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KCET – MATHEMATICS – 2018

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1. For the LPP; maximise $z = x + 4y$ subject to the constraints $x + 2y \leq 2$, $x + 2y \geq 8$, $x, y \geq 0$

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

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

Ans: (D)

2. 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)

3. 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)

4. 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)

5. If $|x + 5| \geq 10$ 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)

6. 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)

7. 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)

8. 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)

9. 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)

10. 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)

11. 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 or D)

12. 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)

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

(A) 0 (B) xyz (C) -1 (d) 1

Ans: (D)

14. The value of $\lim_{x \to 0} \frac{|x|}{x}$ is

(A) 1 (B) -1 (C) 0 (D) Does not exist

Ans: (D)

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

(A) 0 (B) 2 (C) 1 (D) -2

Ans: (B)

16. 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)

17. 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)

18. 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)

19. 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)

20. 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 (fog) (x) for x < 0 is

(A) 0 (B) 4x (C) -4x (D) 2x

Ans: (C)

21. A is 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)

22. 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)

23. 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)

24. 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)

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

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

Ans: (D)

26. 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)

27. 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)

28. If x, y, z $\in$ R, then the value of determinant $\begin{vmatrix} (5^x+5^{-x})^2 & (5^x-5^{-x})^2 & 1 \\ (6^x+6^{-x})^2 & (6^x-6^{-x})^2 & 1 \\ (7^x+7^{-x})^2 & (7^x-7^{-x})^2 & 1 \end{vmatrix}$ is

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

Ans: (D)

29. 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: () wrong question

30. If (x_1, y_1), (x_2, y_2) and (x_3, y_3) are the vertices of 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)

31. Let A be a square matrix of order 3 x 3, then |5A| =

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

Ans: (B)

32. If f(x) = $\left\{ \begin{array}{ll} \dfrac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & if \quad -1 \le x < 0 \\ \dfrac{2x+1}{x-1} & if \quad 0 \le x \le 1 \end{array} \right\}$ 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)

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

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

Ans: (B)

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

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

Ans: (A)

35. 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)

36. If f(x) = $\left\{ \begin{array}{ll} \dfrac{\log_e x}{x-1} & ; \quad x \neq 1 \\ k & ; \quad x = 1 \end{array} \right\}$ is continuous at x = 1, then the value of k is

A) e B) 1 C) -1 D) 0

Ans: (B)

37. Approximate change in the volume V of a cube of side x meters 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)

38. 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)

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

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

Ans: (B)

40. 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)

41. $\int \frac{1}{1+e^x} dx$ 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)

42. $\int \frac{1}{\sqrt{3-6x-9x^2}} dx$ 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)

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

A) $\sin x \cdot e^{\sin x} + c$ B) $\cos x \cdot e^{\sin x} + c$

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

Ans: (A)

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

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

Ans: (A)

45. $\int_0^1 \frac{dx}{e^x + e^{-x}}$ 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)

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

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

Ans: (A)

47. 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) 2sq. units D) 3 sq. units

Ans: (C)

48. 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)

49. 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: (A)

50. 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)

51. 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)

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

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

Ans: (C)

53. If $\vec{a}$ and $\vec{b}$ are mutually perpendicular unit vectors, then

$(3\vec{a}+2\vec{b}).(5\vec{a}-6\vec{b})$ =

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

Ans: (B)

54. 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)

55. 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)

56. 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)

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

A) 0° B) 45° C) 90° D) 30°

Ans: (C)

58. 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)

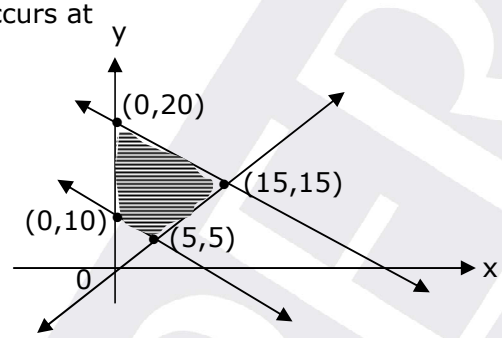
59. The locus represented by xy + yz = 0 is

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)

60. 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)