

FULL TEST-01



Maximum Marks : 60 Total No. of Questions : 60 Total Duration : 80 Minutes Maximum Time for Answering : 70 Minutes Time : 02.30 pm to 03.50 pm				
MENTION YOUR CET NUMBER				

MATHS

Serial Number :

Subject code	2M0025K
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Dos:

1. This question booklet is issued to you by the room invigilator **after 2.30 Pm.**
2. Check wheter the CET Number has been entered and shaded in the respective circles on the OMR answer sheet
3. The version code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
4. The Version Code and Serial Number of this question booklet should be entered on the Nominal Roll number without any mistakes.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DONTs :

1. **THE TIMGAND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED/MUTILATED/SPOILED.**
2. The 3rd Bell rings at 2.40 pm, till then.
 - Do not remove the seal present on the right hand side of this question booklet.
 - Do not look inside this question booklet or start answering on the OMR answer sheet.

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. In case of usage of signs and symbols in the questions, the regular textbook connotation should be considered unless stated otherwise.
2. This question booklet contains 60 questions and each question will have one statement and four different options / responses & out of which you have to choose one correct answer.
3. After the 3rd Bell rings at 2.40 pm, remove the paper seal of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items. etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
4. Completely **darken/shade** the relevant circle with a **blue or black ink ballpoint pen against the question number on the OMR answer sheet.**

CORRECT METHOD	WRONG METHODS
(A) ● (C) (D)	(A) (B) (C) (D) (A) (B) (C) (D) (A) ● ● (D)
	(A) (B) (C) (D) (A) ● (C) (D)

5. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognized and recored by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
6. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
7. **Last Bell will ring at 3.50 PM**, stop writing on the OMR answer sheet.
8. Hand over the **OMR answer sheet** to the room invigilator as it is.
9. After separating the top sheet (Office copy), the invigilator will return the bottom sheet replica (candidate's copy) to you.

NOTE : - In case of any discrepancy between English and Kannada Versions, the English version will be taken as final.

MATHEMATICS

- Q.1** The set $A = \{x : x \in \mathbb{R}, x^2 = 16 \text{ and } 2x = 6\}$ equals
(A) ϕ (B) $\{14, 3, 4\}$ (C) $\{3\}$ (D) $\{4\}$
- Q.2** If $A = \{x : x = 4n + 1, n \leq 5, n \in \mathbb{N}\}$ and $B = \{3n : n \leq 8, n \in \mathbb{N}\}$, then $A - (A - B)$ is :
(A) $\{9, 21\}$ (B) $\{9, 12\}$ (C) $\{6, 12\}$ (D) $\{6, 21\}$
- Q.3** Number of integers in the range of the function $f(x) = \cos^4 x + 3 \sin^2 x$ will be
(A) 1 (B) 2 (C) 3 (D) 0
- Q.4** Let R be the real line. Consider the following subsets of the plane $\mathbb{R} \times \mathbb{R}$
 $S = \{(x, y) : y = x + 1 \text{ and } 0 < x < 2\}$
 $T = \{(x, y) : x - y \text{ is an integer}\}$
Which one of the following is true?
(A) T is an equivalence relation on \mathbb{R} but S is not
(B) Neither S nor T is an equivalence relation on \mathbb{R}
(C) Both S and T are equivalence relations on \mathbb{R}
(D) S is an equivalence relation on \mathbb{R} but T is not
- Q.5** The value of expression
 $\cos^4 \frac{\pi}{8} + \cos^4 \frac{3\pi}{8} + \cos^4 \frac{5\pi}{8} + \cos^4 \frac{7\pi}{8}$ is equal to
(A) $\frac{1}{2}$ (B) $\frac{3}{2}$ (C) $\frac{1}{4}$ (D) $\frac{3}{4}$
- Q.6** If a and b are positive integer such that $N = (a + ib)^3 - 107i$, is a positive integer. Then the value of N , is
(where $i = \sqrt{-1}$)
(A) 190 (B) 198 (C) 200 (D) 298
- Q.7** Total number of words that can be formed using all letters of the word "BRIJESH" that neither begins with 'I' nor ends with 'B' is
(A) 4920 (B) 4800 (C) 3600 (D) 3720
- Q.8** If ${}^{10}C_x = {}^9C_y + {}^9C_{y-1}$ then $x + y$ is equal to ($x \neq y$)
(A) 5 (B) 9 (C) 10 (D) 13

SPACE FOR ROUGH WORK

Q.9 The value of the expression

$$\left(\frac{1 \cdot 2 \cdot 4 + 2 \cdot 4 \cdot 8 + \dots + n \cdot 2n \cdot 4n}{1 \cdot 3 \cdot 9 + 2 \cdot 6 \cdot 18 + \dots + n \cdot 3n \cdot 9n} \right)^{\frac{1}{3}}, \text{ is}$$

- (A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{4}{9}$ (D) $\frac{8}{27}$

Q.10 Focus and directrix of the parabola $x^2 = -8ay$ are

- (A) $(0, -2a)$ and $y = 2a$ (B) $(0, 2a)$ and $y = -2a$
(C) $(2a, 0)$ and $x = -2a$ (D) $(-2a, 0)$ and $x = 2a$

Q.11 The distance between the lines $3x + 4y = 9$ and $6x + 8y = 15$ is

- (A) $3/2$ (B) $3/10$ (C) 6 (D) None of these

Q.12 If the points $(-1, 3, 2)$, $(-4, 2, -2)$ and $(5, 5, \lambda)$ are collinear, then $\lambda =$

- (A) -10 (B) 5 (C) -5 (D) 10

Q.13 $\lim_{x \rightarrow a} \frac{(x+2)^{5/3} - (a+2)^{5/3}}{x-a} =$

- (A) $\frac{5}{3}(a+2)^{2/3}$ (B) $\frac{5}{3}(a+2)^{5/3}$ (C) $\frac{5}{3}a^{2/3}$ (D) $\frac{5}{3}a^{5/3}$

Q.14 The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set

- (A) is decreased by 2
(B) is two times the original median
(C) remains the same as that of the original set
(D) is increased by 2

Q.15 Range of the function $f(x) = \frac{x^2 + x + 2}{x^2 + x + 1}$; $x \in \mathbb{R}$ is

- (A) $(1, \infty)$ (B) $(1, 11/7]$ (C) $(1, 7/3]$ (D) $(1, 7/5]$

Q.16 The domain set of definition of the function $f(x) = \sqrt{\cos(\sin x)} + \sin^{-1}\left(\frac{1+x^2}{2x}\right)$ is

- (A) $-1 \leq x \leq 1$ (B) $x \geq 1$ (C) $x \leq 1$ (D) $x = \pm 1$

SPACE FOR ROUGH WORK

Q.17 If A is a square matrix such that

$$A \cdot (\text{adj } A) = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{bmatrix}, \text{ then the value of } \frac{|\text{adj}(\text{adj } A)|}{|\text{adj } A|} \text{ is equal to}$$

- (A) 1 (B) 4 (C) 16 (D) 64

Q.18 The determinant $\begin{vmatrix} \cos(\theta+\phi) & -\sin(\theta+\phi) & \cos 2\phi \\ \sin\theta & \cos\theta & \sin\phi \\ -\cos\theta & \sin\theta & \cos\phi \end{vmatrix}$ is:

- (A) 0 (B) independent of θ
 (C) independent of ϕ (D) independent of θ & ϕ both

Q.19 The value of p and q for which the function

$$f(x) = \begin{cases} \frac{\sin(p+1)x + \sin x}{x}, & x < 0 \\ q, & x = 0 \\ \frac{\sqrt{x+x^2} - \sqrt{x}}{x^{3/2}}, & x > 0 \end{cases}$$

is continuous for all x in R, is

- (A) $p = \frac{5}{2}, q = \frac{1}{2}$ (B) $p = \frac{-3}{2}, q = \frac{1}{2}$ (C) $p = \frac{1}{2}, q = \frac{3}{2}$ (D) $p = \frac{1}{2}, q = \frac{-3}{2}$

Q.20 If $f(x) = \begin{cases} x, & \text{when } 0 < x < \frac{1}{2} \\ 1, & \text{when } x = \frac{1}{2} \\ 1-x & \text{when } \frac{1}{2} < x < 1 \end{cases}$, then

- (A) $\lim_{x \rightarrow 1/2^+} f(x) = 2$ (B) $\lim_{x \rightarrow 1/2^-} f(x) = 2$
 (C) f(x) is continuous at $x = \frac{1}{2}$ (D) f(x) is discontinuous at $x = \frac{1}{2}$

SPACE FOR ROUGH WORK

Q.21 The radius of a right circular cylinder increases at the rate of 0.1 cm/min, and the height decreases at the rate of 0.2 cm/min. The rate of change of the volume of the cylinder, in cm^3/min , when the radius is 2 cm and the height is 3 cm is

- (A) -2π (B) $-\frac{8\pi}{5}$ (C) $-\frac{3\pi}{5}$ (D) $\frac{2\pi}{5}$

Q.22 $\frac{d}{dx} \left(\frac{\cot^2 x - 1}{\cot^2 x + 1} \right) =$

- (A) $-\sin 2x$ (B) $2 \sin 2x$ (C) $2 \cos 2x$ (D) $-2 \sin 2x$

Q.23 Let $f(x) = \begin{cases} x^3 + x^2 - 10x & -1 \leq x < 0 \\ \sin x & 0 \leq x < \frac{\pi}{2} \\ 1 + \cos x & \frac{\pi}{2} \leq x \leq \pi \end{cases}$

then for $f(x)$ which of the following is not TRUE?

- (A) absolute maximum value at $x = -1$ (B) local minimum at $x = \frac{\pi}{2}$
 (C) absolute minimum value at $x = 0, \pi$ (D) local maximum at $x = \frac{\pi}{2}$

Q.24 If the value of the definite integral $\int_0^{2\pi} \frac{dx}{\sin^2 x + (2008)^2 \cdot \cos^2 x} = \frac{a\pi}{b}$ where a and b are coprime then value

of $(a + b)$, is

- (A) 1005 (B) 1010 (C) 1000 (D) 1020

Q.25 If \vec{a} and \vec{b} are two orthogonal vectors of equal magnitude such that $|3\vec{a} + 4\vec{b}| + |4\vec{a} - 3\vec{b}| = 20$,

then the value of $|(\vec{a} \times \vec{b}) \times \vec{a}|$ is equal to

- (A) 16 (B) 8 (C) 4 (D) 2

SPACE FOR ROUGH WORK

- Q.26** Area enclosed by the curve $y = xe^{-x}$ and the x-axis, is
 (A) 1 (B) 2 (C) 4 (D) 6
- Q.27** The solution of the differential equation, $e^x(x+1)dx + (ye^y - xe^x)dy = 0$ with initial condition $y = 0$ at $x = 0$, is
 (A) $xe^x + 2y^2e^y = 0$ (B) $2xe^x + y^2e^y = 0$ (C) $xe^x - 2y^2e^y = 0$ (D) $2xe^x - y^2e^y = 0$
- Q.28** If $\int (\sin 2x - \cos 2x)dx = \frac{1}{\sqrt{2}}\sin(2x - a) + b$ then
 (A) $a = \frac{\pi}{4}, b = 0$ (B) $a = -\frac{\pi}{4}, b = 0$
 (C) $a = \frac{5\pi}{4}, b = \text{any constant}$ (D) $a = -\frac{5\pi}{4}, b = \text{any constant}$
- Q.29** Let $\vec{a} = -\hat{i} + \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} + \hat{k}$, and vector \vec{c} satisfying the conditions
 (i) vector \vec{c} is coplanar with \vec{a} and \vec{b}
 (ii) vector \vec{c} is perpendicular to \vec{b} and
 (iii) $\vec{a} \cdot \vec{c} = 7$.
 Find the value of $2|\vec{c}|^2$.
 (A) 38 (B) 30 (C) 40 (D) 35
- Q.30** The shortest distance between the lines
 $x + 2 = \frac{y-3}{2} = \frac{z-5}{3}$ and $-x = \frac{y-1}{3} = \frac{z-4}{7}$ is
 (A) $\frac{\sqrt{6}}{6}$ (B) $\frac{5\sqrt{6}}{6}$ (C) 5 (D) $\sqrt{6}$
- Q.31** Let the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = 2x + \sin x, x \in \mathbb{R}$. Then f is
 (A) One-to-one and onto (B) One-to-one but not onto
 (C) Onto but not one-to-one (D) Neither one-to-one nor onto

SPACE FOR ROUGH WORK

- Q.32** A pack of cards has one card missing. Two cards are drawn randomly and are found to be spades. The probability that the missing card is not a spade, is :
- (A) $\frac{3}{4}$ (B) $\frac{52}{867}$ (C) $\frac{22}{425}$ (D) $\frac{39}{50}$
- Q.33** If $\frac{5(-8+6i)}{(1+i)^2} = a + ib$, then (a, b) equals
- (A) (15, 20) (B) (20, 15) (C) (-15, 20) (D) None of these
- Q.34** Let $\log_b(2\sin^2 2\theta) = \frac{5}{4}$ where $\theta \in \left(0, \frac{\pi}{2}\right)$ and $\frac{\sin^2 \theta}{2 + \cos^2 \theta} = \frac{1}{5}$. If $b = 2^q$ where q is rational, then the value of q is equal to
- (A) $\frac{4}{5}$ (B) $\frac{3}{5}$ (C) $\frac{3}{4}$ (D) $\frac{2}{3}$
- Q.35** If number of arrangements of letters of the word “DHARAMSHALA” taken all at a time so that no two alike letters appear together, is
- (A) $(4^1 \cdot 5^2 \cdot 6^3 \cdot 7^2)$ (B) $(4^4 \cdot 5^3 \cdot 6^2 \cdot 7^1)$ (C) $(4^1 \cdot 5^2 \cdot 6^2 \cdot 7^1)$ (D) $(4^1 \cdot 5^2 \cdot 6^3 \cdot 7^1)$
- Q.36** Remainder when $(6^{11} - 55)$ is divided by 25, is
- (A) 1 (B) 3 (C) 5 (D) 11
- Q.37** If the n^{th} term of geometric progression $5, -\frac{5}{2}, \frac{5}{4}, -\frac{5}{8}, \dots$ is $\frac{5}{1024}$, then the value of n is
- (A) 11 (B) 10 (C) 9 (D) 4
- Q.38** Let $L = \lim_{x \rightarrow -2} \frac{3x^2 + ax + a + 1}{x^2 + x - 2}$. If L is finite, then
- (A) $L = \frac{4}{3}$ (B) $L = 13$ (C) $L = -2$ (D) $L = \frac{-1}{3}$
- Q.39** If the mean deviation of number $1, 1 + d, 1 + 2d, \dots, 1 + 100d$ from their mean is 255, then the value of (10 d) is equal to
- (A) 101 (B) 102 (C) 105 (D) 110

SPACE FOR ROUGH WORK

- Q.40** If $f: \mathbb{N} \rightarrow \mathbb{N}$ where $f(x) = x - (-1)^x$, then f is
 (A) one one and into (B) many-one and into
 (C) one-one and onto (D) many-one and onto
- Q.41** If the straight lines $\frac{x-1}{k} = \frac{y-2}{2} = \frac{z-3}{3}$ and $\frac{x-2}{3} = \frac{y-3}{k} = \frac{z-1}{2}$ intersect at a point (k is an integer), then acute angle between lines, is
 (A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\cos^{-1} \frac{1}{3}$ (D) $\cos^{-1} \frac{2}{3}$
- Q.42** If $\operatorname{cosec}^{-1} x + \sec^{-1} x^2 + \frac{\pi}{2} = 0$ is satisfied by $x = \alpha$ then $\sin^{-1} \alpha - \cos^{-1} \alpha$ is equal to
 (A) $-\frac{3\pi}{2}$ (B) $-\frac{\pi}{2}$ (C) 0 (D) $\frac{\pi}{2}$
- Q.43** Let $A = \begin{bmatrix} 2 & 2 & 1 \\ 2 & 5 & 2 \\ 1 & 2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -x & -y & z \\ 0 & y & 2z \\ x & -y & z \end{bmatrix}$ where $x, y, z \in \mathbb{R}$. If $B^T A B = \begin{bmatrix} 8 & 0 & 0 \\ 0 & 27 & 0 \\ 0 & 0 & 42 \end{bmatrix}$ then the number of ordered triplet (x, y, z) is
 (A) 2 (B) 6 (C) 8 (D) 9
- Q.44** The determinant $\begin{vmatrix} a & b & a\alpha + b \\ b & c & b\alpha + c \\ 2\alpha + b & b\alpha + c & 0 \end{vmatrix} = 0$, if a, b, c are in
 (A) A.P. (B) G.P. (C) H.P. (D) None of these
- Q.45** Let $f(x) = |x| \sin x + |x^2 - \pi^2| \cos x$, then number of points where $y = f(x)$ is not differentiable is/are
 (A) 0 (B) 1 (C) 2 (D) 3
- Q.46** If $f(x) = \begin{cases} ax^2 + b; & x \leq 0 \\ x^2; & x > 0 \end{cases}$ possesses derivative at $x=0$, then
 (A) $a = 0, b = 0$ (B) $a > 0, b = 0$ (C) $a \in \mathbb{R}, b = 0$ (D) None of these

SPACE FOR ROUGH WORK

Q.47 If $y = \cos(\sin x^2)$, then at $x = \sqrt{\frac{\pi}{2}}$, $\frac{dy}{dx} =$

- (A) -2 (B) 2 (C) $-2\sqrt{\frac{\pi}{2}}$ (D) 0

Q.48 The radius of a cylinder is increasing at the rate of 3 m/s and its altitude is decreasing at the rate of 4 m/s. The rate of change of volume, when radius is 4 m and altitude is 6m, is

- (A) $80\pi \text{ m}^3/\text{s}$ (B) $144\pi \text{ m}^3/\text{s}$ (C) $208 \text{ m}^3/\text{s}$ (D) $64 \text{ m}^3/\text{s}$

Q.49 A function f satisfying $f'(\sin x) = \cos^2 x$ for all x and $f(0) = 1$ is :

- (A) $f(x) = x + \frac{x^3}{3} - \frac{1}{3}$ (B) $f(x) = \frac{x^3}{3} + \frac{2}{3}$
(C) $f(x) = x - \frac{x^3}{3} + \frac{1}{3}$ (D) $f(x) = \sqrt{x} - \frac{x^3}{3} + \frac{1}{3}$

Q.50 The value of $\int_{-1}^1 \frac{dx}{(2-x)\sqrt{1-x^2}}$ is

- (A) 0 (B) $\frac{\pi}{\sqrt{3}}$
(C) $\frac{2\pi}{\sqrt{3}}$ (D) cannot be determined

Q.51 $\int \frac{dx}{\sqrt{1+x+\sqrt{x}}} =$

- (A) $\frac{2}{3}(1+x)^{2/3} - \frac{2}{3}x^{2/3} + c$
(B) $\frac{3}{2}(1+x)^{2/3} + \frac{3}{2}x^{2/3} + c$
(C) $\frac{3}{2}(1+x)^{3/2} + \frac{3}{2}x^{3/2} + c$
(D) $\frac{2}{3}(1+x)^{3/2} - \frac{2}{3}x^{3/2} + c$

SPACE FOR ROUGH WORK

Q.52 $\int \frac{1}{(x^2-1)\sqrt{x^2+1}} dx =$

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

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

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

(D) None of these

Q.53 The area bounded by the x-axis and the part of graph of $y = \cos x$ between $x = \frac{-\pi}{2}$ and $x = \frac{\pi}{2}$ is separated into two regions by the line $x = k$. If the area of the region for $\frac{-\pi}{2} \leq x \leq k$ is three times the area of the region for $k \leq x \leq \frac{\pi}{2}$, then k is equal to

(A) $\arcsin\left(\frac{1}{4}\right)$

(B) $\arcsin\left(\frac{1}{3}\right)$

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

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

Q.54 If the curve satisfying the equation $(x^2 + y^2)dy = xy dx$ and passing through points $(1, 1)$ and (k, \sqrt{e}) , then the value of k^2/e is equal to

(A) 4

(B) 2

(C) 5

(D) 3

Q.55 Let $\vec{a} = \hat{i} + 2\hat{j} + \lambda\hat{k}$, $\vec{b} = 3\hat{i} - 5\hat{j} - \lambda\hat{k}$, $\vec{a} \cdot \vec{c} = 7$, $2\vec{b} \cdot \vec{c} + 43 = 0$, $\vec{a} \times \vec{c} = \vec{b} \times \vec{c}$. Then $|\vec{a} \cdot \vec{b}|$ is equal to

(A) 8

(B) 6

(C) 4

(D) 10

Q.56 If the position vectors of the vertices A, B, C of a triangle ABC are $7\hat{j} + 10\hat{k}$, $-\hat{i} + 6\hat{j} + 6\hat{k}$ and $-4\hat{i} + 9\hat{j} + 6\hat{k}$ respectively, the triangle is

(A) Equilateral

(B) Isosceles

(C) Scalene

(D) Right angled and isosceles also

SPACE FOR ROUGH WORK

- Q.57** The line L given by $\frac{x-2}{2} = \frac{y-1}{b} = \frac{z+1}{c}$ passes through the point (1, 2, 3). Another line K is parallel to line L and has the equation $\frac{x+2}{a} = \frac{y-3}{2} = \frac{z+4}{d}$. The distance between line L and K, is
- (A) 5 (B) 6
(C) $7\sqrt{2}$ (D) $3\sqrt{3}$
- Q.58** The shortest distance of the point (a, b, c) from the x-axis is
- (A) $\sqrt{(a^2 + b^2)}$ (B) $\sqrt{(b^2 + c^2)}$
(C) $\sqrt{(c^2 + a^2)}$ (D) $\sqrt{(a^2 + b^2 + c^2)}$
- Q.59** A single letter is selected at random from the word "PROBABILITY". The probability that the selected letter is a vowel is
- (A) $\frac{2}{11}$ (B) $\frac{3}{11}$
(C) $\frac{4}{11}$ (D) 0
- Q.60** Two cards are dealt one by one without replacement from a well shuffled pack of 52 playing cards. Let A : denotes the event that not more than 1 face card is drawn and B : denotes the event that the second card is not a face card. If $P(A) = p_1$ and $P(B) = p_2$, then
- (A) $13p_1 = 17p_2$ (B) $17p_1 = 21p_2$
(C) $21p_1 = 17p_2$ (D) $17p_1 = 13p_2$

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK