# 8 PRACTICE PAPER

**Time allowed: 45 minutes** **Maximum Marks: 200**

***General Instructions:*** *As given in Practice Paper – 1.*

## *Section–A*

***Choose the correct option:***

**1.** If $A = \begin{bmatrix} 1 & 2 & 3 \\ -2 & 5 & 7 \end{bmatrix}$ and $2A - 3B = \begin{bmatrix} 4 & 5 & -9 \\ 1 & 2 & 3 \end{bmatrix}$ then $B$ is equal to

(*a*) $\frac{1}{3}\begin{bmatrix} -2 & -1 & 15 \\ 5 & 8 & -11 \end{bmatrix}$ (*b*) $\begin{bmatrix} 2 & 1 & -15 \\ 5 & -8 & -11 \end{bmatrix}$ (*c*) $\begin{bmatrix} 2 & -1 & 15 \\ 5 & 8 & 11 \end{bmatrix}$ (*d*) $\frac{-1}{3}\begin{bmatrix} 2 & 1 & -15 \\ 5 & -8 & -11 \end{bmatrix}$

**2.** The value of the determinant $\begin{vmatrix} 41 & 1 & 5 \\ 79 & 7 & 9 \\ 29 & 5 & 3 \end{vmatrix}$ is

(*a*) 1 (*b*) –1 (*c*) 0 (*d*) None of these

**3.** If $A = \begin{bmatrix} 2 & \lambda & -3 \\ 0 & 2 & 5 \\ 1 & 1 & 3 \end{bmatrix}$, then $A^{-1}$ exists if

(*a*) $\lambda = 2$ (*b*) $\lambda \neq 2$ (*c*) $\lambda \neq -2$ (*d*) None of these

**4.** If $f(x) = \log x$ then $f'(1)$ equal to

(*a*) 1 (*b*) 0 (*c*) $\frac{1}{2}$ (*d*) – 1

**5.** The tangent to the curve given by $x = e^t . \cos t$, $y = e^t . \sin t$ at $t = \frac{\pi}{4}$ makes with $x$-axis an angle of

(*a*) 0 (*b*) $\frac{\pi}{4}$ (*c*) $\frac{\pi}{3}$ (*d*) $\frac{\pi}{2}$

**6.** Integration of $\int_0^1 \frac{e^x}{1+e^{2x}}\,dx$ is

(*a*) $\frac{\pi}{4}$ (*b*) $\frac{-\pi}{4}$

(*c*) $\tan^{-1} e - \frac{\pi}{4}$ (*d*) None of these

**7.** The value of $\int \tan^8 x \sec^4 x\,dx$ is

(a) $\frac{\tan^{11}x}{11}+\frac{\tan^{9}x}{9}+C$ (b) $\frac{\tan^{6}x}{6}+\frac{\tan^{9}x}{9}+C$

(c) $\frac{\tan^{8}x}{8}+\frac{\tan^{4}x}{4}+C$ (d) $\frac{\tan^{11}x}{11}+\frac{\tan^{8}x}{8}+C$

**8.** **The value of $\int\frac{dx}{2\sin^2x+5\cos^2x}$ is**

(a) $\frac{1}{\sqrt{5}}\tan^{-1}[\sqrt{2}\tan x]+C$ (b) $\frac{1}{\sqrt{10}}\tan^{-1}\left[\frac{\sqrt{2}\tan x}{\sqrt{5}}\right]+C$

(c) $\frac{\sqrt{2}}{\sqrt{5}}\tan^{-1}\left[\frac{\sqrt{2}\tan x}{\sqrt{5}}\right]+C$ (d) $\frac{1}{\sqrt{10}}\tan^{-1}[\sqrt{2}\tan x]+C$

**9.** **The value of $\int_{-1}^{1}\frac{(x^2+\sin x)dx}{1+x^2}$ is equal to**

(a) $2-\pi$ (b) $\pi-2$ (c) $2-\pi/2$ (d) none of these

**10.** **The area of the curve $y = \sin x$ between 0 and $\pi$ is**

(a) 2 sq. units (b) 4 sq. units (c) 12 sq. units (d) 14 sq. units

**11.** **The degree of the differential equation $\frac{d^2y}{dx^2}+e^{dy/dx}=0$ is**

(a) 0 (b) 2 (c) 1 (d) Not defined

**12.** **The general solution of $\frac{dy}{dx}+ay=e^{mx}$ is**

(a) $(m+a)y=e^{mx}+ke^{-ax}$ (b) $y=e^{mx}+k$ (c) $y=e^{-ax}+k$ (d) None of these

**13.** **Feasible region is the set of points which satisfy**

(a) the objective functions (b) some of the given constraints

(c) all of the given constraints (d) None of these

**14.** **The mean of the numbers obtained on throwing a die having written 1 on three faces, 2 on two faces and 5 on one face is**

(a) 1 (b) 2 (c) 5 (d) 8/3

**15.** **Suppose that two cards are drawn at random from a deck of cards. Let $X$ be the number of aces obtained. Then the value of $E(X)$ is**

(a) 37/221 (b) 5/13 (c) 1/13 (d) 2/13

## *Section–B (B1)*

**16.** **Let $R$ be a relation on $A = \{a, b, c\}$ such that $R = \{(a, a), (b, b), (c, c)\}$, then $R$ is**

(a) Reflexive (b) Symmetric only (c) Non - transitive (d) Equivalence

**17.** **Let $A = \{1, 2, 3\}$. Then, the number of relations containing (1, 2) and (1, 3) which are reflexive and symmetric but not transitive, are**

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

**18.** **Let $A = R - \{3\}$ and $B = R - \{1\}$. Consider the function $f : A \to B$ defined by $f(x) = \left(\frac{x-2}{x-3}\right)$ then $f^{-1}(x)$ equals**

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

**19.** **Let * be a binary operation on $\mathbb{N}$ given by $a * b = a + b$ then (2 * 3) * 4 is equal to**

(a) 9 (b) 5 (c) 7 (d) 6

**20.** Let $f : \mathbb{R} \longrightarrow \mathbb{R}$ defined by $f(x) = 2x^3 + 2x^2 + 300x + 5 \sin x$ then $f$ is

(*a*) one-one onto (*b*) one-one into

(*c*) many one onto (*d*) many one into

**21.** The value of $\cos^{-1}\left(\cos\frac{5\pi}{3}\right) + \sin^{-1}\left(\sin\frac{5\pi}{3}\right)$ is equal to

(*a*) 0 (*b*) $\frac{\pi}{2}$ (*c*) $\frac{10\pi}{3}$ (*d*) $\frac{2\pi}{3}$

**22.** The value of $\sin^{-1}\left(\frac{4}{5}\right) + 2\tan^{-1}\left(\frac{1}{3}\right)$ is equal to

(*a*) $\tan^{-1}\left(\frac{3}{4}\right)$ (*b*) $\tan^{-1}\left(\frac{4}{3}\right)$ (*c*) $\tan^{-1}\frac{3}{\sqrt{10}}$ (*d*) $\frac{\pi}{2}$

**23.** $\cot^{-1}\left[\frac{\sqrt{1-\sin x}+\sqrt{1+\sin x}}{\sqrt{1-\sin x}-\sqrt{1+\sin x}}\right]$ is equal to

(*a*) $\pi - x$ (*b*) $2\pi - x$ (*c*) $\frac{\pi}{2}$ (*d*) $\pi - \frac{x}{2}$

**24.** Simplified value of the expression $\tan\left\{\frac{1}{2}\sin^{-1}\frac{2x}{1+x^2} + \frac{1}{2}\cos^{-1}\frac{1-y^2}{1+y^2}\right\}$ is

(*a*) $\frac{x+y}{1+xy}$ (*b*) $\frac{x+y}{1-xy}$ (*c*) $xy$ (*d*) $x\sqrt{1-x^2} + y\sqrt{1-x^2}$

**25.** $\begin{bmatrix}7 & 1 & 2\\ 9 & 2 & 1\end{bmatrix}\begin{bmatrix}3\\4\\5\end{bmatrix} + 2\begin{bmatrix}4\\5\end{bmatrix}$ is equal to

(*a*) $\begin{bmatrix}45\\44\end{bmatrix}$ (*b*) $\begin{bmatrix}43\\45\end{bmatrix}$ (*c*) $\begin{bmatrix}44\\43\end{bmatrix}$ (*d*) $\begin{bmatrix}43\\50\end{bmatrix}$

**26.** *Read the following statements.*

**Statement I** : Each diagonal element of skew-symmetric matrix is zero.

**Statement II** : Identity matrix is not a skew symmetric matrix.

*Choose the correct option:*

(*a*) Statement I is correct but statement II is not correct.

(*b*) Statement II is correct but statement I is not correct.

(*c*) Both statements I and II are correct.

(*d*) None of these

**27.** For any two square matrices $A$ & $B$, $|A| = 2$ & $|B| = 6$ then $|AB|$ equals

(*a*) 2 (*b*) 6 (*c*) 12 (*d*) none of these

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

(*a*) 12 (*b*) 144 (*c*) –12 (*d*) 13

**29.** If $f(x) = |\cos x - \sin x|$ then $f'\left(\frac{\pi}{3}\right)$ is equal to

(*a*) $\frac{(\sqrt{3}+1)}{2}$ (*b*) $\frac{\sqrt{3}}{2}$

(*c*) $\frac{(\sqrt{3}-1)}{2}$ (*d*) none of these

**30.** For the curve $\sqrt{x}+\sqrt{y}=1$, $\frac{dy}{dx}$ at $\left(\frac{1}{4},\frac{1}{4}\right)$ is

(a) 1 (b) $-1$ (c) 0 (d) 2

**31.** The function $f(x)=\begin{cases}\frac{\sin x}{x}+\cos x, & \text{if } x\neq 0\\ k, & \text{if } x=0\end{cases}$ is continuous at $x=0$, then the value of $k$ is

(a) 3 (b) 2 (c) 1 (d) 1.5

**32.** If $y=\sec^{-1}\left(\frac{\sqrt{x}+1}{\sqrt{x}-1}\right)+\sin^{-1}\left(\frac{\sqrt{x}-1}{\sqrt{x}+1}\right)$, then $\frac{dy}{dx}$ is equal to

(a) 1 (b) $\pi$ (c) 0 (d) $-1$

**33.** If $f(x)=\frac{x}{\sin x}$ and $g(x)=\frac{x}{\tan x}$, where $0<x\leq 1$, then in the interval

(a) both $f(x)$ and $g(x)$ are increasing functions.

(b) both $f(x)$ and $g(x)$ are decreasing functions.

(c) $f(x)$ is an increasing function.

(d) $g(x)$ is an increasing function.

**34.** The value of $\int \cos x\cos 2x\cos 3x\,dx$ is

(a) $\frac{1}{4}\left[x+\frac{\sin 2x}{2}+\frac{\sin 4x}{4}+\frac{\sin 6x}{6}\right]+C$ (b) $\frac{1}{4}\left[x-\frac{\sin 2x}{2}+\frac{\sin 4x}{4}-\frac{\sin 6x}{6}\right]+C$

(c) $x+\frac{\sin 2x}{2}+\frac{\sin 4x}{4}+\frac{\sin 6x}{6}+C$ (d) $x-\sin 2x+\sin 4x+\sin 6x+C$

**35.** If $\int \frac{3e^x-5e^{-x}}{4e^x+5e^{-x}}dx=ax+b\log\left|4e^x+5e^{-x}\right|+C$, 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) $a=\frac{1}{8}, b=\frac{-7}{8}$

**36.** If $g(x)=\int_0^x \cos^4 t\,dt$, then $g(x+\pi)$ is equal to

(a) $g(x)-g(\pi)$ (b) $g(x).g(\pi)$ (c) $g(x)$ (d) $g(x)+g(\pi)$

**37.** The area bounded by the curve $y^2=4x$ and the circle $x^2+y^2-2x-3=0$ is equal to

(a) $\left(2\pi+\frac{8}{3}\right)$sq. units. (b) $\left(4\pi+\frac{8}{3}\right)$sq. units.

(c) $\left(\pi+\frac{8}{3}\right)$sq. units. (d) $\left(\pi-\frac{8}{3}\right)$sq. units.

**38.** The solution of differential equation $\frac{dy}{dx}=e^{x-y}+x^2e^{-y}$ is

(a) $y=e^{x-y}-x^2e^{-y}+C$ (b) $e^y-e^x=\frac{x^3}{3}+C$

(c) $e^x+e^y=\frac{x^3}{3}+C$ (d) $e^x-e^y=\frac{x^3}{3}+C$

**39.** The differential equation of system of concentric circles with centre (1,2) is

(a) $(y-2)\frac{dy}{dx}+(x-1)=0$ (b) $y\frac{dy}{dx}+x=0$

(c) $\frac{dy}{dx}+x=0$ (d) None of these

**40.** If $\vec{a},\vec{b},\vec{c}$ are three non-coplanar vectors and $\vec{p},\vec{q},\vec{r}$ are reciprocal vectors of them, then $(l\vec{a}+m\vec{b}+n\vec{c})\cdot(l\vec{p}+m\vec{q}+n\vec{r})$ is equal to

(a) $l+m+n$ (b) $l^3+m^3+n^3$ (c) $l^2+m^2+n^2$ (d) None of these

**41.** The locus of a point equidistant from two points whose position vectors are $\vec{a}$ and $\vec{b}$ is

(a) $\left\{\vec{r}-\frac{1}{2}(\vec{a}+\vec{b})\right\}\cdot(\vec{b}-\vec{a})=0$ (b) $\{\vec{r}-(\vec{a}+\vec{b})\}\cdot\vec{b}=0$

(c) $\left\{\vec{r}-\frac{1}{2}(\vec{a}+\vec{b})\right\}\cdot\vec{a}=0$ (d) $\left\{\vec{r}-\frac{1}{2}(\vec{a}-\vec{b})\right\}\cdot(\vec{a}+\vec{b})=0$

**42.** The number of vectors of unit length perpendicular to vectors $\vec{a}=5\hat{i}+6\hat{j}+0\hat{k}$ and $\vec{b}=6\hat{i}+5\hat{j}+0\hat{k}$ is

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

**43.** The value of $\vec{A}\cdot\{(\vec{B}+\vec{C})\times(\vec{A}+\vec{B}+\vec{C})\}$ is

(a) 0 (b) $[\vec{A}\ \vec{B}\ \vec{C}][\vec{B}\ \vec{C}\ \vec{A}]$

(c) $[\vec{A}\ \vec{B}\ \vec{C}]$ (d) $\vec{A}\times(\vec{B}\times\vec{C})$

**44.** If the line drawn from a point (–2, –1, –3), meets a plane at right angle at the point (1, –3, 3), then, the equation of the plane is

(a) $3x-2y+6z-20=0$ (b) $3x+2y-5z-5=0$

(c) $x+2y+z-4=0$ (d) $3x-2y+6z-27=0$

**45.** The $x$–coordinate of a point on the line joining the points $Q$ (2, 2, 1) and $R$ (5, 1, –2) is 4, then its $z$–coordinate is

(a) – 1 (b) 0 (c) 1 (d) 2

**46.** The distance of a point ( – 2, 4, –5) from the line $\frac{x+3}{3}=\frac{y-4}{5}=\frac{z+8}{6}$ is

(a) $\frac{\sqrt{7}}{2}$ (b) $\sqrt{\frac{15}{7}}$ (c) $\sqrt{\frac{37}{10}}$ (d) None of these

**47.** The angle between the lines whose direction cosines are given by the equations $3l + m + 5n = 0$ and $6mn - 2nl + 5lm = 0$ is

(a) $\cos^{-1}\left(-\frac{5}{6}\right)$ (b) $\cos^{-1}\left(-\frac{1}{6}\right)$ (c) $\cos^{-1}\left(\frac{2}{3}\right)$ (d) 0

**48.** If $P(A) = 1/2$, $P(B) = 0$, then $P(A/B)$ is

(a) 0 (b) 1/2 (c) not defined (d) 1

**49.** If $A$ and $B$ are events such that $P(A/B) = P(B/A)$, then

(a) $A \subseteq B$ but $A \neq B$ (b) $A = B$ (c) $A \cap B = \phi$ (d) $P(A) = P(B)$

**50.** If $A$ and $B$ are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct?

(a) $P(A/B)=\frac{P(B)}{P(A)}$ (b) $P(A/B) < P(A)$ (c) $P(A/B) \geq P(A)$ (d) none of these