Mathematics K CET – 2018 (Version E)

1. $\int_0^1 \frac{dx}{e^x + e^{-x}}$ is equal to

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

Ans (B)

2. $\int_0^{1/2} \frac{dx}{(1+x^2)\sqrt{1-x^2}}$ is equal to

(A) $\frac{1}{\sqrt{2}}\tan^{-1}\sqrt{\frac{2}{3}}$ (B) $\frac{2}{\sqrt{2}}\tan^{-1}\left(\frac{3}{\sqrt{2}}\right)$ (C) $\frac{\sqrt{2}}{2}\tan^{-1}\left(\frac{3}{2}\right)$ (D) $\frac{\sqrt{2}}{2}\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Ans (A)

3. The area of the region bounded by the curve y = cos x between x = 0 and x = π is

(A) 1 sq. unit (B) 4 sq. units (C) 2 sq. units (D) 3 sq. units

Ans (C)

4. The area bounded by the line y = x, x-axis and ordinates x = – 1 and x = 2 is

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

Ans (B)

5. The degree and the order of the differential equation $\frac{d^2y}{dx^2} = \sqrt[3]{1+\left(\frac{dy}{dx}\right)^2}$ respectively are

(A) 2 and 3 (B) 3 and 2 (C) 2 and 2 (D) 3 and 3

Ans (B)

6. The solution of the differential equation $x\frac{dy}{dx} - y = 3$ represents a family of

(A) straight lines (B) circles (C) parabolas (D) ellipses

Ans (A)

7. The integrating factor of $\frac{dy}{dx} + y = \frac{1+y}{x}$ is

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

Ans (C)

8. If $|\vec{a} \times \vec{b}|^2 + |\vec{a} \cdot \vec{b}|^2 = 144$ and $|\vec{a}| = 4$, then the value of $|\vec{b}|$ is

(A) 1 (B) 2 (C) 3 (D) 4

Ans (C)

9. If $\vec{a}$ and $\vec{b}$ are mutually perpendicular unit vectors, then $(3\vec{a} + 2\vec{b}) \cdot (5\vec{a} - 6\vec{b}) =$

(A) 5 (B) 3 (C) 6 (D) 12

Ans (B)

10. If the vector $a\hat{i}+\hat{j}+\hat{k}$, $\hat{i}+b\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+c\hat{k}$ are coplanar ($a \neq b \neq c \neq 1$), then the value of $abc - (a + b + c)$ =

(A) 2 (B) –2 (C) 0 (D) – 1

Ans (B)

11. If $\vec{a}=\hat{i}+\lambda\hat{j}+2\hat{k}$; $\vec{b}=\mu\hat{i}+\hat{j}-\hat{k}$ are orthogonal and $|\vec{a}| = |\vec{b}|$ then (λ, μ) =

(A) $\left(\frac{1}{4}, \frac{7}{4}\right)$ (B) $\left(\frac{7}{4}, \frac{1}{4}\right)$ (C) $\left(\frac{1}{4}, \frac{9}{4}\right)$ (D) $\left(\frac{-1}{4}, \frac{9}{4}\right)$

Ans (A)

12. The image of the point (1, 6, 3) in the line $\frac{x}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ is

(A) (1, 0, 7) (B) (7, 0, 1) (C) (2, 7, 0) (D) (–1, –6, –3)

Ans (A)

13. The angle between the lines $2x = 3y = –z$ and $6x = –y = –4z$ is

(A) 0° (B) 45° (C) 90° (D) 30°

Ans (C)

14. The value of k such that the line $\frac{x-4}{1}=\frac{y-2}{1}=\frac{z-k}{2}$ lies on the plane $2x – 4y + z = 7$ is

(A) –7 (B) 4 (C) –4 (D) 7

Ans (D)

15. The locus represented by $xy + yz = 0$ is

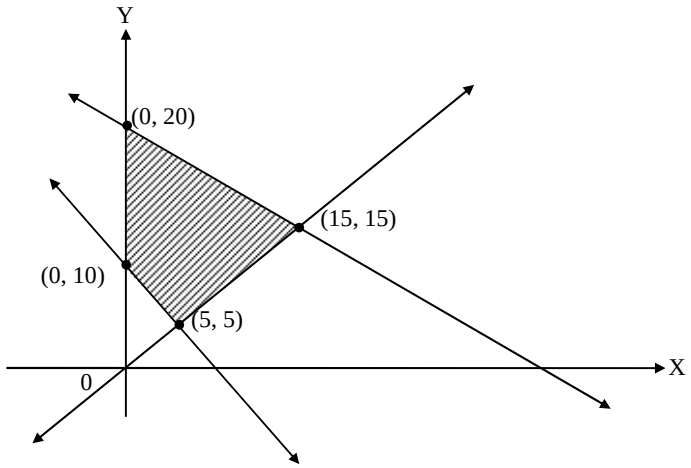
(A) a pair of perpendicular lines (B) a pair of parallel lines

(C) a pair of parallel planes (D) a pair of perpendicular planes

Ans (D)

16. The feasible region of an LPP is shown in the figure. If $z = 3x + 9y$, then the minimum value of z occurs at

(A) (5, 5)
(B) (0, 10)
(C) (0, 20)
(D) (15, 15)



Ans (A)

17. For the LPP, maximize z = x + 4y subject to the constraints $x + 2y \le 2$, $x + 2y \ge 8$, $x, y \ge 0$

(A) $z_{max} = 4$ (B) $z_{max} = 8$

(C) $z_{max} = 16$ (D) has no feasible solution

Ans (D)

18. For the probability distribution given by

$X = x_i$	0	1	2
P_i	$\frac{25}{36}$	$\frac{5}{18}$	$\frac{1}{36}$

the standard deviation (σ) is

(A) $\sqrt{\frac{1}{3}}$ (B) $\frac{1}{3}\sqrt{\frac{5}{2}}$ (C) $\sqrt{\frac{5}{36}}$ (D) none of the above

Ans (B)

19. A bag contains 17 tickets numbered from 1 to 17. A ticket is drawn at random, then another ticket is drawn without replacing the first one. The probability that both the tickets may show even numbers is

(A) $\frac{7}{34}$ (B) $\frac{8}{17}$ (C) $\frac{7}{16}$ (D) $\frac{7}{17}$

Ans (A)

20. A flashlight has 10 batteries out of which 4 are dead. If 3 batteries are selected without replacement and tested, then the probability that all 3 are dead is

(A) $\frac{1}{30}$ (B) $\frac{2}{8}$ (C) $\frac{1}{15}$ (D) $\frac{1}{10}$

Ans (A)

21. If $|x+5| \ge 10$ then

(A) $x \in (-15, 5]$ (B) $x \in (-5, 5]$

(C) $x \in (-\infty, -15] \cup [5, \infty)$ (D) $x \in [-\infty, -15] \cup [5, \infty)$

Ans (C)

22. Everybody in a room shakes hands with everybody else. The total number of handshakes is 45. The total number of persons in the room is

(A) 9 (B) 10 (C) 5 (D) 15

Ans (B)

23. The constant term in the expansion of $\left(x^2 - \frac{1}{x^2}\right)^{16}$ is

(A) ${}^{16}C_8$ (B) ${}^{16}C_7$ (C) ${}^{16}C_9$ (D) ${}^{16}C_{10}$

Ans (A)

24. If $P(n) : "2^{2n} - 1$ is divisible by k for all $n \in N"$ is true, then the value of 'k' is

(A) 6 (B) 3 (C) 7 (D) 2

Ans (B)

25. The equation of the line parallel to the line $3x - 4y + 2 = 0$ and passing through (−2, 3) is

(A) $3x - 4y + 18 = 0$ (B) $3x - 4y - 18 = 0$ (C) $3x + 4y + 18 = 0$ (D) $3x + 4y - 18 = 0$

Ans (A)

26. If $\left(\frac{1-i}{1+i}\right)^{96} = a + ib$ then (a, b) is

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

Ans (B)

27. The distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$. Its equation is

(A) $x^2 - y^2 = 32$ (B) $\frac{x^2}{4} - \frac{y^2}{9} = 1$ (C) $2x^2 - 3y^2 = 7$ (D) $y^2 - x^2 = 32$

Ans (A)

28. The number of ways in which 5 girls and 3 boys can be seated in a row so that no two boys are together is

(A) 14040 (B) 14440 (C) 14000 (D) 14400

Ans (D)

29. If a, b, c are three consecutive terms of an AP and x, y, z are three consecutive terms of a G.P., then the value of x^{b-c}, y^{c-a}, z^{a-b} is

(A) 0 (B) xyz (C) −1 (D) 1

Ans (D)

30. The value of $\lim_{x \to 0} \frac{[x]}{x}$ is

(A) 1 (B) −1 (C) 0 (D) Does not exist.

Ans (D)

31. Let $f(x) = x - \frac{1}{x}$ then f(−1) is

(A) 0 (B) 2 (C) 1 (D) −2

Ans (B)

32. The negation of the statement "72 is divisible by 2 and 3" is

(A) 72 is not divisible by 2 or 72 is not divisible by 3

(B) 72 is divisible by 2 or 72 is divisible by 3

(C) 72 is divisible by 2 and 72 is divisible by 3

(D) 72 is not divisible by 2 and 3

Ans (A)

33. The probability of happening of an event A is 0.5 and that of B is 0.3. If A and B are mutually exclusive events, then the probability of neither A nor B is

(A) 0.4 (B) 0.5 (C) 0.2 (D) 0.9

Ans (C)

34. In a simultaneous throw of a pair of dice, the probability of getting a total more than 7 is

(A) $\frac{7}{12}$ (B) $\frac{5}{36}$ (C) $\frac{5}{12}$ (D) $\frac{7}{36}$

Ans (C)

35. If A and B are mutually exclusive events, given that $P(A)=\frac{3}{5}, P(B)=\frac{1}{5}$, then P(A or B) is

(A) 0.8 (B) 0.6 (C) 0.4 (D) 0.2

Ans (A)

36. Let f, g : R $\to$ R be two functions defined as f(x) = | x | + x and g(x) = | x | – x $\forall$ x $\in$ R. Then $(f \circ g)(x)$ for x < 0 is

(A) 0 (B) 4x (C) –4x (D) 2x

Ans (A)

37. A is a set having 6 distinct elements. The number of distinct functions from A to A which are not bijections is

(A) 6! – 6 (B) $6^6 - 6$ (C) $6^6 - 6!$ (D) 6!

Ans (C)

38. Let f : R $\to$ R be defined by $f(x)=\begin{cases} 2x & ; \quad x>3 \\ x^2 & ; \quad 1<x\le 3 \\ 3x & ; \quad x\le 1 \end{cases}$. Then f(–1) + f(2) + f(4) is

(A) 9 (B) 14 (C) 5 (D) 10

Ans (A)

39. If $\sin^{-1}x+\cos^{-1}y=\frac{2\pi}{5}$, then $\cos^{-1}x+\sin^{-1}y$ is

(A) $\frac{2\pi}{5}$ (B) $\frac{3\pi}{5}$ (C) $\frac{4\pi}{5}$ (D) $\frac{3\pi}{10}$

Ans (B)

40. The value of the expression $\tan\left(\frac{1}{2}\cos^{-1}\frac{2}{\sqrt{5}}\right)$ is

(A) $2-\sqrt{5}$ (B) $\sqrt{5}-2$ (C) $\frac{\sqrt{5}-2}{2}$ (D) $5-\sqrt{2}$

Ans (B)

41. If $A=\begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$, then $A^n = 2^k A$, where k =

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

Ans (D)

42. If $\begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix}=\begin{bmatrix} 2 \\ 4 \end{bmatrix}$, then the values of x and y respectively are

(A) – 3, – 1 (B) 1, 3 (C) 3, 1 (D) – 1, 3

Ans (D)

43. If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then AA′ =

(A) A (B) zero matrix (C) A′ (D) I

Ans (D)

44. If x, y, z ∈ R, then the value of determinant

$$\begin{vmatrix} (5^x+5^{-x})^2 & (5^x-5^{-x})^2 & 1 \\ (6^x+6^{-x})^2 & (6^x-6^{-x})^2 & 1 \\ (7^x+7^{-x})^2 & (7^x-7^{-x})^2 & 1 \end{vmatrix} \text{ is}$$

(A) 10 (B) 12 (C) 1 (D) 0

Ans (D)

45. The value of determinant $\begin{vmatrix} a-b & b+c & a \\ b-a & c+a & b \\ c-a & a+b & c \end{vmatrix}$ is

(A) $a^3 + b^3 + c^3$ (B) 3abc

(C) $a^3 + b^3 + c^3 - 3abc$ (D) $a^3 + b^3 + c^3 + 3abc$

Ans

Question is wrong.

46. If (x_1, y_1), (x_2, y_2) and (x_3, y_3) are the vertices of a triangle whose area is 'k' square units, then $\begin{vmatrix} x_1 & y_1 & 4 \\ x_2 & y_2 & 4 \\ x_3 & y_3 & 4 \end{vmatrix}^2$ is

(A) 32 k^2 (B) 16 k^2 (C) 64 k^2 (D) 48 k^2

Ans (C)

47. Let A be a square matrix of order 3 × 3, then |5A| =

(A) 5 |A| (B) 125 |A| (C) 25 |A| (D) 15 |A|

Ans (B)

48. If $f(x) = \begin{cases} \dfrac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & \text{if} \quad -1 \le x < 0 \\ \dfrac{2x+1}{x-1} & \text{if} \quad 0 \le x \le 1 \end{cases}$

is continuous at x = 0, then the value of k is

(A) k = 1 (B) k = – 1 (C) k = 0 (D) k = 2

Ans (B)

49. If cos y = x cos (a + y) with cos a ≠ ± 1, then $\frac{dy}{dx}$ is equal to

(A) $\dfrac{\sin a}{\cos^2(a+y)}$ (B) $\dfrac{\cos^2(a+y)}{\sin a}$ (C) $\dfrac{\cos a}{\sin^2(a+y)}$ (D) $\dfrac{\cos^2(a+y)}{\cos a}$

Ans (B)

50. If $f(x) = |\cos x - \sin x|$, then $f'\left(\frac{\pi}{6}\right)$ is equal to

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

Ans (A)

51. If $y = \sqrt{x+\sqrt{x+\sqrt{x+\ldots\infty}}}$, then $\frac{dy}{dx} =$

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

Ans (D)

52. If $f(x) = \begin{cases} \frac{\log_e x}{x-1} & ; \quad x \neq 1 \\ k & ; \quad x = 1 \end{cases}$ is continuous at x = 1, then the value of k is

(A) e (B) 1 (C) – 1 (D) 0

Ans (B)

53. Approximate change in the volume V of a cube of side x metres caused by increasing the side by 3% is

(A) $0.09\ x^3\ m^3$ (B) $0.03\ x^3\ m^3$ (C) $0.06\ x^3\ m^3$ (D) $0.04\ x^3\ m^3$

Ans (A)

54. The maximum value of $\left(\frac{1}{x}\right)^x$ is

(A) e (B) e^e (C) $e^{1/e}$ (D) $\left(\frac{1}{e}\right)^{1/e}$

Ans (C)

55. $f(x) = x^x$ has stationary point at

(A) x = e (B) $x = \frac{1}{e}$ (C) x = 1 (D) $x = \sqrt{e}$

Ans (B)

56. The maximum area of a rectangle inscribed in the circle $(x + 1)^2 + (y - 3)^2 = 64$ is

(A) 64 sq. units (B) 72 sq. units (C) 128 sq. units (D) 8 sq. units

Ans (C)

57. $\int \frac{1}{1+e^x} dx$ is equal to

(A) $\log_e\left(\frac{e^x+1}{e^x}\right)+c$ (B) $\log_e\left(\frac{e^x-1}{e^x}\right)+c$

(C) $\log_e\left(\frac{e^x}{e^x+1}\right)+c$ (D) $\log_e\left(\frac{e^x}{e^x-1}\right)+c$

Ans (C)

58. $\int \frac{1}{\sqrt{3-6x-9x^2}}dx$ is equal to

(A) $\sin^{-1}\left(\frac{3x+1}{2}\right)+c$ (B) $\sin^{-1}\left(\frac{3x+1}{6}\right)+c$

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

Ans (C)

59. $\int e^{\sin x}\cdot\left(\frac{\sin x+1}{\sec x}\right)dx$ is equal to

(A) sin x . e^{sinx} + c (B) cos x. e^{sinx} + c

(C) e^{sinx} + c (D) $e^{\sin x}$ (sin x + 1) + c

Ans (A)

60. $\int_{-2}^{2}|x\cos\pi x|dx$ is equal to

(A) $\frac{8}{\pi}$ (B) $\frac{4}{\pi}$ (C) $\frac{2}{\pi}$ (D) $\frac{1}{\pi}$

Ans (A)

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