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 $f: \mathbb{R} \to \mathbb{R}$ 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 **2**

Col. A	**Col. B**
(a)$A + A'$	(i)Always a null Matrix
(b)$A - A'$	(ii)Symmetric Matrix
	(iii)Skew-Symmetric Matrix

Q9 **2**

Col. A	**Col. B**
(a)$f(x) = e^x$	(i)Continuous function
(b)$f(x) = \frac{1}{x}$	(ii)Identity function
	(iii)Discontinuous function

Q10 **2**

Col. A	**Col. B**
(a)$\frac{d}{dx}(\sin x)$	(i)$\tan x$
(b)$\frac{d}{dx}(\cos x)$	(ii)$\cos x$
	(iii)$-\sin x$

Q11 **2**

Col. A	**Col. B**
(a)$f(x) = -x$	(i)Strictly increasing function
(b)$f(x) = e^x$	(ii)Strictly decreasing function
	(iii)Constant function

Q12 **2**

Col. A	**Col. B**
(a)$f''(a) < 0$	(i)$x = a$ is point of minima
(b)$f''(a) > 0$	(ii)$x = a$ is point of maxima
	(iii)$x = a$ is a point of inflexion

Q13 **2**

Col. A	**Col. B**
(a)$\int dx$	(i)$-\sin x + c$
(b)$\int \cos x \, dx$	(ii)$x + c$
	(iii)$\sin x + c$

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

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

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 $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + y = 0$ is _____ **2**

Q18 Integrating factor of the differential equation $\frac{dy}{dx} + 2y = \cos x$ is _____ **2**

Q19 If $\vec{a} = \hat{\imath} - 2\hat{\jmath} + \hat{k}$ and $\vec{b} = 3\hat{\imath} + 2\hat{\jmath} - \hat{k}$ then $\vec{a}.\vec{b} =$_____ **2**

Q20 If $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$ then $|\vec{a} \times \vec{b}| =$_____ **2**

State as True or False from Q21 to Q26.

Q21 Direction ratios of x −axis are$< 0,1,1 >$. **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 $\vec{a} = 3\hat{\imath} - \hat{\jmath} + \hat{k}$ and $\vec{b} = 5\hat{\imath} + \hat{\jmath} - 7\hat{k}$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

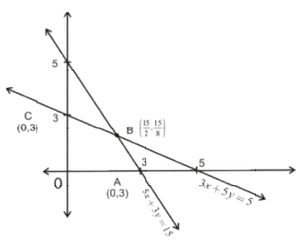
Q37 Give one example each of an increasing function and a decreasing function. **4**

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. **4**
Find the probability that one of them is black and other is red.