GUJCET-2022

Time: 1 Hours
Maximum Marks: 40

MATHS

General Instructions

1. The Maths test consists of 40 questions. Each question carries 1 mark. For each
2. correct response, the candidate will get **1** mark. For each incorrect response, **1/4** mark will be deducted. The maximum marks are **40**.
3. This Test is of 1 hour duration.

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(1) The area of the parabola $x^2 = 12y$ bounded by its latus rectum is.....

(A) 3 (B) $\frac{24}{3}$ (C) 24 (D) $\frac{8}{3}$

(2) The area of the region bounded by the curve $y^2 = 4x$ and the line $x = 3$ is.....

(A) $3\sqrt{3}$ (B) $3\sqrt{8}$ (C) 8 (D) $8\sqrt{3}$

(3) If length of subnormal at any point of a curve is always constant then that curve represents a.....

(A) Parabola (B) Hyperbola (C) Ellipse (D) Rectangular hyperbola

(4) The integrating factor of the differential equation $x\frac{dy}{dx} - y = x^2$ is.....

(A) e^{-x} (B) $\frac{1}{x}$ (C) e^x (D) x

(5) If the vectors $\hat{i} - \hat{j} + \hat{k}, 3\hat{i} + \hat{j} + 2\hat{k}$ and $\hat{i} + \lambda\hat{j} - 3\hat{k}$ are coplanar then □ =.....

(A) 15 (B) –15 (C) 5 (D) $\frac{5}{3}$

(6) Let the vectors $\vec{a}$ and $\vec{b}$ be such that $|\vec{a}| = 3$ and $|\vec{b}| = \frac{\sqrt{2}}{3}$. If $\vec{a} \times \vec{b}$ is a unit vector, then the angle between $\vec{a}$ and $\vec{b}$ is.....

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

(7) If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ then $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a} = ...$

(A) $-\frac{1}{2}$ (B) $\frac{3}{2}$ (C) $\frac{1}{2}$ (D) $-\frac{3}{2}$

(8) The angle between the line $\frac{x+1}{2} = \frac{y}{3} = \frac{z-3}{6}$ and the plane $10x + 2y - 11z = 3$ is....

(A) $\cos^{-1}\left(\frac{1}{8}\right)$ (B) $\cos^{-1}\left(\frac{8}{21}\right)$ (C) $\sin^{-1}\left(\frac{8}{21}\right)$ (D) $\sin^{-1}\left(\frac{1}{8}\right)$

(9) The area of a triangle having the points A(1,1,1), B(1,2,3) and C(2,3,1) as its vertices is.....

(A) $\frac{\sqrt{19}}{2}$ (B) $\frac{\sqrt{21}}{2}$ (C) $\frac{19}{2}$ (D) $\frac{21}{2}$

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(10) The lines $\frac{1-x}{3}=\frac{7y-14}{2p}=\frac{z-3}{2}$ and $\frac{7-7x}{3p}=\frac{y-5}{1}=\frac{6-z}{5}$ are at right angles the value of p is.....

(A) $\frac{11}{7}$ (B) 7 (C) $\frac{70}{11}$ (D) $\frac{7}{11}$

(11) The mean number of heads in three tosses of a fair coin is.....

(A) 3.5 (B) 0.5 (C) 15 (D) 1.5

(12) If for Bernoulli distribution $B\left(10,\frac{1}{2}\right)$, it is given that $P(X\le 2)=m\left(\frac{1}{2}\right)^{10}$ then m =....

(A) 101 (B) 55 (C) 56 (D) 46

(13) Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is.....

(A) $\frac{2}{5}$ (B) $\frac{4}{5}$ (C) $\frac{1}{5}$ (D) $\frac{1}{2}$

(14) Corner points of the feasible region of objective function Z = 3x + 9y of a linear programming problem are (0, 10), (5, 5), (15, 15) and (0, 20). Minimum value of Z is.....

(A) 70 (B) 90 (C) 50 (D) 60

(15) If $A=\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ then A^3 =.....

(A) $\begin{bmatrix}\cos 3\theta & \sin 3\theta\\ -\cos 3\theta & \sin 3\theta\end{bmatrix}$ (B) $\begin{bmatrix}-\cos 3\theta & \sin 3\theta\\ \sin 3\theta & \cos 3\theta\end{bmatrix}$

(C) $\begin{bmatrix}\cos 3\theta & \sin 3\theta\\ -\sin 3\theta & \cos 3\theta\end{bmatrix}$ (D) $\begin{bmatrix}\cos 3\theta & -\sin 3\theta\\ -\sin 3\theta & \cos 3\theta\end{bmatrix}$

(16) If $A=\begin{bmatrix}1 & -1 & 1\\ 2 & 1 & -3\\ 1 & 1 & 1\end{bmatrix}, 10B=\begin{bmatrix}4 & 2 & 2\\ -5 & 0 & \alpha\\ 1 & -2 & 3\end{bmatrix}$ and B is inverse of A then □ =.....

(A) 10 (B) 9 (C) 3 (D) 5

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(17) For real numbers x, y, z such that x ≠ y ≠ z, $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$ and $\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} \neq 0$ then xyz =.....

(A) 2 (B) –1 (C) 0 (D) 1

(18) If a, b, c are measurements of sides of △ABC and $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 0$ then $\sin^2A + \sin^2B + \sin^2C$ =.....

(A) $\frac{13}{4}$ (B) $\frac{9}{4}$ (C) $\frac{15}{4}$ (D) $\frac{11}{4}$

(19) If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ then sum of all the elements of A^{-1} =.....

(A) 6 (B) –6 (C) 0 (D) $\frac{11}{6}$

(20) If $\sin^{-1} a = \alpha + \beta$, $\sin^{-1} b = \alpha - \beta$ then $\sin^2\alpha + \cos^2\beta$ = ...

(A) ab (B) 1 – ab (C) ab – 1 (D) 1 + ab

(21) If $2\sin^{-1} x = \sin^{-1} 2x\sqrt{1-x^2}$ then x ∈.....

(A) $\left[-\frac{1}{\sqrt{2}}, 1\right]$ (B) [0, 1] (C) $\left[\frac{1}{\sqrt{2}}, 1\right]$ (D) $\left[-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right]$

(22) $\cos\left(\sin^{-1}\frac{1}{5} + \cos^{-1} x\right) = 0$ then x =.....

(A) 1 (B) $\frac{1}{5}$ (C) 0 (D) 5

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(23) Binary operation * on R is given by $a * b = \frac{a+b}{2}$. Then * is.....

(A) not commutative but associative

(B) commutative and associative

(C) commutative but not associative

(D) not commutative and not associative

(24) Let A = {–1, –2, 3, 4}. Number of all one-one functions from the set A to is.....

(A) 24 (B) 16 (C) 4 (D) 256

(25) If functions *f* and g are defined as:

$f : \left[0, \frac{\pi}{2}\right] \to R, \quad f(x) = \sin x$ and

$g : \left[0, \frac{\pi}{2}\right] \to R, \quad g(x) = \cos x$

then.....

(A) *f* + g is one-one and *fg* is not one-one

(B) *f* + g is not one-one and *fg* is one-one

(C) *f* + g is not one-one and *fg* is not one-one

(D) *f* + g is one-one and *fg* is one-one

(26) If $y = 100e^{2x} + 200e^{-2x}$ and $\frac{d^2y}{dx^2} = ay$ then a =.....

(A) 4 (B) –4 (C) 2 (D) 0

(27) Function *f*: [1.2, 1.9] □ R, *f*(x) = [x], where [x] denotes the greatest integer less than or equal to x. Then.....

(A) $f'(x) = 1$ (B) *f* is not differentiative

(C) $f'(x) = 0$ (D) *f* is not continuous function

(28) If $x = \sqrt{10^{\sin^{-1} t}}, y = \sqrt{10^{\cos^{-1} t}}$ then $\frac{dy}{dx} =$ .....

(A) $-\frac{x}{y}$ (B) $\frac{y}{x}$ (C) 0 (D) $-\frac{y}{x}$

(29) The interval in which $y = x^2e^{-x}$ is increasing is.....

(A) (0, 2) (B) (–2, 0) (C) (2, ∞) (D) (–∞,∞)

(30) Equation of tangent line to $16x^2 + 25y^2 = 1$, which is parallel to Y-axis is.....

(A) 5y – 1 = 0 (B) 5x – 1 = 0 (C) 4y + 1 = 0 (D) 4x – 1 = 0

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(31) A cylindrical tank of diameter 20 m is being filled with wheat at the rate of 314 cubic meter per hour. Then the depth of the wheat is increasing at the rate of.....

(A) 0.5 m/h (B) 0.1 m/h (C) 1.1 m/h (D) 1 m/h

(32) $\int e^{\sin x} \sin 2x \, dx = ... + C.$

(A) $e^{\sin x}(\sin x + 1)$ (B) $2e^{\sin x}(\sin x - 1)$ (C) $2e^{\sin x}(\sin x + 1)$ (D) $e^{\sin x}(\sin x - 1)$

(33) $\int \sqrt{\frac{\cos x - \cos^3 x}{1 - \cos^3 x}} dx = ... + C$

(A) $-\frac{3}{2}\cos^{-1}\left(\cos^{\frac{3}{2}} x\right)$ (B) $-\frac{2}{3}\cos^{-1}\left(\cos^{\frac{3}{2}} x\right)$

(C) $\frac{3}{2}\cos^{-1}\left(\cos^{\frac{3}{2}} x\right)$ (D) $\frac{2}{3}\cos^{-1}\left(\cos^{\frac{3}{2}} x\right)$

(34) $\int (x+1)(x+3)(x+2)^7 \, dx = ... + C$

(A) $\frac{(x+3)^{10}}{10} + \frac{(x+3)^8}{8}$ (B) $\frac{(x+2)^{10}}{10} + \frac{(x+2)^8}{8}$

(C) $\frac{(x+3)^{10}}{10} - \frac{(x+3)^8}{8}$ (D) $\frac{(x+2)^{10}}{10} - \frac{(x+2)^8}{8}$

(35) $\int \frac{x}{(x-1)(x-2)} dx = ... + C$

(A) $\log|(x-1)(x-2)|$ (B) $\log\left|\frac{(x-2)^2}{x-1}\right|$

(C) $\log\left|\left(\frac{x-1}{x-2}\right)^2\right|$ (D) $\log\left|\frac{(x-1)^2}{x-2}\right|$

(36) $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^2 x \, dx = ...$

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{4} - \frac{1}{2}$ (C) $\frac{\pi}{4} - 1$ (D) $\frac{\pi}{4} + \frac{1}{2}$

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(37) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(x^{13} + x\cos x + \tan^{15} x + 1\right) dx = ...$

(A) 1 (B) 2 (C) □ (D) 0

(38) If $f(a + b - x) = f(x)$ then $\int_a^b x\, f(x) dx = ...$

(A) $\frac{a+b}{2}\int_a^b f(x)dx$ (B) $\frac{a+b}{2}\int_a^b f(b+x)dx$

(C) $\frac{b-a}{2}\int_a^b f(x)dx$ (D) $\frac{a+b}{2}\int_a^b f(b-x)dx$

(39) $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx = ...$

(A) $\frac{\pi}{4}$ (B) 0 (C) –1 (D) 1

(40) The area of the region bounded by the two parabolas $y = x^2$ and $y^2 = x$ is.....

(A) $\frac{3}{4}$ (B) 3 (C) $\frac{1}{2}$ (D) $\frac{1}{3}$

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ANSWER KEY | GUJCET-MATHS-2022

1.	(c)	**2.**	(d)	**3.**	(a)	**4.**	(b)	**5.**	(a)	**6.**	(b)	**7.**	(d)	**8.**	(c)
9.	(b)	**10.**	(c)	**11.**	(d)	**12.**	(c)	**13.**	(b)	**14.**	(d)	**15.**	(c)	**16.**	(d)
17.	(b)	**18.**	(b)	**19.**	(d)	**20.**	(d)	**21.**	(d)	**22.**	(b)	**23.**	(c)	**24.**	(a)
25.	(c)	**26.**	(a)	**27.**	(c)	**28.**	(d)	**29.**	(a)	**30.**	(d)	**31.**	(d)	**32.**	(b)
33.	(d)	**34.**	(d)	**35.**	(b)	**36.**	(b)	**37.**	(c)	**38.**	(a)	**39.**	(b)	**40.**	(d)

Difficulty Level

Easy	**22**
Moderate	**12**
Difficult	**6**

Chapter	No. Of Questions asked in Gujcet 2022
1. Relations and Functions	3
2. Inverse Trigonometric Functions	3
3. Matrices	3
4. Determinants	2
5. Continuity and Differentiability	3
6 . Application of Derivatives	3
7. Integrals	8
8. Application of Integrals	3
9. Differential Equations	2
10. Vector Algebra	4
11. Three Dimensional Geometry	2
12. Linear Programming	1
13. Probability	3

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