KCET – 2016 TEST PAPER WITH ANSWER KEY
(HELD ON WEDNESDAY 4th MAY, 2016)

MATHEMATICS

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

(1) $\left(\frac{1}{e}\right)^e$ (2) $e^{1/e}$

(3) e^c (4) e

Ans: (2)

2. The contrapositive of the converse of the statement "If x is a prime number then x is odd" is

(1) If x is not a prime number then x is not an odd

(2) If x is a prime number then it is not odd.

(3) If x is not an odd number then x is not a prime number.

(4) If x is not a prime number then x is odd

Ans: (1)

3. The simplified form of $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

(1) i (2) -1

(3) 1 (4) 0

Ans: (4)

4. The coefficient of variation of two distributions are 60 and 70. the standard deviation are 21 and 16 respectively, then their mean is

(1) 22.85 (2) 28.25

(3) 23 (4) 35

Ans: (1, 4)

5. The slope of the tangent to the curve $x = t^2 + 3t - 8, y = 2t^2 - 2t - 5$ at the point (2, -1) is

(1) $\frac{-6}{7}$ (2) $\frac{7}{6}$

(3) $\frac{6}{7}$ (4) $\frac{22}{7}$

Ans: (3)

6. Suppose $\vec{a} + \vec{b} + \vec{c} = 0, |\vec{a}| = 3, |\vec{b}| = 5, |\vec{c}| = 7,$ then the angle between $\vec{a}$ & $\vec{b}$ is

(1) $\pi/4$ (2) $\pi/3$

(3) $\pi/2$ (4) π

Ans: (2)

7. Let * be a binary operation defined on R by a * b = $\frac{a+b}{4} \forall\ a, b \in R$ then the operation * is

(1) Neither Associative nor commutative

(2) Associative but not commutative

(3) Commutative but not Associative

(4) Commutative and Associative

Ans: (3)

8. if $x^m y^n = (x+y)^{m+n}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{y}{x}$ (2) 0

(3) xy (4) $\frac{x+y}{xy}$

Ans: (1)

9. If $y = e^{\sin^{-1}(t^2-1)}$ & $x = e^{\sec^{-1}\left(\frac{1}{t^2-1}\right)}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{-x}{y}$ (2) $\frac{y}{x}$

(3) $\frac{-y}{x}$ (4) $\frac{x}{y}$

Ans: (3)

10. If $1 + \sin\theta + \sin^2\theta + \ldots$ upto $\infty = 2\sqrt{3} + 4$, then θ = _____

(1) $3\pi/4$ (2) $\pi/3$

(3) $\pi/4$ (4) $\pi/6$

Ans: (2)

11. The order and degree of the differential equation

$$\left[1 + \left(\frac{dy}{dx}\right)^2 + \sin\left(\frac{dy}{dx}\right)\right]^{3/4} = \frac{d^2y}{dx^2}$$

(1) order = 2, degree = not defined (2) order = 2, degree = $\frac{3}{4}$

(3) order = 2, degree = 4 (4) order = 2, degree = 3

Ans: (1)

12. The value of $\sin^{-1}\left(\cos\frac{53\pi}{5}\right)$ is

(1) $\frac{-\pi}{10}$ (2) $\frac{\pi}{10}$

(3) $\frac{-3\pi}{5}$ (4) $\frac{3\pi}{5}$

Ans: (1)

13. If a = 3, b = 4, c = 5 each one of $\vec{a},\vec{b}\ \&\ \vec{c}$ is perpendicular to the sum of the remaining then $\left|\vec{a}+\vec{b}+\vec{c}\right|$ is equal to

(1) $\sqrt{5}$ (2) $5\sqrt{2}$

(3) $\frac{2}{\sqrt{5}}$ (4) $\frac{5}{\sqrt{2}}$

Ans: (2)

14. The real part of $(1-\cos\theta+i\sin\theta)^{-1}$ is

(1) $\cot\frac{\theta}{2}$ (2) $\tan\frac{\theta}{2}$

(3) $\frac{1}{1+\cos\theta}$ (4) $\frac{1}{2}$

Ans: (4)

15. Area lying between the curves $y^2=2x$ and $y=x$ is

(1) $\frac{3}{4}$ sq.units (2) $\frac{1}{4}$ sq.units

(3) $\frac{1}{3}$ sq.units (4) $\frac{2}{3}$ sq.units

Ans: (4)

16. If the straight lines $2x+3y-3=0$ and $x+ky+7=0$ are perpendicular, then the value of k is

(1) -3/2 (2) -2/3

(3) 3/2 (4) 2/3

Ans: (2)

17. If $A=\frac{1}{\pi}\begin{bmatrix}\sin^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right)\\ \sin^{-1}\left(\frac{x}{\pi}\right) & \cot^{-1}(\pi x)\end{bmatrix}, B=\frac{1}{\pi}\begin{bmatrix}-\cos^{-1}(\pi x) & \tan^{-1}\left(\frac{x}{\pi}\right)\\ \sin^{-1}\left(\frac{x}{\pi}\right) & -\tan^{-1}(\pi x)\end{bmatrix}$

then A - B is equal to

(1) $\frac{1}{2}I$ (2) 2I

(3) 0 (4) I

Ans: (1)

18. The set A has 4 elements and the set B has 5 elements then the number of injective mappings that can be defined from A to B is

(1) 120 (2) 60

(3) 72 (4) 144

Ans: (1)

19. Integrating factor of $x\frac{dy}{dx}-y=x^4-3x$ is

(1) -x (2) $\frac{1}{x}$

(3) log x (4) x

Ans: (2)

20. If $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$ then A^2-5A is equal to

(1) -7I (2) 7I

(3) -I (4) I

Ans: (1)

21. Two cards are drawn at random from a pack of 52 cards. The probability of these two being "Aces" is

(1) $\frac{1}{13}$ (2) $\frac{1}{2}$

(3) $\frac{1}{221}$ (4) $\frac{1}{26}$

Ans: (3)

22. The value of $\int_{-\pi/4}^{\pi/4}\sin^{103}x.\cos^{101}x\,dx$ is

(1) 0 (2) 2

(3) $\left(\frac{\pi}{4}\right)^{101}$ (4) $(\pi/4)^{103}$

Ans: (1)

23. $\lim_{x\to 0}\frac{xe^x-\sin x}{x}$ is equal to

(1) 2 (2) 0

(3) 1 (4) 3

Ans: (2)

24. If $x = 2 + 3\cos\theta$ and $y = 1 - 3\sin\theta$ represent a circle then the centre and radius is

(1) $(-2,-1),3$ (2) $(1,2),\frac{1}{3}$

(3) $(2,1),3$ (4) $(2,1),9$

Ans: (3)

25. If $\sin^{-1}x+\sin^{-1}y=\frac{\pi}{2}$, then x^2 is equal to

(1) $\sqrt{1-y}$ (2) 0

(3) y^2 (4) $1 - y^2$

Ans: (4)

26. The value of the $\sin 1^0+\sin 2^0+...+\sin 359^0$ is equal to

(1) 180 (2) -1

(3) 1 (4) 0

Ans: (4)

27. The 11^{th} term in the expansion of $\left(x+\frac{1}{\sqrt{x}}\right)^{14}$ is

(1) $\frac{x}{1001}$ (2) i

(3) $\frac{1001}{x}$ (4) $\frac{999}{x}$

Ans: (3)

28. If A is a matrix of order $m \times n$ and B is a matrix such that AB' and B'A are both defined, the order of the matrix B is

(1) $m \times n$ (2) $n \times m$

(3) $n \times n$ (4) $m \times m$

Ans: (1)

29. The differential coefficient of $\log_{10} x$ with respect to $\log_x 10$ is

(1) $\frac{x^2}{100}$ (2) $(\log_x 10)^2$

(3) $-(\log_{10} x)^2$ (4) 1

Ans: (3)

30. The two curves $x^3-3xy^2+2=0$ and $3x^2y-y^3=2$

(1) Cut at an angle $\pi/4$

(2) Cut at an angle $\pi/3$

(3) Cut each other at right angle

(4) Touch each other

Ans: (3)

31. If $\tan^{-1}(x^2+y^2)=\alpha$ then $\frac{dy}{dx}$ is equal to

(1) -xy (2) $\frac{x}{y}$

(3) xy (4) $\frac{-x}{y}$

Ans: (4)

32. The rate of change of area of a circle with respect to its radius at r = 2 cms is

(1) 4π (2) 2

(3) 2π (4) 4

Ans: (1)

33. $\int_0^{\pi/2}\frac{\sin^{1000}x\,dx}{\sin^{1000}x+\cos^{1000}x}$ is equal to

(1) $\frac{\pi}{4}$ (2) $\frac{\pi}{2}$

(3) 1 (4) 1000

Ans: (1)

34. The value fo $\tan\frac{\pi}{8}$ is equal to

(1) $1-\sqrt{2}$ (2) $\frac{1}{\sqrt{2}+1}$

(3) $\sqrt{2}+1$ (4) $\frac{1}{2}$

Ans: (2)

35. The solution for the differential equation $\frac{dy}{y}+\frac{dx}{x}=0$ is

(1) $x + y = c$ (2) $x\,y = c$

(3) $\log x.\ \log y = c$ (4) $\frac{1}{y}+\frac{1}{x}=c$

Ans: (2)

36. Find the co-ordinates of the foot of the perpendicular drawn from the origin to the plane $5y + 8 = 0$

(1) $\left(0,-\frac{8}{5},0\right)$ (2) $\left(\frac{8}{25},0,0\right)$

(3) $\left(0,\frac{8}{5},0\right)$ (4) $\left(0,-\frac{18}{5},2\right)$

Ans: (1)

37. The simplified from of $\tan^{-1}\left(\frac{x}{y}\right)-\tan^{-1}\left(\frac{x-y}{x+y}\right)$ is equal to

(1) π (2) $\frac{\pi}{2}$

(3) $\frac{\pi}{4}$ (4) 0

Ans: (3)

38. If $A=\begin{bmatrix}\cos 2\theta & -\sin 2\theta\\ \sin 2\theta & \cos 2\theta\end{bmatrix}$ and $A + A^T = I$

Where I si teh unit matrix of 2×2 & A^T is the transpose of A, then the value of θ is equal to

(1) $3\pi/2$ (2) π

(3) $\pi/3$ (4) $\pi/6$

Ans: (4)

39. The value of $\int\frac{e^{6\log x}-e^{5\log x}}{e^{4\log x}-e^{3\log x}}dx$ is equal to

(1) $\frac{1}{x}$ (2) $\frac{3}{x^3}$

(3) $\frac{x^3}{3}$ (4) 0

Ans: (3)

40. If $3\tan^{-1}x+\cot^{-1}x=\pi$ then x equal to

(1) 1/2 (2) -1

(3) 1 (4) 0

Ans: (3)

41. The value of $\int\frac{e^x\left(x^2\tan^{-1}x+\tan^{-1}x+1\right)}{x^2+1}dx$ is equal to

(1) $e^{\tan^{-1}x}+c$ (2) $\tan^{-1}\left(x^c\right)+c$

(3) $\tan^{-1}\left(e^x\right)+c$ (4) $e^x\tan^{-1}x+c$

Ans: (4)

42. The value of x if $x\left(\hat{i}+\hat{J}+\hat{k}\right)$ is a unit vector is

(1) $\pm\frac{1}{3}$ (2) ± 3

(3) $\pm\sqrt{3}$ (4) $\pm\frac{1}{\sqrt{3}}$

Ans: (4)

43. If $\cos\alpha,\cos\beta,\cos\gamma$ are the direction cosines of a vector $\vec{a}$, then $\cos 2\alpha+\cos 2\beta+\cos 2\gamma$ is equal to

(1) 0 (2) -1

(3) 3 (4) 2

Ans: (2)

44. If A is any square matrix of order 3×3 then $|3A|$ is equal to

(1) $9|A|$ (2) $27|A|$

(3) $\frac{1}{3}|A|$ (4) $3|A|$

Ans: (2)

45. If x y z are not equal and $\neq 0,\neq 1$ the value of

$$\begin{vmatrix}\log x & \log y & \log z\\ \log 2x & \log 2y & \log 2z\\ \log 3x & \log 3y & \log 3z\end{vmatrix}$$ is equal to

(1) $\log(x+y+z)$ (2) 0

(3) $\log(6xyz)$ (4) $\log(xyz)$

Ans: (2)

46. The function $f(x)=[x]$ where [x] the greatest integer function is continuous at

(1) -2 (2) 1

(3) 4 (4) 1.5

Ans: (4)

47. If $2\vec{a}.\vec{b}=|\vec{a}|.|\vec{b}|$ then the angle between $\vec{a}$ & $\vec{b}$ is

(1) 60° (2) 90°

(3) 0° (4) 30°

Ans: (1)

48. The length of latus rectum of the parabola $4y^2+3x+3y+1=0$ is

(1) 3/4 (2) 12

(3) 7 (4) 4/3

Ans: (1)

49. If $P(A\cap B)=7/10$ $P(B)=17/20$, where P stands for probability then $P(A\,|\,B)$ is equal to

(1) 1/8 (2) 14/17

(3) 17/20 (4) 7/8

Ans: (2)

50. If x y z are all different and not equal to zero and $\begin{vmatrix}1+x & 1 & 1\\ 1 & 1+y & 1\\ 1 & 1 & 1+z\end{vmatrix}=0$ then the value of $x^{-1}+y^{-1}+z^{-1}$ is equal to

(1) -1 (2) $-x-y-z$

(3) $x^{-1}y^{-1}z^{-1}$ (4) xyz

Ans: (1)

51. The value of $\int\frac{e^x(1+x)dx}{\cos^2(e^x.x)}$ is equal to

(1) $\cot(e^x)+c$ (2) $\tan(e^x)+c$

(3) $\tan(e^x.x)+c$ (4) $-\cot(ex^x)+c$

Ans: (3)

52. Two dice are thrown simultaneously, the probability of obtaining a total score of 5 is

(1) $\frac{1}{6}$ (2) $\frac{1}{9}$

(3) $\frac{1}{12}$ (4) $\frac{1}{18}$

Ans: (2)

53. If $\vec{a}$ and $\vec{b}$ are unit vectors then what is the angle between $\vec{a}$ and $\vec{b}$ for $\sqrt{3}\vec{a}-\vec{b}$ to be unit vector?

(1) 90° (2) 60°

(3) 45° (4) 30°

Ans: (4)

54. The general solution of $\cot\theta+\tan\theta=2$ is

(1) $\theta=n\pi+(-1)^n\pi/8$ (2) $\theta=\frac{n\pi}{2}+(-1)^n\pi/6$

(3) $\frac{n\pi}{2}+(-1)^n\pi/4$ (4) $\theta=\frac{n\pi}{2}+(-1)^n\pi/8$

Ans: (3)

55. The vector equation of the plane which is at a distance of $3/\sqrt{14}$ from the origin and the normal from the origin is $2\hat{i}-3\hat{j}+\hat{k}$ is

(1) $\vec{r}.(2\hat{i}+\hat{k})=3$ (2) $\vec{r}.(\hat{i}+2\hat{j})=3$

(3) $\vec{r}.(\hat{i}+\hat{j}+\hat{k})=9$ (4) $\vec{r}.(2\hat{i}-3\hat{j}+\hat{k})=3$

Ans: (4)

56. The value of $\int_2^8\frac{\sqrt{10-x}}{\sqrt{x}+\sqrt{10-x}}dx$ is

(1) 3 (2) 8

(3) 0 (4) 10

Ans: (1)

57. The sum of 1st n terms of the series $\frac{1^2}{1}+\frac{1^2+2^2}{1+2}+\frac{1^2+2^2+3^2}{1+2+3}+\ldots$

(1) $\frac{n(n-2)}{6}$ (2) $\frac{n(n-2)}{3}$

(3) $\frac{n(n+2)}{3}$ (4) $\frac{n+2}{3}$

Ans: (3)

58. If $x^y = e^{x-y}$ then $\frac{dy}{dx}$ is equal to

(1) $\frac{1}{y} - \frac{1}{x-y}$ (2) $\frac{\log x}{(1+\log x)^2}$

(3) $\frac{e^x}{x^{x-y}}$ (4) $\frac{\log x}{\log(x-y)}$

Ans: (2)

59. Let $f : R \to R$ be defined by $f(x) = 2x + 6$ which is a bijective mapping then $f^{-1}(x)$ is given by

(1) 6x + 2 (2) x - 3

(3) 2x + 6 (4) $\frac{x}{2} - 3$

Ans: (4)

60. The equation of the normal to the curve $(1+x^2) = 2 - x$ where the tangent crosses x - axis is

(1) $x + 5y + 10 = 0$ (2) 5x+y+10=0

(3) $x - 5y - 10 = 0$ (4) 5x-y-10=0

Ans: (4)