GUJCET-ME-2021

Test Booklet No. [ ] Test Booklet Set No. **15**

This booklet contains 16 pages.

DO NOT open this Test Booklet until you are asked to do so.

Important Instructions :

1) The Mathematics test consists of 40 questions. Each question carries **1** mark. For each correct response, the candidate will get **1** mark. For each incorrect response, ¼ mark will be deducted. The maximum marks are 40.
2) This Test is of **1 hour** duration.
3) Use **Black Ball Point Pen only** for writing particulars on OMR Answer Sheet and marking answers by darkening the circle '●'.
4) Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5) **On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room / Hall. The candidates are allowed to take away this Test Booklet with them.**
6) The Set No. for this Booklet is 15. Make sure that the Set No. printed on the Answer Sheet is the same as that on this booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7) The candidate should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet.
8) Do not write your Seat No. anywhere else, except in the specified space in the Test Booklet / Answer Sheet.
9) Use of White fluid for correction is not permissible on the Answer Sheet.
10) Each candidate must show on demand his / her Admission Card to the Invigilator.
11) No candidate, without special permission of the Superintendent or Invigilator, should leave his / her seat.
12) Use of Simple (Manual) Calculator is permissible.
13) The candidate should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and must sign the Attendance Sheet (Patrak - 01). Cases where a candidate has **not** signed the Attendance Sheet (Patrak - 01) will be deemed not to have handed over the Answer Sheet and will be dealt with as an unfair means case.
14) The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
15) No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
16) The candidates will write the Correct Test Booklet Set No. as given in the Test Booklet / Answer Sheet in the Attendance Sheet. (Patrak - 01)

Candidate's Name : ....

Exam. Seat No. (in figures) .... (in words) ....

Name of Exam. Centre : .... Exam. Centre No.: ....

Test Booklet Set No. : .... Test Booklet No. : ....

Candidate's Sign. .... *Block Supervisor Sign.* .... [signature]

PSO (15)

MATHEMATICS

1) $\int \frac{x^5+1}{x+1}dx =$ ________ $+ C$

(A) $\sum_{n=1}^{4}\left((-1)^{n+1}\cdot\frac{x^n}{n}\right)$

(B) $\sum_{n=1}^{5}\left((-1)^{n+1}\cdot\frac{x^n}{n}\right)$

(C) $\sum_{n=1}^{4}\left((-1)^{n}\cdot\frac{x^n}{n}\right)$

(D) $\sum_{n=1}^{5}\left((-1)^{n}\cdot\frac{x^n}{n}\right)$

2) $\int_{-1}^{1} \cot^{-1} x \, dx =$ ______

(A) 0

(B) $\frac{\pi}{2}$

(C) π

(D) 2π

3) $\int \tan\left(\frac{\pi}{4}-x\right)\cdot(2+2\sin 2x)dx =$ ________ $+ C.$

(A) $\sin 2x$

(B) $-\sin 2x$

(C) $2\sin 2x$

(D) $-2\sin 2x$

4) $\int_{0}^{1} \frac{dx}{(3x+2)+\sqrt{3x+2}} =$ ________

(A) $-\frac{2}{3}\log\left|\frac{\sqrt{5}+1}{\sqrt{2}+1}\right|$

(B) $\frac{2}{3}\log\left|\frac{\sqrt{5}+1}{\sqrt{2}+1}\right|$

(C) $2\log\left|\sqrt{5}+1\right|$

(D) $\frac{2}{3}\log\left|\sqrt{5}+1\right|$

5) If $\int \frac{\cos 3x}{\sin x} dx = p\cos 2x + q\log\left|\sin x\right| + C$, then $p+q =$ ________

(A) 0

(B) $\frac{3}{2}$

(C) 2

(D) $\frac{1}{2}$

6) $\int e^{x}\left(2021+\tan x+\tan^{2} x\right)dx =$ ________ + C.

(A) $(2021+\tan x)e^{x}$

(B) $(2020+\tan x)e^{x}$

(C) $(2020+\tan x)$

(D) $(2000+\tan x)e^{x}$

7) If area bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is $\frac{\pi}{6}$, then equation of ellipse is ______

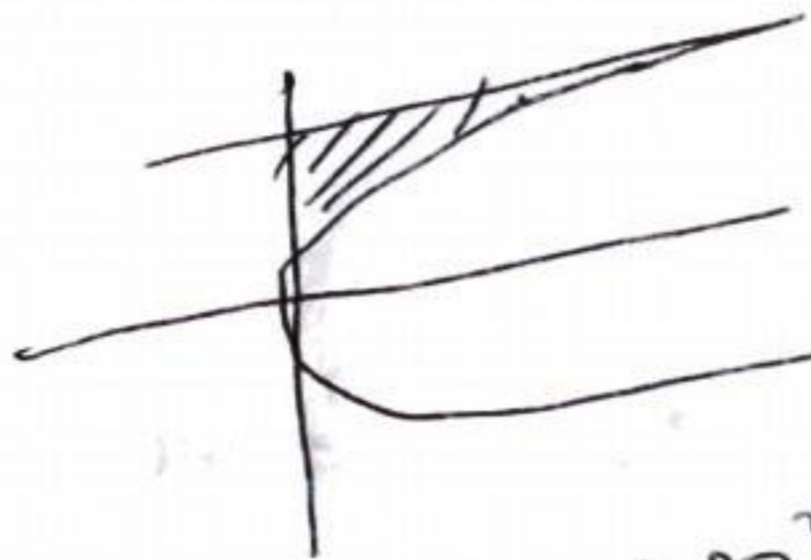
(A) $\frac{x^2}{4}+\frac{y^2}{9}=1$

(B) $4x^2+9y^2=1$

(C) $\frac{x^2}{36}+y^2=1$

(D) $x^2+y^2=36$

8) Area of the region bounded by the curve $y^2=4x$, Y-axis and the line $y=3$ is ______



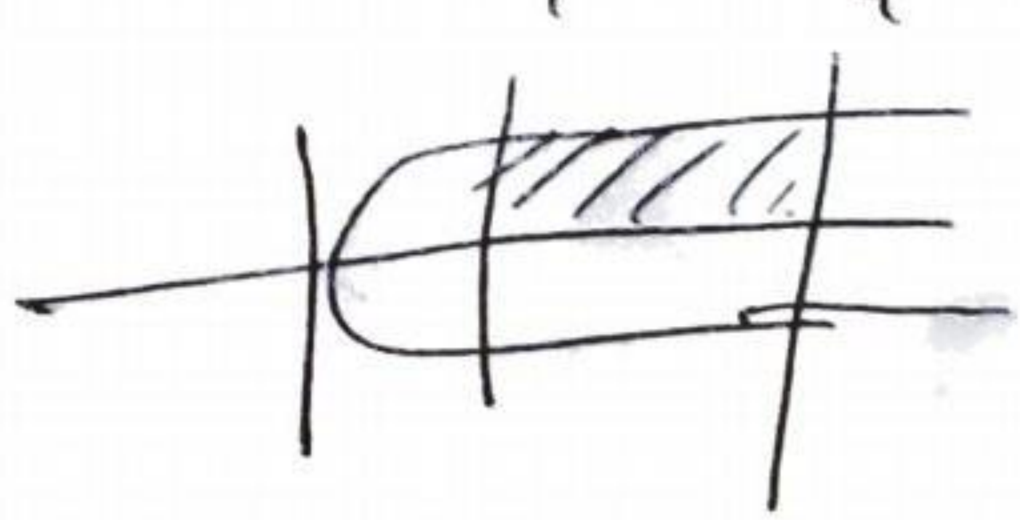
(A) 2

(B) $\frac{9}{3}$

(C) $\frac{9}{4}$

(D) $\frac{9}{2}$

9) Area of the region bounded by the curve $y^2=x$ and the lines $x=1$, $x=4$ and X-axis in the first quadrant is ______



(A) $\frac{14}{3}$

(B) $\frac{7}{3}$

(C) $\frac{28}{3}$

(D) 14

10) The general solution of the differential equation $\frac{dy}{dx} = e^{x-y}$ is ______

(A) $e^x + e^y = C$

(B) $e^{-x} + e^y = C$

(C) $e^{-x} + e^{-y} = C$

(D) $e^x - e^y = C$

$\frac{dy}{dx} = e^x \cdot e^{-y}$

$e^x dx = e^y dy$

$e^x - e^y = 1$

11) The number of arbitrary constants in the particular solution of a differential equation of order 4 are : ______

(A) 4

(B) 2

(C) 3

(D) 0

12) Order and degree of the differential equation $e^{\frac{d^2y}{dx^2}} = x$ are ______ respectively.

(A) 2 and not defined

(B) 1 and 2

(C) 2 and 1

(D) 1 and not defined

13) If $\vec{c}$ is the unit vector in the direction of sum of the vectors $\vec{a} = 2\hat{i} + 2\hat{j} - 5\hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j} + 3\hat{k}$, then $|\vec{c}| =$ ______

(A) $\frac{4}{\sqrt{29}}\hat{i} + \frac{3}{\sqrt{29}}\hat{j} - \frac{2}{\sqrt{29}}\hat{k}$

(B) 1

(C) 0

(D) -1

14) Let the vector $\vec{a}$ and $\vec{b}$ be such that $|\vec{a}| = 3$ and $|\vec{b}| = \frac{\sqrt{2}}{3}$, then $\vec{a} \times \vec{b}$ is unit vector, if the angle between $\vec{a}$ and $\vec{b}$ is ______

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{3}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

15) The area of parallelogram whose adjacent sides are determined by the vectors $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$ and $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$ is ______

1 −1 3
2 −7 1
(−1+21) − (1−6) + (−7
(20) + 5 − 5

(A) $15\sqrt{2}$ (B) 15

(C) $\frac{15}{\sqrt{2}}$ (D) $\frac{15}{2}$

16) The distance of a point $(2, 5, -3)$ from the plane $6x - 3y + 2z - 4 = 0$ is ______

(A) $\frac{13}{\sqrt{7}}$ (B) $\frac{5}{7}$

(C) $\frac{5}{\sqrt{7}}$ (D) $\frac{13}{7}$

17) The coordinates of the foot of the perpendicular drawn from the origin to the plane $2x-3y+4z-12=0$ is ______

(A) $\left(\frac{12}{29}, -\frac{18}{29}, \frac{24}{29}\right)$

(B) $\left(\frac{24}{29}, -\frac{36}{29}, \frac{48}{29}\right)$

(C) $\left(\frac{24}{\sqrt{29}}, -\frac{36}{\sqrt{29}}, \frac{48}{\sqrt{29}}\right)$

(D) $\left(\frac{12}{\sqrt{29}}, -\frac{18}{\sqrt{29}}, \frac{24}{\sqrt{29}}\right)$

18) If $2x+3y-z+7=0$ and $x-2y+kz+2=0$ are two perpendicular planes, then $k=$ ______

(A) 4

(B) 8

(C) -4

(D) -8

19) Minimise : $Z=2x+3y$, subject to constraints $2x+4y\leq 12$, $x+y\leq 3$, $x\geq 0$ and $y\geq 0$.

(A) 12

(B) 9

(C) 0

(D) 6

(Space for Rough Work)

20) If $P(A)=\frac{6}{11}$, $P(B)=\frac{5}{11}$ and $P(A\cup B)=\frac{7}{11}$, then $P(A/B)=$ ______

(A) $\frac{4}{5}$
(B) $\frac{2}{3}$
(C) $\frac{4}{11}$
(D) $\frac{2}{11}$

21) For two mutually exclusive events A and B if $P(A)=\frac{1}{2}$, $P(A\cup B)=\frac{3}{5}$ and $P(B')=p$, then $p=$ ______

(A) $\frac{1}{5}$
(B) $\frac{9}{10}$
(C) $\frac{2}{5}$
(D) $\frac{1}{10}$

22) If A and B are two events such that $P(A)\neq 0$ and $P(B/A)=1$, then ______

(A) $B\subset A$
(B) $B=\varnothing$
(C) $A=\varnothing$
(D) $A\subset B$

23) Let R be the relation in the set $\{x : x\in N, x\leq 4\}$ given by $R=\{(1, 1), (2, 2), (3,3)\}$ then, R is ______.

(A) reflexive and symmetric but not transitive
(B) symmetric and transitive but not reflexive
(C) reflexive and transitive but not symmetric
(D) an equivalence relation

(Space for Rough Work)

24) Function $f: R \rightarrow R$ defined as $f(x)=x^3, f$ is ________.

(A) one-one and onto

(B) one-one but not onto

(C) many-one and onto

(D) neither one-one nor onto

25) If $f(x)=\frac{1+x}{1-x}; x \neq 1$, then $f(x) \cdot f(y)=$ ________.

(A) $f\left(\frac{x+y}{1-xy}\right)$

(B) $f(x \cdot y)$

(C) $f\left(\frac{x+y}{1+xy}\right)$

(D) $f\left(\frac{1}{1+xy}\right)$

26) $\cos^2\left(\sin^{-1} x\right)+\sin^2\left(\cos^{-1} x\right)=$ ________ $; 0<x<1$.

(A) $2\sqrt{1-x^2}$

(B) $2\left(x^2-1\right)$

(C) 0

(D) $2\left(1-x^2\right)$

(Space for Rough Work)

27) Solution set of $\tan^{-1}2x + \tan^{-1}3x = \frac{\pi}{4}$ is ________.

(A) $\left\{\frac{1}{6}, -1\right\}$ (B) $\{0, 1\}$

(C) $\left\{\frac{1}{6}, 1\right\}$ (D) $\left\{\frac{1}{6}\right\}$

$\frac{2x+3x}{1-6x^2} = \pi$

$5x = 1-6x$

$11x = 1$

$x = \frac{1}{11}$

28) If $AB = \begin{bmatrix} -6 & 26 \\ -1 & 19 \end{bmatrix}$ and $11B^{-1} = \begin{bmatrix} 5 & -3 \\ 2 & 1 \end{bmatrix}$, then $A =$ ________.

(A) $\begin{bmatrix} -2 & 4 \\ 3 & -2 \end{bmatrix}$ (B) $\begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & -4 \\ -3 & 2 \end{bmatrix}$ (D) $\begin{bmatrix} -2 & 4 \\ 3 & 2 \end{bmatrix}$

29) If $A = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$, then $(A+B)^{-1} =$ ________.

(A) $\frac{1}{25} I_3$ (B) $-\frac{1}{5} I_3$

(C) $\frac{1}{5} I_3$ (D) $-\frac{1}{25} I_3$

(Space for Rough Work)

$\begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$

30) If $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, then which one of the following is incorrect.

(A) $(AB)' = A'B'$

(B) $A \cdot \text{adj } A = |A| I$

(C) $(A+B)' = B' + A'$

(D) $(AB)^{-1} = B^{-1} \cdot A^{-1}$

31) A(1, 3), B(0, 0) and C(k, 0) are vertices of Δ ABC. If area of Δ ABC is 3 units, then k is ________.

(A) 2

(B) 0

(C) -2

(D) ± 2

$\begin{vmatrix} 1 & 3 & 1 \\ 6 & 0 & 1 \\ K & 0 & 1 \end{vmatrix} = 3$

$-3K = 3$

$K = -1$

32) If $2\begin{vmatrix} \sin(A+B) & \cos(A+B) \\ \cos(A-B) & \sin(A-B) \end{vmatrix} + \sqrt{3} = 0$, then A = ________.

(A) $\frac{\pi}{6}$

(B) $\frac{\pi}{3}$

(C) $\frac{\pi}{12}$

(D) $\frac{\pi}{4}$

33) For $\begin{vmatrix} 2 & 3 & 5 \\ 1 & 0 & 7 \\ -1 & -2 & 4 \end{vmatrix}$, the sum of minor and cofactor of 7 = ________.

(A) 0

(B) 2

(C) -2

(D) -1

37) If $x+1=e^{-y}$, then $\frac{d^2y}{dx^2}=$ ______.

(A) $\left(\frac{dy}{dx}\right)^3$

(B) $\frac{dy}{dx}$

(C) $\left(\frac{dy}{dx}\right)^2$

(D) $-\frac{dy}{dx}$

38) The slope of normal to the curve $y=2x^2+3\sin x$ at $x=0$ is ______.

(A) 3

(B) -3

(C) $\frac{1}{3}$

(D) $-\frac{1}{3}$

39) The point on the curve $x^2=2y$ which is nearest to the point (0, 5) is ______.

(A) $\left(2\sqrt{2},4\right)$

(B) (0, 0)

(C) $\left(2\sqrt{2},0\right)$

(D) (2, 2)

40) The interval in which $y=x^2\cdot e^{-x}$ is increasing is ______.

(A) $(-\infty,\infty)$

(B) $(2,\infty)$

(C) $(-2,0)$

(D) $(0,2)$