

Sample Paper
10+2
Mathematics (For DA Students)

Time : 3 Hours

Maximum Marks : 80

Instructions:

1. Section A contains Q1 to Q26(objective type questions) of 2 marks each.
2. Section B contains Q27 to Q34 of 3 marks each.
3. Section C contains Q35 to Q42 of 4 marks each.
4. All questions of Section A are compulsory. Attempt any 4 questions out of 8 questions in Section B. Attempt any 4 questions out of 8 questions in Section C.

Section A

Choose a correct option from the given options from Q1 to Q7 :

- Q1 Let $R = \{(a, b) : a = b - 2, b > 6\}$ be a relation defined on the set \mathbb{N} of natural numbers, then 2
(a) $(2, 4) \in R$ (b) $(3, 8) \in R$ (c) $(6, 8) \in R$ (d) $(8, 7) \in R$
- Q2 The function $f: \mathbb{R} \rightarrow \mathbb{R}$ given by $f(x) = 2x - 5$ is 2
(a) one-one only (b) onto only (c) one-one and onto (d) not onto
- Q3 Principal value of $\sin^{-1}\left(\frac{-1}{2}\right)$ is 2
(a) $\frac{-\pi}{6}$ (b) $\frac{\pi}{6}$ (c) $\frac{-\pi}{3}$ (d) $\frac{\pi}{3}$
- Q4 If $y = \sin^{-1}(x)$ then x belongs to the interval : 2
(a) $(0, \pi)$ (b) $(-1, 1)$ (c) $[-1, 1]$ (d) $[0, \pi]$
- Q5 If order of matrix A is 2×3 and order of matrix B is 3×5 then order of matrix $B'A'$ is : 2
(a) 5×2 (b) 2×5 (c) 5×3 (d) 3×2
- Q6 If $\begin{vmatrix} x & 1 \\ 1 & x \end{vmatrix} = \begin{vmatrix} 2 & 0 \\ 8 & 4 \end{vmatrix}$ then value of x is : 2
(a) 3 (b) 2 (c) 4 (d) 8
- Q7 If $\begin{bmatrix} 2x+y & 0 \\ 5 & x \end{bmatrix} = \begin{bmatrix} 5 & 0 \\ 5 & 3 \end{bmatrix}$, then y is equal to:- 2
(a) 1 (b) 3 (c) 2 (d) -1

Match the columns from Q8 to Q13 :

- | | | | |
|-----|---|---|---|
| Q8 | Col. A
(a) $A + A'$
(b) $A - A'$ | Col. B
(i) Always a null Matrix
(ii) Symmetric Matrix
(iii) Skew-Symmetric Matrix | 2 |
| Q9 | Col. A
(a) $f(x) = e^x$
(b) $f(x) = \frac{1}{x}$ | Col. B
(i) Continuous function
(ii) Identity function
(iii) Discontinuous function | 2 |
| Q10 | Col. A
(a) $\frac{d}{dx}(\sin x)$

(b) $\frac{d}{dx}(\cos x)$ | Col. B
(i) $\tan x$

(ii) $\cos x$
(iii) $-\sin x$ | 2 |
| Q11 | Col. A
(a) $f(x) = -x$
(b) $f(x) = e^x$ | Col. B
(i) Strictly increasing function
(ii) Strictly decreasing function
(iii) Constant function | 2 |
| Q12 | Col. A
(a) $f''(a) < 0$
(b) $f''(a) > 0$ | Col. B
(i) $x = a$ is point of minima
(ii) $x = a$ is point of maxima
(iii) $x = a$ is a point of inflexion | 2 |
| Q13 | Col. A
(a) $\int dx$
(b) $\int \cos x dx$ | Col. B
(i) $-\sin x + c$
(ii) $x + c$
(iii) $\sin x + c$ | 2 |

Fill in the blanks from Q14 to Q20 from the the following options :

$$\left\{ -2, \sqrt{426}, \frac{1}{2}, \int_1^4 x^2 dx, 4 \int_0^3 \sqrt{9-x^2} dx, 2, e^{2x}, 5, \tan x \right\}$$

- Q14 $\int_0^1 x dx =$ _____ 2
- Q15 Area of the region bounded between parabola $y = x^2$ and lines $x = 1, x = 4$ in the first quadrant is given by the integral _____ 2
- Q16 Area of the circle $x^2 + y^2 = 9$ is given by the integral _____ 2
- Q17 Order of the differential equation $\frac{d^2 y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + y = 0$ is _____ 2
- Q18 Integrating factor of the differential equation $\frac{dy}{dx} + 2y = \cos x$ is _____ 2
- Q19 If $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}$ then $\vec{a} \cdot \vec{b} =$ _____ 2
- Q20 If $\vec{a} = 5\hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} + \hat{j} - 2\hat{k}$ then $|\vec{a} \times \vec{b}| =$ _____ 2

State as True or False from Q21 to Q26.

- Q21 Direction ratios of x -axis are $\langle 0, 1, 1 \rangle$. 2
- Q22 $\frac{x-2}{3} = \frac{y+7}{2} = \frac{z-9}{5}$ is the vector form of equation of line. 2
- Q23 Subject to the constraints $x + y \leq 3, x \geq 0, y \geq 0$ maximum value of $Z = 2x + y$ is 6. 2
- Q24 Subject to the constraints $x + y \leq 5, x \geq 0, y \geq 0$ maximum value of $Z = x + 2y$ is 5. 2
- Q25 If $P(A) = 0.3$ then $P(\bar{A}) = 0.6$. 2
- Q26 If $P(A) = 0.5, P(A \cap B) = 0.2$ then $P(B / A) = 0.4$ 2

Section B

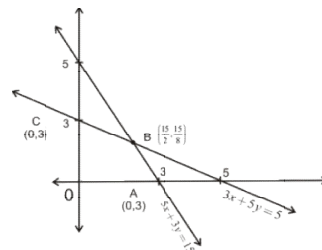
This section contains 8 questions of 3 marks each. Attempt any 4 questions out of these questions .

- Q27 Find the value of $4 \tan^{-1}(1) - \cos^{-1}\left(-\frac{1}{2}\right)$ 3
- Q28 Form a matrix $A = [a_{ij}]$ of order 2×2 where $a_{ij} = i + j$. 3
- Q29 If $y = \cos 2x - \sin 5x$ then find $\frac{dy}{dx}$. 3
- Q30 Evaluate $\int_0^1 \frac{dx}{1+x^2}$. 3
- Q31 Find the area of the region bounded by the parabola $y^2 = x$ lines $x = 0, x = 3$ and x - axis in the first quadrant. 3
- Q32 If $\vec{a} = 3\hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 5\hat{i} + \hat{j} - 7\hat{k}$ then find $|\vec{a} \times \vec{b}|$. 3
- Q33 Find the vector and cartesian equation of the line which passes through the points $(3, -2, -4)$ and $(5, -7, 8)$. 3
- Q34 If $P(A) = \frac{6}{11}, P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$ then find $P(A \cap B)$. 3

Section C

This section contains 8 questions of 4 marks each. Attempt any 4 questions out of these questions .

- Q35 Give two examples each of : (i) row matrix 4
(ii) square matrix
- Q36 Write the formula of differentiation using : 4
(i) Product Rule (ii) Quotient Rule
- Q37 Give one example each of an increasing function and a decreasing function. 4
- Q38 Find the area bounded by ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$ 4
- Q39 Formulate the integral to find the area bounded by the circle $x^2 + y^2 = 25$ in the first quadrant . 4
- Q40 Give one example each of (i) Homogenous differential equation 4
(ii) First order linear differential equation
- Q41 Shade the feasible region in the given figure 4
subject to the constraints
 $5x + 3y \leq 15, 3x + 5y \leq 15, x \geq 0, y \geq 0$.
Also maximize $Z = 8x + 16y$ for this graph.



- Q42 Two balls are drawn at random with replacement from a box containing 10 black balls and 8 red balls. Find the probability that one of them is black and other is red. 4