DEHRADUN PUBLIC SCHOOL
ASSIGNMENT (2023-24)
SUBJECT- MATHEMATICS (041)
CLASS - XII

CHAPTER 1 - RELATIONS AND FUNCTIONS

Multiple choice questions:

Q1. Let R be a relation on the set N of natural numbers defined by n R m iff n divides m. Then, R is
a. Reflexive & symmetric
b. transitive & symmetric
c. Equivalence
d. Reflexive, transitive but not symmetric

Q2. The function f: A $\rightarrow$B defined by f(x) = 4x + 7, x $\in$ R is
a. One-one
b. Many- one
c. Odd
d. Even

Q3. The smallest integer function f(x) =[x] is
a. One-one
b. On to
c. Both (a) & (b)
d. Many- one

Assertion –Reason type questions:

Two statements are labeled as Assertion (A) and Reason(R).Select the most appropriate answer from the options given below:
a. Both A and R are true and R is correct explanation of A.
b. Both A and R are true but R is not the correct explanation of A.
c. A is true but R is false.
d. A is false but R is true.

Q4. **Assertion (A)**: Let A ={1,2,3,4,5} by aRb , if $|a^2 - b^2| < 7$, then $R^{-1} = R$.
Reason (R): For above relation, domain of R^{-1} = Range of R.

Q5. **Assertion (A)**: Let R be the relation on the set of integers Z given by R = {(a,b): 2 divides(a−b)} is an equivalence relation.
Reason (R): A relation R in a set A is said to be an equivalence relation if R is reflexive, symmetric and transitive.

Subjective type questions:

Q6. Show that a one-one function: f{1, 2, 3}$\rightarrow${1, 2, 3} must be onto.

Q7. State the reason for the relation R in the set {1, 2, 3} given by R = {(1, 2), (2, 1)} is not to be transitive.

Q8. Show that the relation R on R defined as R = {(a, b): a $\leq$ b}, is reflexive and transitive but not symmetric.

Q9. Prove that the relation R in set A = {1 , 2 ,3 ,4, 5} given by R ={(a ,b) :|a – b| is even} is an equivalence relation.

Q10. **Case Study: Read the following passage and answer the questions given below:**
A relation R on set A is said to be an equivalence relation on A if it is
- Reflexive i.e., (a, a) $\in$R $\forall$a$\in$ A.
- Symmetric i.e., (a, b) $\in$ *R* $\Rightarrow$(b, a) $\in$ R $\forall$ a, b$\in$ A.
- Transitive i.e., (a, b) $\in$ *R* and (b, c) $\in$ *R* $\Rightarrow$ (a, c) $\in$ R $\forall$ a, b, c $\in$ A. Based on the above information, answer the following questions.

i. If the relation R = { (1, 1), (1,2), (1, 3), (2,2), (2, 3), (3, 2), (3, 1), (3, 3)} defined on the set A = {1, 2, 3}, then R is?
ii. If the relation R on the set N of all natural numbers defined as R = {(x, y): y = x+5 and x< *4*}, then R is?

CHAPTER 2 -INVERSE TRIGONOMETRIC FUNCTIONS

Multiple choice questions:

Q1. Find the value of $\sin^{-1}[1/2]$

a. $\Pi/6$ b. $\Pi/4$ c. $-\Pi/6$ d. 0

Q2. The domain of the function $\cos^{-1}(2x-1)$ is

a. [0, 1] b. [-1, 1] c. (-1, 1) d. (0, π)

Q3. Value of $\sec^{-1}(2)$ is

a. $\frac{\pi}{2}$ b. $\frac{\pi}{3}$ c. $\frac{2\pi}{3}$ d. π

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**: Principal value of $\cos^{-1}\{\cos(2\pi/3)\}$ is $2\pi/3$.

Reason (R): Principal value branch of arc cosine function is [0, π].

Q5. **Assertion (A)**: Domain of $f(x)= \sin^{-1} x + \cos x$ is [−1,1].

Reason (R): Domain of a function is a set of all possible values for which function will be define.

Subjective type questions:

Q6.Let Find the value of $\sin^{-1}\left[\cos\left\{\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right\}\right]$.

Q7. Which is greater $\tan^{-1}1$ or $\tan 1$

Q8. If $\sin\left(\sin^{-1}\frac{1}{5}+\cos^{-1}x\right) = 1$, then find the value of x.

Q9. If $\sin\{\cot^{-1}(x+1)\} = \cos(\tan^{-1} x)$, then find x.

Q10. **Case Study:** The value of an inverse trigonometric function which lies in its Principal value branch is called the Principal value of that inverse trigonometric function. When we refer to the function $\sin^{-1}$, we take it as the function whose domain is [-1, 1] and range is $[-\Pi/2,\Pi/2]$. The branch with range $[-\Pi/2,/2]$ is called the Principal value branch.

Based on the above information answer the following

i. Find the principal value of $\tan^{-1}\sqrt{3}$

ii. Find the principal value of $\cot^{-1}(-1/\sqrt{3})$.

$$\sin^{-1} x = \frac{1}{\sin x} = \arcsin x$$

$$\cos^{-1} x = \frac{1}{\cos x} = \arccos x$$

$$\tan^{-1} x = \frac{1}{\tan x} = \arctan x$$

CHAPTER 3 -MATRICES

Multiple choice questions:

Q1. If A and B are two matrices such that AB = A and BA = B, then B^2 is equal to :

a. B b. A c. 1 d. 0

Q2. If A is square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to:

a. A b. I – A c. I d. 3A

Q3. If a matrix A is both symmetric and skew symmetric , then :

a. A is a diagonal matrix
b. A is a zero matrix
c. A is a scalar matrix
d. A is a square matrix

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.
b. Both A and R are true but R is not the correct explanation of A.
c. A is true but R is false.
d. A is false but R is true.

Q4. **Assertion (A)**: A matrix A = $[4 \quad -7 \quad 9]$ is a row matrix of order 1 x 3.

Reason (R):A matrix having only one row and any number of column is called a row matrix.

Q5. **Assertion (A)**: If A and B are symmetric matrices of same order , then AB – BA is also a symmetric matrix.

Reason (R): Any square matrix A is called a symmetric matrix is $A^T = A$.

Subjective type questions:

Q6. If $A^2 = A$ find value of $(I + A)^2 - 3A$.

Q7. Construct a 3 × 2 matrix, whose elements are given by $a_{ij} = e^{ix} \sin jx$.

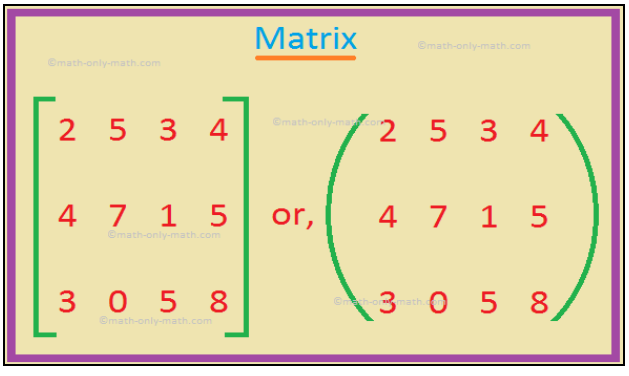
Q8. Express the following matrices $\begin{bmatrix} 3 & 5 \\ 1 & -1 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix.

Q9. Let A be a square matrix. Then prove that

i. $A + A'$ is a symmetric matrix
ii. $A - A'$ is a skew- symmetric matrix

Q10. **Case Study: Read the following passage and answer the questions given below:**

The bookshop of a particular school has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economics books. Their selling prices are Rs. 80, Rs 60 and Rs 40 each respectively.



i. Using matrix algebra express the following in matrix form .
ii. Find the total amount the bookshop will receive from selling all the books.

CHAPTER 4 -DETERMINANTS

Multiple choice questions:

Q1. If A is 3x3 order matrix and |A| = 5 then |adj A| is equal to:

a. 5 b. 25 c. 125 d. 625

Q2. If A is the matrix of order 3x3, then the number of minors in determinant of A are

a. 3 b. 6 c. 9 d. 18

Q3. If the value of a third order determinant is 12,then the value of the determinant formed byreplacing each element by its cofactor will be

a. 36 b. 72 c. 144 d. 12

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**: Determinant of a number associated with a square matrix.

Reason (R): Determinant is a square matrix.

Q5. **Assertion (A)**: The inverse of a matrix A = $\begin{bmatrix}6 & 8\\7 & 9\end{bmatrix}$ does not exist.

Reason (R): The matrix A is non- singular .

Subjective type questions:

Q6. If A= , $\begin{bmatrix}1 & 0 & 1\\0 & 1 & 2\\0 & 0 & 4\end{bmatrix}$ then show that $|3A| = 27|A|$

Q7. Find the area of the triangle whose vertices are (3 , 8) , (-4 , 2) and (5 , 1).

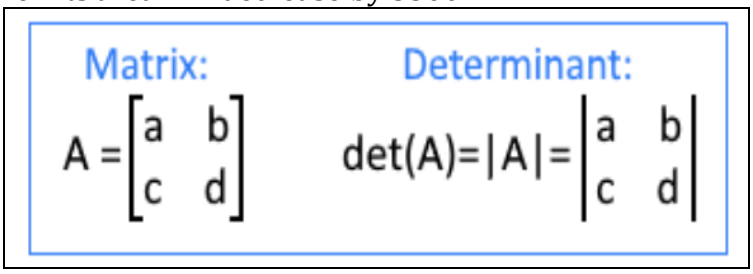
Q8. Let $A = \begin{bmatrix}3 & 7\\2 & 5\end{bmatrix}$ and $B = \begin{bmatrix}6 & 8\\7 & 9\end{bmatrix}$. Verify that $(AB)^{-1} = B^{-1}A^{-1}$

Q9. If $A = \begin{bmatrix}1 & -1 & 1\\2 & 1 & -3\\1 & 1 & 1\end{bmatrix}$, find A^{-1} and hence solve the system of equations

$x + 2y + z = 4$, $-x + y + z = 0$, $x - 3y + z = 2$

Q10. **Case Study: Read the following passage and answer the questions given below:**

Manjit wants to donate a rectangular plot of land for a school in his village. When he was asked to give dimensions of the plot, he told that if its length is decreased by 50 m and breadth is increased by 50 m, then its area will remain same, but if length is decreased by 10 m and breadthis decreased by 20 m, then its area will decrease by 5300 m^2 .



i. Write the following matrix equation represents the information given above?.

ii. Find the value of x (length of rectangular field) and the value of y (breadth of rectangular field).

CHAPTER 5 -CONTINUITY AND DIFFERENTIABILITY

Multiple choice questions:

Q1. The differential coefficient of the function $\cot^3 2x$ is

a. $-6\cot^2 2x.\text{cosec}^2 2x$ b. $-3\cot^2 2x.\text{cosec}^2 2x$ c. $-6\cot^2 2x.\text{cosec}\,2x$ d. cotx

Q2. $F(x) = x^n$, where n is a positive integer or any positive rational, is

a. Continuous b. Discontinuous c. Cannot be determined d. constant

Q3. The function f(x) = [x], where [x] denotes the greatest integer function, is continuous at

a. 4 b. −2 c. 1 d. 0

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. Consider the function f(x)= [sin x],$x \in [0,\pi]$.

Assertion (A): f(x) is not continuous at $x=\pi/2$.

Reason (R): $\lim_{x\to\pi/2} f(x)$ does not exist.

Q5. **Assertion (A)**: If a function is differentiable then it is always continuous.

Reason (R): A continuous function is always differentiable.

Subjective type questions:

Q6. Differentiate $e^{\sqrt{3x}}$, with respect to x.

Q7. Show that the function f(x)= |x−1|+|x+1|, for all $x \in R$, is not differentiable at the points x = −1 and x = 1.

Q8. If x = a(2θ − sin 2θ) and y = a(1 − cos 2θ), find dy/dx when θ = π/3.

Q9. Find all points of discontinuity of f, where f is defined as follows.

$$\begin{cases} |x| + 3 & x \le -1 \\ -2x & -1 < x < 3 \\ 6x + 2 & x \ge 3 \end{cases}$$

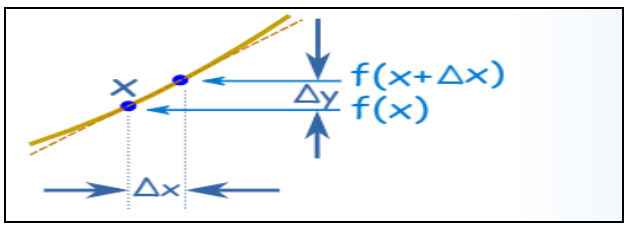
Q10. **Case Study: Read the following passage and answer the questions given below:**

The derivative of f at x= c is defined by:

$$f(x)= \lim_{h\to 0} \frac{f(c+h)-f(c)}{h}$$

A function is said to be differentiable at a point c if the left-hand derivative at x=c is equal to the right-hand derivative at x=c.

Similarly, a function is said to be differentiable in an interval (a,b), if it is differentiable at every point of (a,b).



i.Discuss the differentiability of f(x)= x|x| at x=0 .

ii. If x= a $\sec^3\theta$ and y = b $\tan^3\theta$ find dy/dx at θ= π/3 .

CHAPTER 6 -APPLICATIONS OF DERIVATIVES

Multiple choice questions:

Q1 It is given that at x = 1, the function $x^4 - 62x^2 + ax + 9$ attains its maximum value on the interval[0, 2]. Then the value of a is

a. 100 b. 120 c. 140 d. 160

Q2 The length of the longest interval, in which the function $3 \sin x - 4\sin^3 x$ is increasing, is

a. $\frac{\pi}{3}$ b. $\frac{\pi}{2}$ c. $\frac{3\pi}{2}$ d. π

Q3. The interval in which $y = x^2e^{-x}$ is increasing, in

a. $(-\infty, \infty)$ b. (-2, 0) c. $(2, \infty)$ d. (0, 2)

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**: f(x) = tan x − x always increases.

Reason (R): Any function f(x) is increasing if $\frac{dy}{dx} > 0$.

Q5. **Assertion (A)**: $f(x) = e^{-3x}$ always increases.

Reason (R): Any function f(x) is decreasing if $\frac{dy}{dx} < 0$.

Subjective type questions:

Q6. Find interval in which $f(x) = \sin 3x - \cos 3x$, $0 < x < \pi$, is strictly increasing or decreasing.

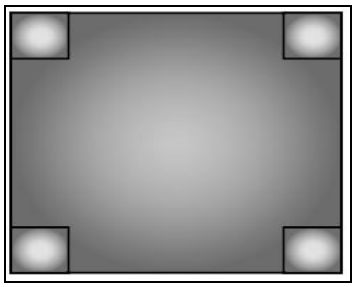
Q7. A stone is dropped into a quiet lake and waves move in circles at a speed of 4cm per second. At the instant, when the radius of the circular wave is 10cm ,how fast is the enclosed area increasing?

Q8. Find the intervals in which the function $f(x) = \sin 3x$, $x \in [0, \frac{\pi}{2}]$ is (a) strictly increasing (b) strictly decreasing.

Q9. A Window is of the form of a semi - circle with a rectangle on its diameter. The total perimeter of the window is 10m. Find the dimensions of the window to admit maximum light through the wholeopening.

Q10. **Case Study: Read the following passage and answer the questions given below:**

A square piece of tin of side 24 cm is to be made into a box without top by cutting a square from each corner and folding up the flaps to form a box.



i. Find the length , breadth and height of box formed, in terms of x .

ii. Find the Maximum value of volume of box.

CHAPTER 7 -INTEGRALS

Multiple choice questions:

Q1. If $\int 2^x\,dx = f(x) + C$, then f(x) is

a. 2^x b. $2^x \log_e 2$ c. $2^x / \log_e 2$ d. $2^{x+1}/x+1$

Q2. $\int \cot^2 x\,dx$ equals to

a. cot x – x + C b. -cot x – x + C c. cot x + x + C d. -cot x + x + C

Q3. Integrate $\int_0^2 (x^2+x+1)\,dx$

a. 15/2 b. 20/5 c. 20/3 d. 3/20

Assertion –Reason type questions

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**:Derivative of a function is unique but a function can have infinite integrals.
Reason (R): Integration is the reverse process of differentiation.

Q5. **Assertion (A)**: The value of $\int_a^b f(t)dt$ and $\int_a^b f(u)$ du are equal.
Reason (R): The value of definite integral of a function over any particular interval depends on the function and the interval not on the variable of integration.

Subjective type questions:

Q6. Evaluate $\int \cos^{-1}(\sin x)dx$.

Q7. Evaluate $\int e^{-3x} \cos^3 x dx$.

Q8. Evaluate $\int \sqrt{tanx}$ dx.

Q9. Evaluate $\int_{\Pi/4}^{\Pi/2} \cos 2x.\log(\sin x)dx$

Q10. **Case Study: Read the following passage and answer the questions given below**

The mathematics teacher teaches the following type of integration.In this type of integral, integrand is the product of two functions. One is in exponential form andsecond function is the sum of two functions in which one is derivative of other function. Then, toevaluate such integrals, we directly use the following formula

$$\int e^x \left[f(x) + f'(x)dx\right] = e^x f(x) + C$$

$$\int_0^z \frac{(1-\cos t)\,dt}{t}$$

i. Find the value of $\int e^x (\sin x + \cos x)dx$

ii. Find the value of $\int \sin(\log x) + \cos(\log x)dx$

CHAPTER 8 -APPLICATIONS OF INTEGRALS

Multiple choice questions:

Q1. The area bounded by the curves $y^2 = 4x$ and $y = x$ is equal to

a. 1/3 b. 8/3 c. 35/6 d. 35

Q2. The area of the region bounded by the circle $x^2 + y^2 = 1$ is

a. 2π sq. units b. 3π sq. units c. 4π sq. units d. π sq. units

Q3. The area of the region bounded by the curve $y^2 = x$, the y-axis and between $y = 2$ and $y = 4$ is

a. 52/3 sq. units b. 54/3 sq. units c. 56/3 sq. units d. 56 sq. units

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**:The coefficients of expansions are arranged in an array. This array is called Pascal's triangle.

Reason (R): There are11th terms in the expansion of $(4x +7y)^{10} + (4x -7y)^{10}$.

Q5. **Assertion (A)**: Number of terms in the expansion of $(2x +3)^3$ is 4.

Reason (R): If n is odd then number of terms are n+1.

Subjective type questions:

Q6 Find the area of the region bounded by the curve $y= x^2$ and the line $y=4$.

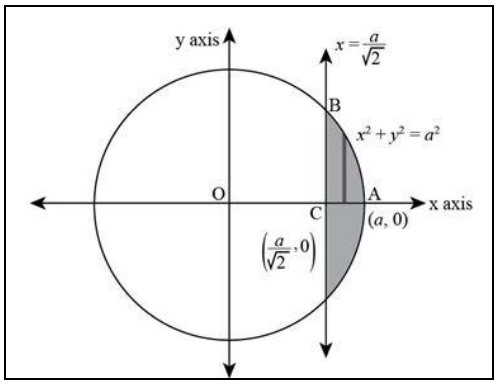
Q7. Find the area of the region bounded by the circle $4x^2 +4y^2 = 9$ and first quadrant.

Q8. Find the area of the region bounded by the parabola $y^2 = 4ax$ and $x^2 = 4ay$.

Q9. Find the area of the triangle ABC bounded by the lines represented by the equations $5x -2y -10 =0$, $x - y - 9 =0$ and $3x - 4y - 6 = 0$, using integration method.

Q10. **Case Study: Read the following passage and answer the questions given below:**

A parking lot in an IT park has an area equal to the smaller part of the circle $x^2 + y^2 = a^2$ cut-off bythe line $x = a/\sqrt{2}$. This area is allotted for car owners who practice car pooling.



i. Find the area used for car pooling.

ii. Find the area of remaining part.

CHAPTER 9 -DIFFERENTIAL EQUATIONS

Multiple choice questions:

Q1. The order of the differential equation of all the circles of given radius 4 is

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

Q2. The differential equation of the family of lines passing through origin is

a. $y = mx$ b. $dy/dx = m$ c. $x\,dy - y\,dx = 0$ d. $dy/dx = 0$

Q3. The degree of the differential equation $\frac{dy}{dx} + \sin\left(\frac{dy}{dx}\right) = 0$ is

a.1 b. 0 c. 2 d. Not defined

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**: $\frac{dy}{dx} + x^2 y = 5$ is a first order linear differential equation.

Reason (R): If P and Q are functions of x only or constant then differential equation of the form $\frac{dy}{dx} + Py = Q$ is a first order linear differential equation.

Q5. **Assertion (A)**: The number of arbitrary constants in the solution of differential equation $d^2y/dx^2 = 0$ are 2.

Reason (R): The solution of a differential equation contains as many arbitrary constants as in the order of differential equation.

Subjective type questions:

Q6. Find the particular solution of the differential equation $(x - y)\frac{dy}{dx} = (x + 2y)$, given that y = 0 when x = 1.

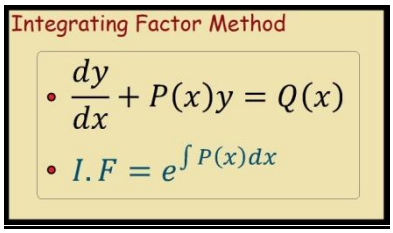
Q7. Find the general solution of the equation $(x^3 + x^2 + x+1)\frac{dy}{dx} = 2x^2 + x$.

Q8. Solve the differential equation $xy\,dy = (y +5)\,dx$, given that $y(5) = 0$.

Q9. Find the general solution of the differential equation $\cos^2 x \frac{dy}{dx} + y = \tan x$.

Q10. **Case Study: Read the following passage and answer the questions given below.**

If the equation is of the form $\frac{dy}{dx} + Py = Q$, where P and Q are functions of x, then the solution of the differential equation is given by $ye^{\int Pdx} = \int Qe^{\int Pdx}dx + C$, where $e^{\int Pdx}$ is called the integrating factor(IF).



i. Find the integrating factor of the differential equation $\frac{dy}{dx} + y\cot x = 2x + x^2 \cot x$, where $x \neq 0$.

ii. Find the general solution of $\frac{dy}{dx} + 3y = e^{-2x}$.

CHAPTER 10 -VECTORS

Multiple choice questions:

Q1. If $|a \times b| = 4$ and $|a.b| = 2$, then $|a|^2 |b|^2$ is equal to:

a. 4 b. 6 c. 20 d. 2

Q2. The magnitude of the vector $6\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$

a. 1 b. 5 c. 7 d. 12

Q3. If a vector makes an angle of $\pi/4$ with the positive directions of both X-axis and Y-axis, then the angle which it makes with positive Z-axisis

a. $\pi/4$ b. $3\pi/4$ c. $\pi/2$ d. 0

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**: Magnitude of unit vector is 1.

Reason (R): Unit vector is represented by $\hat{\imath}$.

Q5. **Assertion (A)**: Two vectors are said to be like vectors if they have the same direction but different magnitude.

Reason (R): Vector quantities do not have a specific direction.

Subjective type questions:

Q6. Write the direction ratios of the vector $3\vec{a} + 2\vec{b}$, where $\vec{a} = \hat{\imath} + \hat{\jmath} - 2\hat{k}$ and $\vec{b} = 2\hat{\imath} - 4\hat{\jmath} + 5\hat{k}$

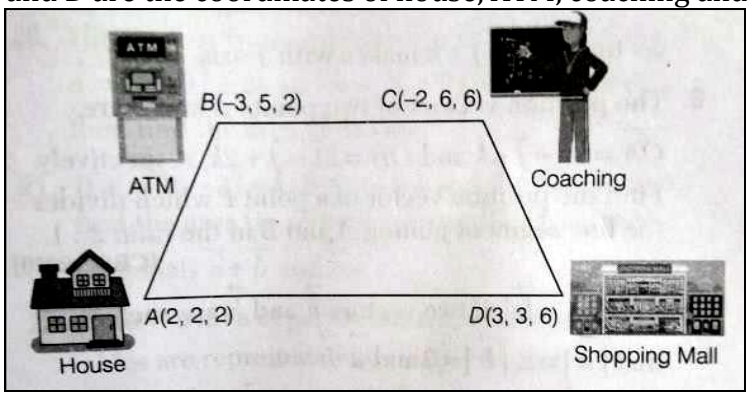
Q7. Find the unit vector in the direction of the sum of the vectors $2\hat{\imath} + 3\hat{\jmath} - \hat{k}$ and $4\hat{\imath} - 3\hat{\jmath} + 2\hat{k}$.

Q8. Using vectors, prove that the parallelogram on the same base and between the same parallels areequal in area.

Q9. A Find a vector a of magnitude $5\sqrt{2}$, making an angle of $\pi/4$ with X-axis, $\pi/2$ with Y-axis and an acute angle 0^0 with Z-axis.

Q10. **Case Study: Read the following passage and answer the questions given below.**

Nitin starts walking from his house to shopping mall. Instead of going to the mall directly, hefirst goes to ATM, from there to his son's coaching and then reaches the mall. In the diagram, A, B, C and D are the coordinates of house, ATM, coaching and mall respectively.



i. Find the distance between House (A) and ATM (B).

ii. Find the total distance travelled by Nitin.

CHAPTER 11 -THREE – DIMENSIONAL GEOMETRY

Multiple choice questions:

Q1. The direction cosines of the y-axis are

a. (6, 0, 0) b. (1, 0, 0) c. (0, 1, 0) d. (0, 0, 1)

Q2. The coordinates of the midpoints of the line segment joining the points (2, 3, 4) and (8, -3, 8)are

a. (10, 0, 12) b. (5, 6, 0) c. (6, 5, 0) d. (5, 0, 6)

Q3. The distance of the plane 2x – 3y + 6z + 7 = 0 from the point (2, -3, -1) is

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

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A):** The points A (2,9,12), B (1,8,8), C (2,11,8) and D(1,12,12) are the vertices of a rhombus

Reason (R): AB=BC=CD=DA and AC=BD.

Q5. **Assertion (A):** The direction ratios of the line joining origin and point (x, y, z) must be x, y, z.

Reason (R): If (x, y, z) is a point in space and OP = r, then direction cosines of OP are x/r , y/r and z/r.

Subjective type questions:

Q6. Find the angle between the lines whose direction cosines are given by the equations :
3l + m + 5n = 0 and 6mn – 2nl + 5lm = 0.

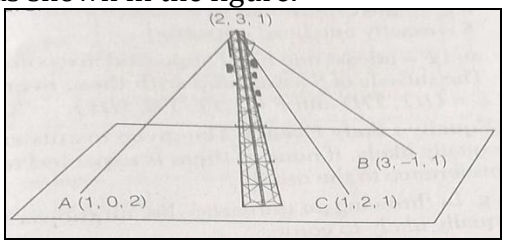
Q7. Find the coordinates of the foot of the perpendicular drawn from a point A(1, 8, 4) to the line joining the points B (0, –1, 3) and C(2, –3, –1).

Q8. Find the vector and cartesian equations of the plane passing through the points (2, 2, –1), (3, 4, 2) and (7, 0, 6). Also find the vector equation of a plane passing through (4, 3, 1) and parallel to the plane obtained above.

Q9. Find the coordinates of the point where the line through the points (3, –4, –5) and (2, –3, 1), crosses the plane determined by the points (1, 2, 3), (4, 2, –3 and (0, 4, 3).

Q10.**Case Study: Read the following passage and answer the questions given below:**

A mobile tower stands at the top of a hill. Consider the surface on which the tower stands as a planehaving points A(1, 0, 2), B(3, -1, 1) and C(1, 2 , 1)on it. The mobile tower is tied with 3 cables from the point A, B and C such that it stands vertically on the ground. The top of the tower is at the point (2, 3, 1) as shown in the figure.



i. Find the equation of the plane that passing through the points A, B and C .

ii. Find the equation of the perpendicular line drawn from the top of the tower to the ground.

CHAPTER 12 -LINEAR PROGRAMMING

Multiple choice questions:

Q1. Feasible region in the set of points which satisfy

a. The objective functions
b. Some the given constraints
c. All of the given constraints
d. Subjective function

Q2. All the points of the feasible region for maximum or minimum of objective function the points

a. Inside the feasible region
b. At the boundary line of the feasible region
c. Vertex point of the boundary of the feasible region
d. Unbounded region

Q3. Objective function of a linear programming problem is

a. a constraint
b. function to be optimized
c. A relation between the variables
d. feasible region

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.
b. Both A and R are true but R is not the correct explanation of A.
c. A is true but R is false.
d. A is false but R is true.

Q4. **Assertion (A)**: At corner points O (0,0) , A(3, 0) , B(4,4) , C (0,9) , the objective function $Z = 3x + 8y$ is maximum at (0,9).

Reason (R): In a L.P.P. , the linear inequalities or restriction on the variables are called linear constraints.

Q5. **Assertion (A)**: Linear programming is also called linear optimization .

Reason (R): Linear programming is a method to achieve the best outcomes.

Subjective type questions:

Q6. Solve the following LPP graphically:

Maximise $Z = 2x + 3y$,
subject to the constraints: $x + y \leq 4, x \geq 0, y \geq 0$

Q7. Solve the following linear programming problem graphically:

Minimise $Z = 200 x + 500 y$
subject to the constraints: $x + 2y \geq 10, 3x + 4y \leq 24, x \geq 0, y \geq 0$

Q8. Solve the following problem graphically:

Minimise and Maximise $Z = 3x + 9y$
subject to the constraints: $x + 3y \leq 60 , x + y \geq 10 , x \leq y , x \geq 0, y \geq 0$

Q9. Minimise $Z = 3x + 2y$
subject to the constraints: $x + y \geq 8 , 3x + 5y \leq 15 , x \geq 0, y \geq 0$.

Q10**. Case Study:** Read the following passage and answer the questions given below:

Let R be the feasible region for a linear programming problem and let $Z = ax + by$ be the objective function. When Z has an optimal value (maximum or minimum), where the variables and y are subject to the constraints described by linear inequalities, thisoptimal value must occur at a corner point (vertex) of the feasible region.

i. If the corner points of the feasible region for the LPP are (0, 3), (5, 0), (6, 8), (0, 8). Let $Z = 4x - 6y$ be the objective function. Then find the point at which the minimum value of Z occurs .

ii. Corner points of the feasible region for the LPP are (0, 3), (5, 0), (6, 8), (0, 8). Let $Z = 4x - 6y$ be the objective function. Find the point at which the maximum value occurs .

CHAPTER 13 -PROBABILITY

Multiple choice questions:

Q1 If P(A) = 3/8, P(B) = 1/3 and P(A∩B) = 1/4, then P (A' ∩B') is

a. 13/24 b. 13/8 c. 13/9 d. 13/4

Q2. If A and B are two events such that P(A) ≠ 0 and P(AB) = 1, then

a. B ⊂ A b. B = ϕ c. A ⊂ B d. A ∩ B = ϕ

Q3. The chance of getting a doublet with 2 dice is

a. 2/3 b. 1/6 c. 5/6 d. 5/36

Assertion –Reason type questions:

Two statements are labeled as Assertion(A) and Reason(R).Select the most appropriate answer from the options given below:

a. Both A and R are true and R is correct explanation of A.

b. Both A and R are true but R is not the correct explanation of A.

c. A is true but R is false.

d. A is false but R is true.

Q4. **Assertion (A)**: Probability of getting a head in a toss of an unbiased coin is $\frac{1}{2}$.

Reason (R): In a simultaneous toss of two coins, the probability of getting 'no tails' is $\frac{1}{4}$

Q5. **Assertion (A)**: In tossing a coin, the exhaustive number of cases is 2.

Reason (R): If a pair of dice is thrown, then the exhaustive number of cases is 6x6.

Subjective type questions:

Q6. A die is thrown twice and the sum of the numbers appearing is observed to be 8. What is the conditional probability that the number 5 has appeared at least once?

Q7. A man is known to speak the truth 3 out of 4 times. He throws a die and reports that it is a six. Findthe probability that is a actually a six.

Q8. A card from a pack of 52 cards is lost from the remaining cards of the pack two cards are drawn and are found to be both spades. Find the probability of the lost card being a spade.

Q9. Two groups are competing for the position of the Board of Directors of a Corporation. The probabilities that the first and second groups will win are 0.6 and 0.4 respectively. Further, if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.

Q10 **Case Study: Read the following passage and answer the questions given below.**

In answering a question on a multiple choice test for class XII, a student either knows the answer or guesses. Let 3/5 be the probability that he knows the answer and 2/5 be the probability that he guesses. Assume that a student who guesses at the answer will be correct with probability 1/3.Let E1 , E2 , E be the events that the student knows the answer, guesses the answers and the answers correctly respectively.

i. Find the value of $P(E_1)$

ii. What is the probability that the student knows the answer given that he answered it correctly?