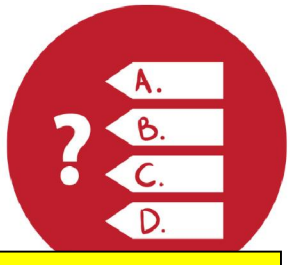
MULTIPLE CHOICE Type Questions



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Chapter 01 – Matrices & Determinants

📖 **Select the correct option (s) in the followings.**

Q01. Which of the following is 'additive identity for matrix addition'?
(a) any matrix (b) any square matrix
(c) any null matrix (d) a null matrix of same order

Q02. A null matrix, whose all elements are zero, is
(a) always a square matrix (b) always a column vector
(c) always a diagonal matrix (d) not necessary to be a square matrix

Q03. If A and B are two matrices such that $A+B$ and AB are both defined then
(a) A and B can be any matrices
(b) A and B are square matrices not necessarily of same order
(c) Number of columns in A = Number of rows in B
(d) A and B are square matrices of same order.

Q04. If $A=\begin{bmatrix}2 & -1\\ 3 & 1\end{bmatrix}$ then, AA^T is equal to
(a) $\begin{bmatrix}5 & 5\\ 10 & 5\end{bmatrix}$ (b) $5\begin{bmatrix}1 & 1\\ 1 & 2\end{bmatrix}$ (c) $5\ I_2$ (d) $\begin{bmatrix}1 & 1\\ 1 & 2\end{bmatrix}$

Q05. Let $|A|=\begin{vmatrix}a & b & c\\ d & e & f\\ g & h & i\end{vmatrix}=4$ then, $|adj.A|=$
(a) 16 (b) 2 only (c) –2 only (d) –16

Q06. If A and B are square matrices of $n\times n$ such that $A^2-B^2=(A-B)(A+B)$, then which of the following is true?
(a) either A or B is a zero matrix (b) $A=B$
(c) $AB=BA$ (d) None of these

Q07. If A is a singular matrix, then adjA is
(a) singular (b) non-singular (c) symmetric (d) not defined

Q08. If order of A, B and C are 4×3, 5×4 and 3×7 respectively then, order of $C'(A'\times B')$ is
(a) 7×5 (b) 4×5 (c) 4×3 (d) 5×7

Q09. If $A=\begin{bmatrix}a & 0 & 0\\ 0 & a & 0\\ 0 & 0 & a\end{bmatrix}$, then the value of $|adj.A|$ is
(a) a^{27} (b) a^6 (c) a^9 (d) a^2

Q10. If A is a square matrix such that $A^2-A+I=O$, then the value of inverse of A is
(a) A – I (b) I + A (c) A (d) I – A

Q11. If $A=\begin{bmatrix}\alpha & 2\\ 2 & \alpha\end{bmatrix}$ and $|A^3|=125$, then α is

(a) ± 2 (b) ± 3 (c) ± 1 (d) ± 5

Q12. The order of $\begin{bmatrix}x & y & z\end{bmatrix}\begin{bmatrix}a & h & g\\ h & b & f\\ g & f & c\end{bmatrix}\begin{bmatrix}m\\ n\\ p\end{bmatrix}$ is

(a) 3×1 (b) 1×1 (c) 1×3 (d) 3×3

Q13. If $A=\begin{bmatrix}\cos x & \sin x\\ -\sin x & \cos x\end{bmatrix}$ and $A.(\text{adj}.A)=k\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, then the value of k is

(a) $\sin x\cos x$ (b) 1 (c) 2 (d) 3

Q14. If $A=\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$, then A^4 is

(a) $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ (b) $\begin{bmatrix}1 & 1\\ 0 & 0\end{bmatrix}$ (c) $\begin{bmatrix}0 & 0\\ 1 & 1\end{bmatrix}$ (d) $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$

Q15. The value of $|A||\text{adj}A|$ if $A=\begin{bmatrix}-1 & 0 & 0\\ 0 & -1 & 0\\ 0 & 0 & -1\end{bmatrix}$, is

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

Chapter 02 - Relations & Functions

Select the correct option (s) in the followings.

Q01. The relation $R=\{(1,2)\}$ on $A=\{1,2,3\}$ is

(a) Reflexive only
(b) Symmetric only
(c) Transitive only
(d) Equivalence i.e., reflexive, symmetric as well as transitive

Q02. In the set $A=\{1,2,3,4,5\}$, a relation R is defined by $R=\{(x,y): x,y\in A \text{ and } x<y\}$. Then R is

(a) Reflexive (b) Symmetric (c) Transitive (d) Equivalence

Q03. Let $f: A\to B$ be a one-one function s. t. range of f is $\{b\}$. Then the value of n(A) is

(a) 1 (b) 2 (c) 0 (d) 4

Q04. Let A = {1, 2, 3, 4} and R = {(1, 1), (2, 2), (3, 3), (4, 4), (1, 2), (2, 1)} be defined on set A. Then the equivalence classes of [1] is

(a) (1, 2) (b) [1, 2] (c) {1, 2} (d) {1, 2, 3, 4}

Q05. If $f: R\to A$, given by $f(x)=x^2-2x+2$ is onto function, then the set A is

(a) $(1,\infty)$ (b) $[1,\infty)$ (c) $(-\infty, 0)$ (d) $(0,\infty)$

Q06. Let $f: R\to R$, $f(x)=\sin x$. Then f(x) is

(a) one-one function (b) onto function
(c) one-one and onto both (d) None of these

Q07. Let $A=\{1,2\}$. Then number of reflexive relations defined on A is

(a) 4 (b) 8 (c) 16 (d) 0

Q08. Let $A=\{1,2,3\}$. Then number of symmetric relations defined on A is

(a) 8 (b) 64 (c) 1 (d) 0

Q09. Let $A = \{1, 2\}$. Then number of reflexive and symmetric relations defined on A is

(a) 8 (b) 4 (c) 2 (d) 1

Q10. Let N be the set of natural numbers and the function $f : N \to N$ be defined by $f(n) = 2n + 3 \ \forall \ n \in N$. Then f is

(a) surjective (b) injective (c) bijective (d) not a function

Q11. Set A has 3 elements and the set B has 4 elements. Then the number of injective mappings that can be defined from A to B is

(a) 144 (b) 12 (c) 24 (d) 64

Chapter 03 - Inverse Trigonometric Functions

📖 **Select the correct option (s) in the followings.**

Q01. The value of $\cos^{-1}(-1) - \sin^{-1}(1)$ is

(a) π (b) $\frac{\pi}{2}$ (c) $\frac{3\pi}{2}$ (d) $-\frac{3\pi}{2}$

Q02. Value of $\sin^{-1}\sin\frac{2\pi}{3}$ is

(a) $-\frac{2\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{4\pi}{3}$ (d) $\frac{\pi}{3}$

Q03. Value of $\cos\tan^{-1}\frac{3}{4}$ is

(a) $\frac{4}{5}$ (b) $\frac{3}{4}$ (c) $\frac{4}{3}$ (d) $\frac{5}{4}$

Q04. If $\sin^{-1} x = \frac{\pi}{5}$, $x \in (-1, 1)$ then $\cos^{-1} x$ is

(a) $\frac{3\pi}{10}$ (b) $\frac{5\pi}{10}$ (c) $-\frac{3\pi}{10}$ (d) $\frac{9\pi}{10}$

Q05. If $y = \sin\cot^{-1} x$, then y is equal to

(a) $(1 + x^2)^{1/2}$ (b) x (c) $(1 + x^2)^{-3/2}$ (d) $(1 + x^2)^{-1/2}$

Q06. The domain of $\sin^{-1} 2x$ is

(a) [0, 1] (b) [–1, 1] (c) $\left[-\frac{1}{2}, \frac{1}{2}\right]$ (d) [–2, 2]

Chapter 04 - Continuity & Differentiability

📖 **Select the correct option (s) in the followings.**

Q01. Value of $\frac{d}{dx}\left(\sin^{-1}\frac{x}{3} + \cos^{-1}\frac{x}{3}\right)$ is equal to

(a) 0 (b) $\frac{1}{3}$ (c) 3 (d) Not possible to find

Q02. $\frac{d}{dx}[\sin^{-1}\cos x]$ is

(a) –1 (b) $\frac{1}{2}$ (c) $\cos^{-1} x$ (d) $\frac{1}{\sin x}$

Q03. If $f(x) = \sin^{-1}\sqrt{x}$, then derivative of the function $f(x)$ w.r. to x is

(a) $\frac{1}{\sqrt{1-x}}$ (b) $\frac{1}{2\sqrt{x}\sqrt{1-x}}$ (c) $\frac{2}{\sqrt{x}\sqrt{1-x}}$ (d) $-\frac{2}{\sqrt{x}\sqrt{1-x}}$

Q04. If $f(x)=|x|$, then $\frac{d}{dx}[f(x)]$ at $x=0$ is

(a) -1 (b) 1 (c) $\pm\frac{|x|}{x}$ (d) Doesn't exist

Q05. Value of $\frac{d(\sin x)}{d(\cos 2x)}$ is equal to

(a) $-\frac{1}{4}\operatorname{cosec} x$ (b) $\frac{1}{4\sin x}$ (c) $-4\sin x$ (d) $\sin 4x$

Q06. If $y=\log_{\sqrt{e}}(\sin x)$, then value of $\frac{dy}{dx}$ is

(a) $\sqrt{e}\cot x$ (b) $\frac{1}{\sqrt{e}}\cot x$ (c) $2\cot x$ (d) $\frac{1}{2}\cot x$

Q07. If $f(x)=\begin{cases}\frac{\log(1+3x)-\log(1-2x)}{x}, & \text{if } x\neq 0\\ k, & \text{if } x=0\end{cases}$ is continuous at $x=0$, then the value of k is

(a) 5 (b) 1 (c) -1 (d) -2

Q08. The function $f(x)=|x|+|x-1|$ is

(a) continuous at $x=0$ as well as at $x=1$ (b) continuous at $x=1$ but not at $x=0$
(c) discontinuous at $x=0$ and at $x=1$ (d) continuous at $x=0$ but not at $x=1$

Chapter 05 - Applications Of Derivatives

📖 **Select the correct option (s) in the followings.**

Q01. If $f(x)=\log x$, then $f(x)$ is

(a) always increasing (b) always decreasing
(c) both increasing and decreasing (d) neither increasing nor decreasing

Q02. An angle θ, $0<\theta<\frac{\pi}{2}$ which increases twice as fast as its sine, is

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{\pi}{2}$ (d) None of these

Q03. The function x^2-4x, $x\in[0, 4]$ attains minimum value at

(a) $x=0$ (b) $x=2$ (c) $x=1$ (d) $x=4$

Q04. The function $f(x)=\frac{x}{2}+\frac{2}{x}$ has a local minimum at

(a) $x=-2$ (b) $x=0$ (c) $x=-3$ (d) $x=2$

Q05. The rate of change of the volume of sphere with respect to its surface area, when its radius is 2 units, is

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

Q06. The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. The rate at which the area increases, when side is 10 cm is

(a) 10 cm^2/s (b) $\sqrt{3}$ cm^2/s (c) $10\sqrt{3}$ cm^2/s (d) $\frac{10}{3}$ cm^2/s

Chapter 06 - Indefinite Integrals

🕮 **Select the correct option (s) in the followings.**

Q01. If $\int e^{-2\log x}dx = f(x)+k$, then $f(x)$ is

(a) $\frac{x^3}{3}$ (b) $-\frac{1}{x}$ (c) $-\frac{2}{x}$ (d) $\frac{1}{x}$

Q02. The value of $\int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x}dx$ is

(a) $\operatorname{cosec} x + \sec x + c$ (b) $\operatorname{cosec} x + \tan x + c$
(c) $\cot x + \tan x + c$ (d) $\tan x - \cot x + c$

Q03. If $f(x)+k = \int \frac{\sin x \cos x}{1+\cos 2x}dx$ then, $f(x)$ is

(a) $\log|1+\cos 2x|$ (b) $\frac{1}{2}\log|\cos x|$ (c) $-\frac{1}{2}\log|\cos x|$ (d) $-\frac{1}{4}\log|\cos x|$

Q04. The value of $\int e^{x\log a}e^x dx$ is

(a) $a^x e^x \log_e a + k$ (b) $a^x e^x \log_a e + k$ (c) $\frac{a^x e^x}{(\log_e a + 1)} + k$ (d) None of these

Q05. The value of $\int \frac{\cos 2x}{\cos x}dx$ is

(a) $2\sin x + \log|\sec x + \tan x| + k$ (b) $2\sin x - \log|\sec x + \tan x| + k$
(c) $2\sin x + \log\left|\tan\left(\frac{\pi}{4}+\frac{x}{2}\right)\right| + k$ (d) $2\sin x - \log|\sec x - \tan x| + k$

Q06. The value of $\int \frac{dx}{(3-x)^2}$ is

(a) $\frac{1}{(3-x)}+k$ (b) $-\frac{1}{(3-x)}+k$ (c) $-\frac{2}{(3-x)}+k$ (d) $\frac{2}{(3-x)}+k$

Chapter 07 - Definite Integrals

🕮 **Select the correct option (s) in the followings.**

Q01. If $x = \int_0^y \frac{dt}{\sqrt{1+9t^2}}$ and $\frac{d^2y}{dx^2} = ay$ then the value of a is

(a) 9 (b) 5 (c) –9 (d) –5

Q02. If $\int_0^1 \frac{e^t}{1+t}dt = a$, then the value of $\int_0^1 \frac{e^t}{(1+t)^2}dt$

(a) $a - 1 - \frac{e}{2}$ (b) $a + 1 - \frac{e}{2}$ (c) 0 (d) $a + 1 + \frac{e}{2}$

Q03. Value of $\int_1^2 \log x dx$ is

(a) $\log\left(\frac{e}{2}\right)$ (b) $\log\left(\frac{2}{e}\right)$ (c) $2\log\left(\frac{e}{2}\right)$ (d) $\log\left(\frac{4}{e}\right)$

Q04. Value of $\int_0^m \frac{f(x)}{f(x)+f(m-x)}dx$ is

(a) $\frac{m}{2}$ (b) $-\frac{m}{2}$ (c) m (d) 0

Q05. The value of $\int_0^{\pi/2} x\sin x dx$ is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) π (d) 1

Chapter 08 - Application Of Integrals

Select the correct option (s) in the followings.

Q01. The area of the ellipse whose major axis is on the x-axis, is

(a) $\pi a\, b$ (b) $\pi(a+b)$ (c) $\frac{\pi}{4}(a^2+b^2)$ (d) $\frac{\pi}{4}(ab)$

Q02. Area of the triangle (in square units) bounded by the sides $x=0$, $y=0$ and $x+y=2$ is

(a) 1 (b) 2 (c) 4 (d) 8

Q03. What is the area of parabola (in square units) $y^2=x$, bounded by its latus-rectum?

(a) $\frac{1}{12}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{32}{3}$

Q04. Area between the curve $y=\cos x$ and x-axis when $0\le x\le 2\pi$, is

(a) 0 (b) 2 (c) 3 (d) 4

Q05. The area enclosed by the curve $y=\sin x$ and $x=0$ to $x=\frac{\pi}{2}$, is

(a) 1 (b) 2 (c) π (d) 2π

Chapter 09 - Differential Equations

Select the correct option (s) in the followings.

Q01. The general solution of the differential equation $\ln\left(\frac{dy}{dx}\right)+x=0$ is

(a) $y=e^{-x}+c$ (b) $y=-e^{-x}+c$ (c) $y=e^{x}+c$ (d) $y=-e^{x}+c$

Q02. Solution of $x\frac{dy}{dx}+y=0$ is given by

(a) $xy=c$ (b) $x=cy$ (c) $x+y=c$ (d) $x^2+y^2=c$

Q03. What is the degree of $y^4-5\left(\frac{d^3y}{dx^3}\right)^3+6\left(\frac{d^2y}{dx^2}\right)-8\left(\frac{dy}{dx}\right)+5=0$?

(a) 2 (b) 3 (c) 4 (d) 5

Q04. Which of the differential equation maybe satisfied by the curve $y=\sin x$?

(a) $\frac{d^2y}{dx^2}+x=0$ (b) $\frac{d^2y}{dx^2}+y=0$ (c) $\frac{d^2y}{dx^2}-y=0$ (d) $\frac{d^2y}{dx^2}+y\frac{dy}{dx}+x=0$

Q05. The degree of $(y_2)^2-\sqrt{y_1}=y^3$ is

(a) 1/2 (b) 2 (c) 3 (d) not defined

Q06. The solution of $\frac{dy}{dx}-1=e^{x-y}$ is

(a) $(x+c)e^{y-x}=1$ (b) $(x-c)e^{y+x}+1=0$ (c) $(x+c)e^{x-y}=1$ (d) $(x+c)e^{x-y}+1=0$

Chapter 10 - Vector Algebra

📖 **Select the correct option (s) in the followings.**

Q01. The magnitude of the vector $6\hat{i}+2\hat{j}+3\hat{k}$ is

(a) 5 (b) 7 (c) 12 (d) 1

Q02. The position vector of the point which divides the join of points with position vectors $\vec{a}+\vec{b}$ and $2\vec{a}-\vec{b}$ in the ratio 1 : 2 is

(a) $\frac{3\vec{a}+2\vec{b}}{3}$ (b) $\vec{a}$ (c) $\frac{5\vec{a}-\vec{b}}{3}$ (d) $\frac{4\vec{a}+\vec{b}}{3}$

Q03. The vector with initial point P (2, –3, 5) and terminal point Q(3, –4, 7) is

(a) $\hat{i}-\hat{j}+2\hat{k}$ (b) $5\hat{i}-7\hat{j}+12\hat{k}$ (c) $-\hat{i}+\hat{j}-2\hat{k}$ (d) $\hat{i}-\hat{j}-2\hat{k}$

Q04. The angle between the vectors $\hat{i}-\hat{j}$ and $\hat{j}-\hat{k}$ is

(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $-\frac{\pi}{3}$ (d) $\frac{5\pi}{6}$

Q05. The value of λ for which the two vectors $2\hat{i}-\hat{j}+2\hat{k}$ and $3\hat{i}+\lambda\hat{j}+\hat{k}$ are perpendicular is

(a) 2 (b) 4 (c) 6 (d) 8

Chapter 11 - Three Dimensional Geometry

📖 **Select the correct option (s) in the followings.**

Q01. Distance of the point (α, β, γ) from y-axis is

(a) β (b) $|\beta|$ (c) $|\beta|+|\gamma|$ (d) $\sqrt{\alpha^2+\gamma^2}$

Q02. If the directions cosines of a line are k, k, k, then

(a) $k>0$ (b) $0<k<1$ (c) $k=1$ (d) $k=\frac{1}{\sqrt{3}}$ or $-\frac{1}{\sqrt{3}}$

Q03. The direction ratios of a line joining the points A (0, 4, 1) and B (2, 3, –1) is

(a) 2, –1, –2 (b) $\frac{2}{3},-\frac{1}{3},-\frac{2}{3}$ (c) –2, 1, –2 (d) –2, –1, 2

Q04. The coordinates of the foot of the perpendicular drawn from the point (2, 5, 7) on the x-axis are

(a) (2, 0, 0) (b) (0, 5, 0) (c) (0, 0, 7) (d) (0, 5, 7)

Q05. P is a point on the line segment joining the points (3, 2, –1) and (6, 2, –2). If x co-ordinate of P is 5, then its y and z co-ordinates are respectively

(a) 2 and $-\frac{5}{3}$ (b) 1 (c) –1 (d) –2

Chapter 12 - Linear Programming

📖 **Select the correct option (s) in the followings.**

Q01. The corner points of the feasible region determined by the system of linear constraints are (0, 10), (5, 5), (15, 15), (0, 20). Let $Z=px+qy$, where $p,q>0$. Condition on p and q so that the maximum of Z occurs at the points (15, 15) and (0, 20) both, is

(a) $p = q$ (b) $p = 2q$ (c) $q = 2p$ (d) $q = 3p$

Q02. The corner points of the feasible region determined by the system of linear constraints are (0, 0), (0, 40), (20, 40), (60, 20), (60, 0). The objective function is $Z = 4x + 3y$.

Compare the quantity in Column A and Column B

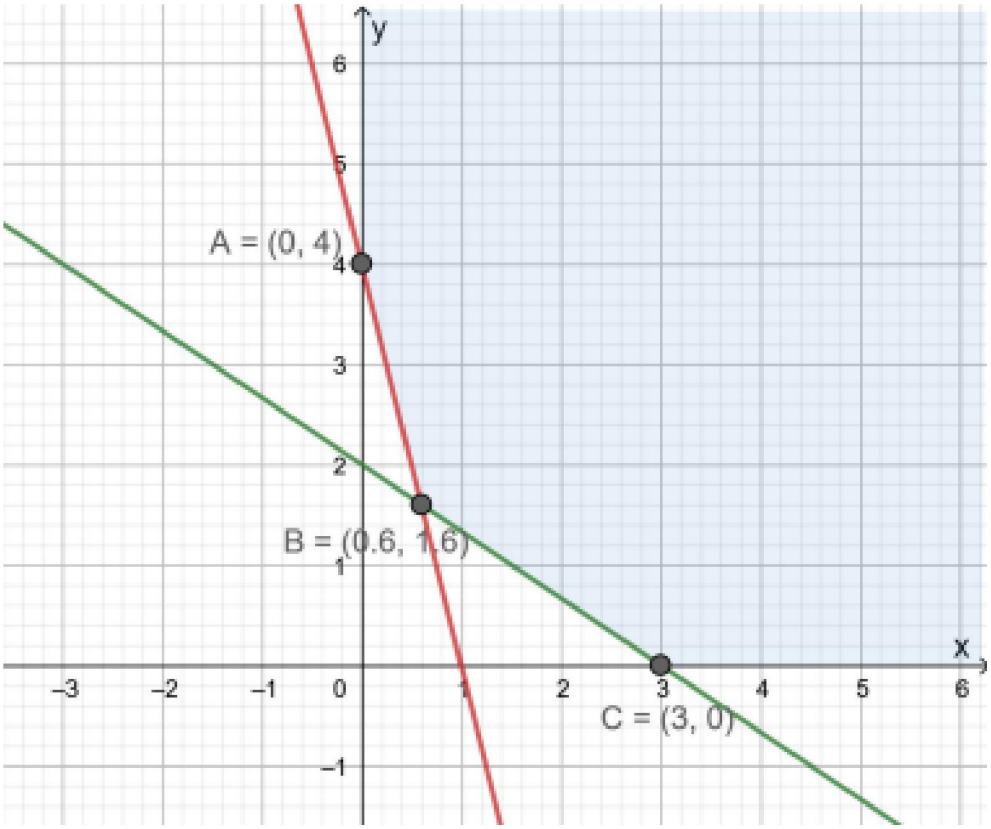
Column A	**Column B**
Maximum of Z	325

(a) The quantity in column A is greater
(b) The quantity in column B is greater
(c) The two quantities are equal
(d) The relationship can not be determined on the basis of the information supplied

Q03. Corner points of the feasible region for an LPP are (0, 2), (3, 0), (6, 0), (6, 8) and (0, 5). Let $F = 4x + 6y$ be the objective function.

The Minimum value of F occurs at
(a) (0, 2) only
(b) (3, 0) only
(c) the mid point of the line segment joining the points (0, 2) and (3, 0) only
(d) any point on the line segment joining the points (0, 2) and (3, 0)

Q04. Feasible region (shaded) for a LPP is shown in the figure. Maximum of $Z = 4x + 3y$ occurs at the point



(a) (0.6, 1.6) only
(b) (3, 0) only
(c) (0.6, 1.6) and (3, 0) only
(d) every point of the line-segment joining the points (0.6, 1.6) and (3, 0)

Q05. The point which does not lie in the half-plane $2x + 3y - 12 \le 0$, is

(a) (1, 2) (b) (2, 1) (c) (2, 3) (d) (–3, 2)

Chapter 13 - Probability

📖 **Select the correct option (s) in the followings.**

Q01. If A and B are independent events and $P(A \cup B) = 3/8$, then $P(A').P(B')$ is

(a) 5/8 (b) 3/8 (c) 1/8 (d) 7/8

Q02. If $P(A) = \frac{3}{8}$, $P(B) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{4}$, then $P(\overline{A} \mid \overline{B})$ is

(a) $\frac{5}{6}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{1}{4}$

Q03. Two planes X and Y bomb a target in succession. Their probabilities to hit correctly are 0.3 and 0.2 respectively. The second plane will bomb only if first misses the target. The probability that the target is hit by Y plane, is

(a) $\frac{8}{20}$ (b) $\frac{8}{25}$ (c) $\frac{1}{25}$ (d) $\frac{7}{22}$

Q04. A pack of playing cards was found to contain only 51 cards. If the first 13 cards, which are examined, are all red, then the probability that the missing card is black, is

(a) $\frac{2}{5}$ (b) $\frac{3}{4}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$