KCET – 2018 TEST PAPER WITH ANSWER KEY
(HELD ON TUESDAY 18TH APRIL, 2018)

MATHEMATICS

1. The distance between the foci of a hypberbola is 16 and its eccentrticity is $\sqrt{2}$. Its equation is

   (A) $x^2 - y^2 = 32$ (B) $\dfrac{x^2}{4} - \dfrac{y^2}{9} = 1$

   (C) $2x^2 - 3y^2 = 7$ (D) $y^2 - x^2 = 32$

   Ans. A,D

2. 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

3. If a, b, c and three consecutive terms of an AP and x, y, z are three consecutive terms of 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

4. The value of $\lim\limits_{x \to 0} \dfrac{|x|}{x}$ is

   (A) 1   (B) –1

   (C) 0   (D) Does not exist

   Ans. D

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

   (A) 0   (B) 2

   (C) 1   (D)`–2

   Ans. B

6. 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

7. The probability of happening of an event A is $0 \cdot 5$ and that of B is $0 \cdot 3$. If A and B are mutually exclusive events, then the prabability of neither A nor B is

   (A) $0 \cdot 4$ (B) $0 \cdot 5$

   (C) $0 \cdot 2$ (D) $0 \cdot 9$

   Ans. C

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

   (A) $\dfrac{7}{12}$ (B) $\dfrac{5}{36}$

   (C) $\dfrac{5}{12}$ (D) $\dfrac{7}{36}$

   Ans. C

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

   (A) $0 \cdot 8$ (B) $0 \cdot 6$

   (C) $0 \cdot 4$ (D) $0 \cdot 2$

   Ans. A

10. Let f, g : R $\to$ R be two functions defined as $f(x) = |x| + x$ and $g(x) = |x| - x \forall x \in R$. The (fog) (x) for x < 0 is

    (A) 0   (B) 4x

    (C) –4x   (D) 2x

    Ans. C

11. A is set haveing 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

12. Let $f : R \to R$ defined by

$$f(x) = \begin{cases} 2x & ; & x > 3 \\ x^2 & ; & 1 < x \le 3 \\ 3x & ; & x \le 1 \end{cases}$$

Then $f(-1) + f(2) + f(4)$ is

(A) 9   (B) 14

(C) 5   (D) 10

Ans. A

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

(A) $\dfrac{2\pi}{5}$ (B) $\dfrac{3\pi}{5}$

(C) $\dfrac{4\pi}{5}$ (D) $\dfrac{3\pi}{10}$

Ans. B

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

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

(C) $\dfrac{\sqrt{5} - 2}{2}$ (D) $5 - \sqrt{2}$

Ans. B

15. 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

16. 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 of x and y respectively are

(A) $-3, -1$ (B) 1, 3

(C) 3, 1   (D) $-1, 3$

Ans. D

17. 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

18. If x, y, z $\in$ R, then the value of determinant

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

(A) 10   (B) 12

(C) 1   (D) 0

19. 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. Bonus

20. 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) $32k^2$ (B) $16k^2$

(C) $64k^2$ (D) $48k^2$

Ans. C

21. 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

22. 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 vlaue of k

(A) $k = 1$ (B) $k = 1$

(C) $k = 0$ (D) $k = 2$

Ans. B

23. If $\cos y = x \cos(a + y)$ with $\cos \ne \pm 1$, then $\dfrac{dy}{dx}$ 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

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

(A) $-\dfrac{1}{2}(1 + \sqrt{3})$

(B) $\dfrac{1}{2}(1 + \sqrt{3})$

(C) $-\dfrac{1}{2}(1 - \sqrt{3})$

(D) $\dfrac{1}{2}(1 - \sqrt{3})$

Ans. A

25. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots \infty}}}$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{1}{y^2 - 1}$

(B) $\dfrac{1}{2y + 1}$

(C) $\dfrac{2y}{y^2 - 1}$

(D) $\dfrac{1}{2y - 1}$

Ans. D

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

(A) e

(B) 1

(C) –1

(D) 0

Ans. B

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

(A) $0.09x^3 m^3$

(B) $0.03x^3 m^3$

(C) $0.06x^3 m^3$

(D) $0.04x^3 m^3$

Ans. A

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

(A) e

(B) e^e

(C) $e^{1/e}$

(D) $\left(\dfrac{1}{e}\right)^{1/e}$

Ans. C

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

(A) $x = e$

(B) $x = \dfrac{1}{e}$

(C) $x = 1$

(D) $x = \sqrt{e}$

Ans. B

30. The maximum area of 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

31. $\int \dfrac{1}{1 + e^x} dx$ is equal to

(A) $\log_e\left(\dfrac{e^x + 1}{e^x}\right) + e$

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

(C) $\log_e\left(\dfrac{e^x}{e^x + 1}\right) + e$

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

Ans. C

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

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

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

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

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

Ans. C

33. $\int e^{\sin x} \cdot \left(\dfrac{\sin x + 1}{\sec x} \right) dx$ 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

34. $\int\limits_{-2}^{3} |x \cos \pi x| \, dx$ is equal to

(A) $\dfrac{8}{\pi}$

(B) $\dfrac{4}{\pi}$

(C) $\dfrac{2}{\pi}$

(D) $\dfrac{1}{\pi}$

Ans. A

35. $\int\limits_{0}^{1} \dfrac{dx}{e^x + e^{-x}}$ is equal to

(A) $\dfrac{\pi}{4} - \tan^{-1}(e)$

(B) $\tan^{-1}(e) - \dfrac{\pi}{4}$

(C) $\tan^{-1}(e) + \dfrac{\pi}{4}$

(D) $\tan^{-1}(e)$

Ans. B

36. $\int\limits_{0}^{1/2} \dfrac{dx}{(1+x^2)\sqrt{1-x^2}}$ is equal to

(A) $\dfrac{1}{\sqrt{2}} \tan^{-1} \sqrt{\dfrac{2}{3}}$

(B) $\dfrac{2}{\sqrt{2}} \tan^{-1} \left(\dfrac{3}{\sqrt{2}} \right)$

(C) $\dfrac{\sqrt{2}}{2} \tan^{-1} \left(\dfrac{3}{2} \right)$

(D) $\dfrac{\sqrt{2}}{2} \tan^{-1} \left(\dfrac{\sqrt{3}}{2} \right)$

Ans. A

37. The area of region bounded by the curve $y = \cos x$ between $x = 0$ and $x = \pi$ is

(A) 1 sq. unit

(B) 4 sq. units

(C) 2 sq. units

(D) 3 sq. units

Ans. C

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

(A) $\dfrac{3}{2}$

(B) $\dfrac{5}{2}$

(C) 2

(D) 3

Ans. B

39. The degree and the order of the differential equation

$\dfrac{d^2 y}{dx^2} = \sqrt[3]{1 + \left(\dfrac{dy}{dx} \right)^2}$ respectively are

(A) 2 and 3

(B) 3 and 2

(C) 2 and 2

(D) 3 and 3

Ans. B

40. The solutio of the differential equation $x\dfrac{dy}{dx} - y = 3$ represents a family of

(A) Straight lines

(B) Circles

(C) Parabolas

(D) Ellipses

Ans. A

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

(A) xe^x

(B) $xe^{1/x}$

(C) $\dfrac{e^x}{x}$

(D) $\dfrac{x}{e^x}$

Ans. C

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

(A) 1

(B) 2

(C) 3

(D) 4

Ans. C

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

(A) 5

(B) 3

(C) 6

(D) 12

Ans. B

44. If the vectors $a\hat{i} + \hat{j} + \hat{k}$, $\hat{i} + b\hat{j} + \hat{k}$ 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

45. 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 $(\lambda, \mu) =$

(A) $\left(\dfrac{1}{4}, \dfrac{7}{4}\right)$

(B) $\left(\dfrac{7}{4}, \dfrac{1}{4}\right)$

(C) $\left(\dfrac{1}{4}, \dfrac{9}{4}\right)$

(D) $\left(\dfrac{-1}{4}, \dfrac{9}{4}\right)$

Ans. A

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

(A) $(1, 0, 7)$ (B) $(7, 0, 1)$

(C) $(2, 7, 0)$ (D) $(-1, -6, -3)$

Ans. A

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

(A) $0°$ (B) $45°$

(C) $90°$ (D) $30°$

Ans. C

48. The value of k such that the line $\dfrac{x-4}{1} = \dfrac{y-2}{1} = \dfrac{z-k}{2}$ lies on the plane $2x - 4y + z = 7$ is
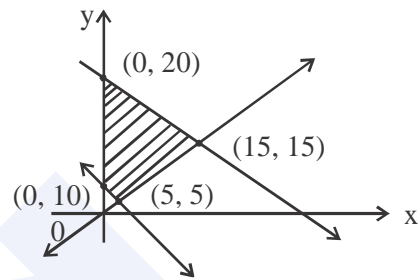
(A) -7 (B) 4

(C) -4 (D) 7

Ans. D

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

(A) a pair of perpendicular lines
(B) a pair of parallell lines
(C) a pair of parallel planes
(D) a pair of perpendicular planes

Ans. D

50. The feasible region of an LPP is shonw 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

51. For the LPP; maximise $z = x + 4y$ 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

52. For the probability distribution given by

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

the standard deviation (σ) is

(A) $\sqrt{\dfrac{1}{3}}$

(B) $\dfrac{1}{3}\sqrt{\dfrac{5}{2}}$

(C) $\sqrt{\dfrac{5}{36}}$

(D) None of these

Ans. B

53. A bag contains 17 tickets numbered from 1 to 7. 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 by

(A) $\dfrac{7}{34}$

(B) $\dfrac{8}{17}$

(C) $\dfrac{7}{16}$

(D) $\dfrac{7}{17}$

Ans. A

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

(A) $\dfrac{1}{30}$

(B) $\dfrac{2}{8}$

(C) $\dfrac{1}{15}$

(D) $\dfrac{1}{10}$

Ans. A

55. 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

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

(A) 9   (B) 10

(C) 5   (D) 15

Ans. B

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

(A) $^{16}C_8$ (B) $^{16}C_7$

(C) $^{16}C_9$ (D) $^{16}C_{10}$

Ans. A

58. 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

59. 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

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

(A) (1, 1)   (B) (1, 0)

(C) (0, 1)   (D) (0, -1)

Ans. B