1M0520K23 (DAY-1, SECOND SESSION)

ವಿಷಯ ಸಂಕೇತ	ಸಮಯ	ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯ	
		ವರ್ಷನ್ ಕೋಡ್	ಕ್ರಮ ಸಂಖ್ಯೆ
M	ಮ 2.30 ರಿಂದ 3.50 ರ ವರೆಗೆ	A-4	0323205

ಒಟ್ಟು ಅವಧಿ	ಉತ್ತರಿಸಲು ಇರುವ ಗರಿಷ್ಠ ಅವಧಿ	ಗರಿಷ್ಠ ಅಂಕಗಳು	ಒಟ್ಟು ಪ್ರಶ್ನೆಗಳು	ನಿಮ್ಮ ಸೀಟ ಸಂಖ್ಯೆಯನ್ನು ಬರೆಯಿರಿ
80 ನಿಮಿಷಗಳು	70 ನಿಮಿಷಗಳು	60	60	23UGE

ಮಾಡಿ

1. ಕೊಠಡಿ ಮೇಲ್ವಿಚಾರಕರಿಂದ ಈ ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯನ್ನು ನಿಮಗೆ ಮ. 2.30 [illegible] ಲಾಗಿರುತ್ತದೆ.
2. ಅಭ್ಯರ್ಥಿಗಳು ಸೀಟ ಸಂಖ್ಯೆಯನ್ನು ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ [illegible] ಸಂಬಂಧಿಸಿದ ವೃತ್ತಗಳನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬಿದ್ದೀರೆಂದು ಖಾತ್ರಿಪಡಿಸಿಕೊಳ್ಳಿ.
3. ಪ್ರಶ್ನೆಪತ್ರಿಕೆಯ ವರ್ಷನ್ ಕೋಡ್ ಅನ್ನು ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಬರೆದು ಅದಕ್ಕೆ ಸಂಬಂಧಿಸಿದ ವೃತ್ತಗಳನ್ನು ಸಂಪೂರ್ಣವಾಗಿ ತುಂಬಬೇಕು.
4. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ವರ್ಷನ್ ಕೋಡ್ ಮತ್ತು ಕ್ರಮ ಸಂಖ್ಯೆಯನ್ನು ನಾಮಿನಲ್ ರೋಲ್‌ನಲ್ಲಿ ತಪ್ಪಿಲ್ಲದೆ ಬರೆಯಬೇಕು.
5. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯ ಕೆಳಭಾಗದ ನಿಗದಿತ ಜಾಗದಲ್ಲಿ ಪೂರ್ಣ ಸಹಿ ಮಾಡಬೇಕು.

ಮಾಡಬೇಡಿ

1. ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಮುದ್ರಿತವಾಗಿರುವ ಟೈಮಿಂಗ್ ಮಾರ್ಕನ್ನು ತಿದ್ದಬಾರದು / ಹಾಳುಮಾಡಬಾರದು / ಅಳಿಸಬಾರದು.
2. ಮೂರನೇ ಬೆಲ್ ಮ. 2.40 ಕ್ಕೆ ಆಗುತ್ತದೆ. ಅಲ್ಲಿಯವರೆಗೂ,
   - ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಬಲಭಾಗದಲ್ಲಿರುವ ಸೀಲ್ ಅನ್ನು ತೆಗೆಯಬಾರದು.
   - ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆಯ ಒಳಗಡೆ ಇರುವ ಪ್ರಶ್ನೆಗಳನ್ನು ನೋಡಲು ಪ್ರಯತ್ನಿಸಬಾರದು ಅಥವಾ ಓ.ಎಂ.ಆರ್. ಉತ್ತರ ಪತ್ರಿಕೆಯಲ್ಲಿ ಉತ್ತರಿಸಲು ಪ್ರಾರಂಭಿಸಬಾರದು.

NTD

MATHEMATICS

1. If $y = a \sin x + b \cos x$, then $y^2 + \left(\frac{dy}{dx}\right)^2$ is a

(A) constant
(B) function of x
(C) function of y
(D) function of x and y

2. If $f(x) = 1 + nx + \frac{n(n-1)}{2}x^2 + \frac{n(n-1)(n-2)}{6}x^3 + \ldots\ldots + x^n$ then $f''(1) =$

(A) 2^{n-1}
(B) $(n-1)2^{n-1}$
(C) $n(n-1)2^{n-2}$
(D) $n(n-1)\,2^n$

3. If $A = \begin{bmatrix} 1 & \tan \alpha/2 \\ -\tan \alpha/2 & 1 \end{bmatrix}$ and $AB = I$ then $B =$

(A) $\sin^2 \alpha/2 \cdot A$
(B) $\cos^2 \alpha/2 \cdot A^T$
(C) $\cos^2 \alpha/2 \cdot A$
(D) $\cos^2 \alpha/2 \cdot I$

2.

(A) 2^{n-1} (B) $(n-1)2^{n-1}$ (C) $n(n-1)2^{n-2}$ (D) $n(n-1)$

3. If $A = \begin{bmatrix} 1 & \tan\alpha/2 \\ -\tan\alpha/2 & 1 \end{bmatrix}$ and $AB = I$ then $B =$

(A) $\sin^2\alpha/2 \cdot A$ (B) $\cos^2\alpha/2 \cdot A^T$ (C) $\cos^2\alpha/2 \cdot A$ (D) $\cos^2\alpha/2 \cdot I$

4. If $u = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and $v = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$ then $\frac{du}{dv}$ is

NTD

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

5. The function $f(x) = \cot x$ is discontinuous on every point of the set

(A) $\left\{x = \frac{n\pi}{2}; n \in Z\right\}$ (B) $\{x = n\pi; n \in Z\}$

7. An enemy fighter jet is flying along the curve given by $y = x^2 + 2$. A soldier is placed at (3, 2) wants to shoot down the jet when it is nearest to him. Then the nearest distance is

(A) $\sqrt{5}$ units (B) $\sqrt{3}$ units (C) $\sqrt{6}$ units (D) 2 units

8. $\int_2^8 \frac{5^{\sqrt{10-x}}}{5^{\sqrt{x}}+5^{\sqrt{10-x}}}\,dx =$

(A) 3 (B) 5 (C) 6 (D) 4

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9. $\int \sqrt{\operatorname{cosec} x - \sin x}\,dx =$

(A) $\frac{2}{\sqrt{\sin x}} + C$ (B) $\sqrt{\sin x} + C$ (C) $\frac{\sqrt{\sin x}}{2} + C$ (D) $2\sqrt{\sin x} + C$

10. If f(x) and g(x) are two functions with $g(x) = x - \frac{1}{x}$ and $fog(x) = x^3 - \frac{1}{x^3}$ then $f'(x) =$

11. A circular plate of radius 5 cm is heated. Due to expansion, its radius increases at the rate of 0.05 cm/sec. The rate at which its area is increasing when the radius is 5.2 cm is

(A) $0.52\ \pi\ cm^2/sec$
(B) $5.2\ \pi\ cm^2/sec$
(C) $27.4\ \pi\ cm^2/sec$
(D) $5.05\ \pi\ cm^2/sec$

12. The distance 's' in meters travelled by a particle in 't' seconds is given by $s = \frac{2t^3}{3} - 18t + \frac{5}{3}$

The acceleration when the particle comes to rest is

(A) $18\ m^2/sec.$
(B) $3\ m^2/sec.$
(C) $10\ m^2/sec.$
(D) $12\ m^2/sec.$

13. A particle moves along the curve $\frac{x^2}{16} + \frac{y^2}{4} = 1$. When the rate of change of abscissa is 4 tim[es] that of its ordinate, then the quadrant in which the particle lies is

(A) II or III
(B) I or III
(C) II or IV
(D) III or IV

15. $\int \frac{1}{1 + 3\sin^2 x + 8\cos^2 x}\,dx =$

(A) $6\tan^{-1}\left(\frac{2\tan x}{3}\right) + C$

(B) $\frac{1}{6}\tan^{-1}(2\tan x) + C$

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

(D) $\frac{1}{6}\tan^{-1}\left(\frac{2\tan x}{3}\right) + C$

16. $\int_{-2}^{0} (x^3 + 3x^2 + 3x + 3 + (x + 1)\cos(x + 1))\,dx =$

NTD

(A) 1

(B) 0

(C) 3

(D) 4

17. $\int^{\pi} \frac{x\tan x}{\sec x \cdot \operatorname{cosec} x}\,dx =$

(A) $6\tan^{-1}\left(\frac{2\tan x}{3}\right)+C$

(B) $\frac{1}{6}\tan^{-1}(2\tan x)+C$

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

(D) $\frac{1}{6}\tan^{-1}\left(\frac{2\tan x}{3}\right)+C$

16. $\int_{-2}^{0}(x^3+3x^2+3x+3+(x+1)\cos(x+1))\,dx=$

(A) 1 (B) 0 (C) 3 (D) 4

NTD

17. $\int_{0}^{\pi}\frac{x\tan x}{\sec x\cdot\operatorname{cosec} x}\,dx=$

(A) $\pi^2/2$ (B) $\pi/4$ (C) $\pi^2/4$ (D) $\pi/2$

20. In the interval $(0, \pi/2)$, area lying between the curves $y = \tan x$ and $y = \cot x$ and the X-axis is

(A) log 2 sq. units

(B) 3 log 2 sq. units

(C) 2 log 2 sq. units

(D) 4 log 2 sq. units

21. The area of the region bounded by the line $y = x + 1$, and the lines $x = 3$ and $x = 5$ is

(A) 7 sq. units

(B) 10 sq. units

(C) $\frac{7}{2}$ sq. units

(D) $\frac{11}{2}$ sq. units

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22. If a curve passes through the point (1, 1) and at any point (x, y) on the curve, the product of the slope of its tangent and x co-ordinate of the point is equal to the y co-ordinate of the point, then the curve also passes through the point

(A) $(\sqrt{3}, 0)$

(B) (2, 2)

(C) (3, 0)

(D) (−1, 2)

23. The degree of the differential equation

26. If (2, 3, −1) is the foot of the perpendicular from (4, 2, 1) to a plane, then the equation of the plane is

(A) $2x + y + 2z - 5 = 0$
(B) $2x - y + 2z + 1 = 0$
(C) $2x + y + 2z - 1 = 0$
(D) $2x - y + 2z = 0$

27. $|\vec{a} \times \vec{b}|^2 + |\vec{a} \cdot \vec{b}|^2 = 144$ and $|\vec{a}| = 4$ then $|\vec{b}|$ is equal to

(A) 4
(B) 12
(C) 3
(D) 8

NTD

28. If $\vec{a} + 2\vec{b} + 3\vec{c} = \vec{0}$ and

$$(\vec{a} \times \vec{b}) + (\vec{b} \times \vec{c}) + (\vec{c} \times \vec{a}) = \lambda (\vec{b} \times \vec{c})$$

then the value of λ is equal to

(A) 6
(B) 2
(C) 3
(D) 4

29. If a line makes an angle of $\frac{\pi}{}$ with each X and Y axis then the acute angle made by Z-axis is

28. If $\vec{a} + 2\vec{b} + 3\vec{c} = \vec{0}$ and

$$(\vec{a} \times \vec{b}) + (\vec{b} \times \vec{c}) + (\vec{c} \times \vec{a}) = \lambda(\vec{b} \times \vec{c})$$

then the value of λ is equal to

(A) 6 (B) 2 (C) 3 (D) 4

29. If a line makes an angle of $\frac{\pi}{3}$ with each X and Y axis then the acute angle made by Z-axis is

NTD

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

30. The length of perpendicular drawn from the point $(3, -1, 11)$ to the line $\frac{x}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ is

(A) $\sqrt{53}$ (B) $\sqrt{66}$ (C) $\sqrt{29}$ (D) $\sqrt{33}$

32. If A and B are events such that $P(A) = \frac{1}{4}$, $P(A/B) = \frac{1}{2}$ and $P(B/A) = \frac{2}{3}$ then P(B) is

(A) $\frac{1}{2}$ (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) $\frac{2}{3}$

33. A bag contains 2n + 1 coins. It is known that n of these coins have head on both sides whereas the other n + 1 coins are fair. One coin is selected at random and tossed. If the probability that toss results in heads is $\frac{31}{42}$, then the value of n is

NTD

(A) 10 (B) 5 (C) 6 (D) 8

34. Let A = {x, y, z, u} and B = {a, b}. A function f : A → B is selected randomly. The probability that the function is an onto function is

(A) $\frac{1}{35}$ (B) $\frac{7}{8}$ (C) $\frac{1}{8}$ (D) $\frac{5}{8}$

35. The modulus of the complex number $\frac{(1+i)^2(1+3i)}{(2-6i)(2-2i)}$ is

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

36. Given that a, b and x are real numbers and $a < b$, $x < 0$ then

(A) $\frac{a}{x} \leq \frac{b}{x}$ (B) $\frac{a}{x} > \frac{b}{x}$ (C) $\frac{a}{x} \geq \frac{b}{x}$ (D) $\frac{a}{x} < \frac{b}{x}$

NTD

37. Ten chairs are numbered as 1 to 10. Three women and two men wish to occupy one chair each. First the women choose the chairs marked 1 to 6, then the men choose the chairs from the remaining. The number of possible ways is

(A) ${}^6P_3 \times {}^4C_2$ (B) ${}^6C_3 \times {}^4C_2$ (C) ${}^6P_3 \times {}^4P_2$ (D) ${}^6C_3 \times {}^4P_2$

38. Which of the following is an empty set ?

39. If $f(x) = ax + b$, where a and b are integers, $f(-1) = -5$ and $f(3) = 3$ then a and b are respectively

(A) 2, 3 (B) −3, −1 (C) 2, −3 (D) 0, 2

40. The value of $e^{\log_{10} \tan 1^\circ + \log_{10} \tan 2^\circ + \log_{10} \tan 3^\circ + \ldots + \log_{10} \tan 89^\circ}$ is

(A) 1 (B) 0 (C) 3 (D) $\frac{1}{e}$

NTD

41. The value of $\begin{vmatrix} \sin^2 14^\circ & \sin^2 66^\circ & \tan 135^\circ \\ \sin^2 66^\circ & \tan 135^\circ & \sin^2 14^\circ \\ \tan 135^\circ & \sin^2 14^\circ & \sin^2 66^\circ \end{vmatrix}$

is

(A) 2 (B) −1 (C) 0 (D) 1

(A) 1, 1 (B) 2, 2 (C) 1, 2

44. If n is even and the middle term in the expansion of $\left(x^2 + \frac{1}{x}\right)^n$ is $924\,x^6$, then n is equal to

(A) 8 (B) 10 (C) 1[illegible] (D) 12

45. n^{th} term of the series

$1 + \frac{3}{7} + \frac{5}{7^2} + \frac{1}{7^2} + \ldots$ is

NTD

(A) $\frac{2n+1}{7^{n-1}}$ (B) $\frac{2n-1}{7^{n-1}}$ (C) $\frac{2n+1}{7^n}$ (D) $\frac{2n-1}{7^n}$

46. If $p\left(\frac{1}{q} + \frac{1}{r}\right), q\left(\frac{1}{r} + \frac{1}{p}\right), r\left(\frac{1}{p} + \frac{1}{q}\right)$ are in A.P., then p, q, r

$1 + \frac{3}{7} + \frac{5}{7^2} + \frac{1}{7^2} + \ldots$ is

(A) $\frac{2n+1}{7^{n-1}}$ (B) $\frac{2n-1}{7^{n-1}}$ (C) $\frac{2n+1}{7^n}$ (D) $\frac{2n-1}{7^n}$

46. If $p\left(\frac{1}{q}+\frac{1}{r}\right), q\left(\frac{1}{r}+\frac{1}{p}\right), r\left(\frac{1}{p}+\frac{1}{q}\right)$ are in A.P., then p, q, r

(A) are not in G.P.

(B) are not in A.P.

(C) are in G.P.

NTD

(D) are in A.P.

47. A line passes through (2, 2) and is perpendicular to the line $3x + y = 3$. Its y-intercept is

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

50. The contrapositive of the statement

"If two lines do not intersect in the same plane then they are parallel." is

(A) If two lines are parallel then they do not intersect in the same plane.

(B) If two lines are not parallel then they intersect in the same plane.

(C) If two lines are parallel then they intersect in the same plane.

(D) If two lines are not parallel then they do not intersect in the same plane.

51. The mean of 100 observations is 50 and their standard deviation is 5. Then the sum of squares of all observations is

NTD

(A) 255000 (B) 50000 (C) 252500 (D) 250000

52. $f : R \to R$ and $g : [0, \infty) \to R$ are defined by $f(x) = x^2$ and $g(x) = \sqrt{x}$. Which one of the following is not true ?

(A) $(gof)(-2) = 2$ (B) $(gof)(4) = 4$ (C) $(fog)(-4) = 4$ (D) $(fog)(2) = 2$

(C) If two lines are parallel then they intersect in the same plane.

(D) If two lines are not parallel then they do not intersect in the same plane.

51. The mean of 100 observations is 50 and their standard deviation is 5. Then the sum of squares of all observations is

(A) 255000 (B) 50000 (C) 252500 (D) 250000

52. $f : R \to R$ and $g : [0, \infty) \to R$ are defined by $f(x) = x^2$ and $g(x) = \sqrt{x}$. Which one of the following is not true ?

(A) $(gof)(-2) = 2$ (B) $(gof)(4) = 4$ NTD (C) $(fog)(-4) = 4$ (D) $(fog)(2) = 2$

53. Let $f : R \to R$ be defined by $f(x) = 3x^2 - 5$ and $g : R \to R$ by $g(x) = \frac{x}{x^2 + 1}$ then gof is

(A) $\frac{3x^2}{9x^4 + 30x^2 - 2}$ (B) $\frac{3x^2 - 5}{9x^4 - 30x^2 + 26}$ (C) $\frac{3x^2 - 5}{9x^4 - 6x^2 + 26}$ (D) $\frac{3x^2}{x^4 + 2x^2 - 4}$