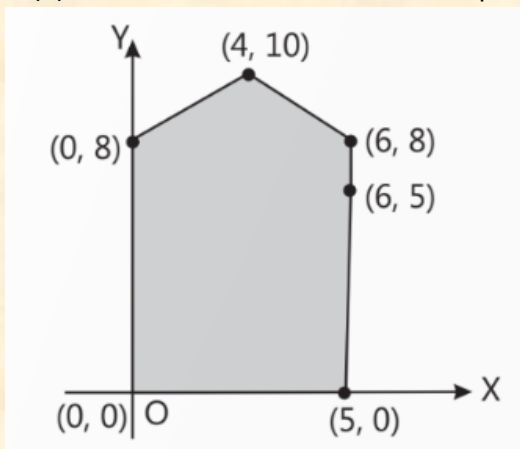


CASE BASED STUDY QUESTIONS

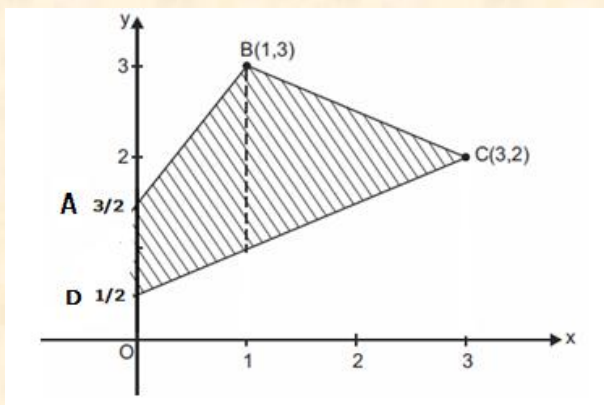
1. For a LPP with objective function Maximize $Z= 3x+9y$, the feasible region is as given below.



- Find all constraints of the LPP
 - Find the optimal value and optimal solution.
2. The feasible region for a LPP is as shown below, $Z=3x-4y$
- Find the points at which maximum and minimum of Z occurs.
 - Find the difference between the optimum values of Z .



3. Given below is the feasible region of LPP with constraints



- (a) Write all constraints of LPP
 (b) Optimal value Maximize $Z=5x-2y$ and corresponding Optimal point.

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1. (c) 2. (b) 3. (d) 4. (c)

ASSERTION-REASON QUESTIONS

- 1) (a) 2 (a) 3 (b) 4 (d)

VERY SHORT ANSWER QUESTIONS

- 1) Constraints are $x + 2y \leq 8$, $3x + 2y \leq 12$ & $x, y \geq 0$, Max =20
 2) 40 3) Zero, as there is no region satisfy all constraints of the problem.
 4. It has no solution, because the feasible region of the LPP and the half plane $ax + by < -30$ has common area.

SHORT ANSWER QUESTIONS

1. Minimum Value of Z is 240 at (6,12) Hence $x=6, y=12$ is the optimal solution and the optimal value of Z is 240.
 2. Minimum value of Z is 150 at $x=15, y=20$
 3. Optimal Sol: $x=4, y=4$, Maximum:4000
 4. constraints are $x + 2y \leq 8$, $x - y \leq 1$, $2x + y \geq 2$ & $x, y \geq 0$
 Corner Points are (0,2),(0,4),(10/3,7/3), (1,0), minimum value Z is 10 at all points of segment joining (0,2) and (1,0).

CASE STUDY BASED QUESTIONS

1. Constraints are $x - y \geq 0$, $x + y \geq 10$, $x + 3y \leq 60$ & $x, y \geq 0$
 Maximum $Z = 180$, Optimal solution is all points of the segment joining (0, 20) and (15,15).
 2. (a) Minimum Value is -32 at (0,8) Maximum Value is 15 at (5,0) (b) Difference is 47
 3. Constraints are $2y - 3x \leq 3$, $x + 2y \leq 7$, $2y - x \geq 1$ & $x, y \geq 0$,
 Optimal Value is 11 at C(3,2)

CHAPTER - 13

PROBABILITY

MULTIPLE CHOICE TYPE QUESTIONS

1. If two events A and B, $P(A-B)=1/5$ and $P(A)=3/5$, then $P(B/A)$ is equal to
(a) $1/2$ (b) $3/5$ (c) $2/5$ (d) $2/3$
2. If A and B are two events such that $P(A/B)=2.P(B/A)$ and $P(A)+P(B)=2/3$, then $P(B)$ is
(a) $2/9$ (b) $7/9$ (c) $4/9$ (d) $5/9$.
3. Three dice are thrown simultaneously. The probability of the events that at least one six comes up is
(a) $\frac{125}{216}$ (b) $\frac{5}{6}$ (c) $\frac{91}{216}$ (d) None of the above
4. If A and B are independent events such that $P(A)=0.4$, $P(B)=x$
and $P(A \cup B) = 0.5$ then x is
(a) $4/5$ (b) 0.1 (c) $1/6$ (d) None of these

ASSERTION-REASON QUESTIONS

1. **Assertion A:** Two cards are drawn from a well shuffled pack of 52 playing cards without replacement. Probability of getting 02 jacks is $16/169$
Reason R : For independent events A and B, $P(A \text{ and } B)=P(A).P(B)$
2. **Assertion (A) :** Let A and B be two events such that $P(A)=1/5$ and $P(A \text{ or } B)=1/2$ then $P(B)=3/8$ for A and B are independent events.
Reason (R) : For independent events $P(A \text{ or } B) = P(A) + P(B) - P(A).P(B)$.
3. Let A and B be two events associated with an experiment such that
 $P(A \cap B) = P(A).P(B)$
Assertion (A): $P(A/B)=P(A)$ and $P(B/A)=P(B)$
Reason (R): $P(A \cup B)=P(A)+P(B)$
4. For any two independent events A and B. $P(A)=p$ and $P(B)=q$
Assertion (A): The probability that exactly one of the events A and B occurs is $p+q-2pq$
Reason (R): $P(A \cup B)=P(A)+P(B)-P(A)P(B)$

VERY SHORT ANSWER QUESTIONS

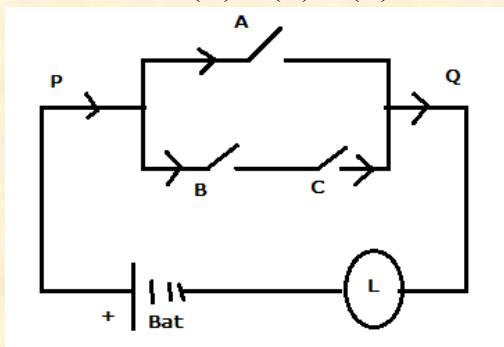
1. Two balls are drawn from a bag containing 2white, 3 red and 4 black balls one by one without replacement. What is the probability that at least one ball is red?
2. Events E and F are independent. Find $P(F)$, if $P(E)=0.35$ and $P(E \cup F)=0.6$.
3. A problem is given to A, B and C. The probabilities that they solve the problem correctly are $1/3$, $2/7$ and $3/8$ respectively. If they try to solve the problem simultaneously, find the probability that exactly one of them solve the problem.
4. A coin is tossed thrice. Let E be the event, 'first throw results in a head', and the event F, 'the last throw results in a tail'. Find whether the events E and F are independent

SHORT ANSWER QUESTIONS

- 40% students of a college reside in hostler and the remaining reside outside. At the end of the year, 50% of the hostellers got A grade while from outside students, only 30% got A grade in the examination. At the end of the year, a student of the college was chosen at random and was found to have gotten A grade. What is the probability that the selected student was a hostler?
- A die is thrown three times. Events a and B are defined as below:
A: 5 on the first and 6 on the second throw.
B: 3 or 4 on the third throw.
Find the probability of B, given that A has already occurred.
- How many minimum number of times must a fair coin be tossed so that the probability of getting at least one head is more than 80%?
- Three machines A, B, and C in a certain factory producing electric bulbs, produces 50%, 25% and 25% respectively, of the total daily output of electric bulbs. It is known that 4% of the bulbs produced by each machines A and B are defective and that 5% of those produced by machine C are defective. If one bulb is picked up at random from day's production, calculate the probability that it is defective.
- From a set of 100 cards numbered 1 to 1000, one card is drawn at random. Find the probability that the number on the card is divisible by 6 or 8 but not by 24.
- If A and B are two events such that $P(A)=0.4$, $P(B)=0.8$, and $P(B/A)=0.6$, then find $P(A/B)$

CASE STUDY BASED QUESTIONS

- A coach is training 3 players. He observes that the player A can hit a target 4 times in 5 shots, player B can hit 3 times in 4 shots and the player C can hit 2 times in 3 shots. From this situation answer the following:
(i) What is the probability that B,C will hit and A will lose?
(ii) What is the probability that none of them hit the target?
(iii) (a) What is the probability that only one of them hit the target? (OR)
(b) What is the probability that at least two of them hit the target?
- Suppose you have two coins which appear identical in your pocket. You know that one is fair and one is 2-headed coin. if you take one out, toss it.
(a) What is the probability it shows head?
(b) if head appears, what is the probability you took the fair coin?
- An electric system has open-closed switches A,B and C as shown below. The switches operate independently of one another and the current will flow from P to Q either if A is closed or B and C are closed. If $P(A)=P(B)=P(C)=1/2$.



- Find the probability that the circuit will work.
- Find the probability that the circuit fails.

ANSWERS

MULTIPLE CHOICE TYPE QUESTIONS

1(d), 2(a) 3(c) 4(c)

ASSERTION-REASON QUESTIONS

1(d) 2 (a) 3(c) 4(b)

VERY SHORT ANSWER QUESTIONS

1). 7/12 2) 5/13 3) 75/168 4) Yes, Independent

SHORT ANSWER QUESTIONS

1). 10/19. 2) 1/3. 3) 3 . 4) 17/400. 5) 1/5 6) 3/10

CASE STUDY BASED QUESTIONS

1 (i) 1/10, (ii) 1/60, (iii) (a) 9/60 (b) 50/60