MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

KARNATAKA CET 2012

Mathematics

1. The lengths of the sub-tangent , ordinate and the sub-normal are in

A. Arithmetico geometric progression

B. A.P

C. H.P

D. G.P

Answer:

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2. The maximum value of xe^{-x} is

A. $-\frac{1}{e}$

B. e

C. $\frac{1}{e}$

D. $-e$

Answer:

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3. If [x] is the greatest integer function not greater than x , then $\int_0^{11}[x]dx$ =

A. 55

B. 45

C. 66

D. 35

Answer:

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4. If $n \in N$ and $I_n = \int (\log x)^n \, dx$, then $I_n + nI_{n-1}$=

A. $\frac{(\log x)^n}{n}$

B. $\frac{(\log x)^{n+1}}{n+1}$

C. $x(\log x)^n + C$

D. $(\log x)^{n-1}$

Answer:

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5. Solution of $e^{\frac{dy}{dx}} = x$ when x = 1 and y = 0 is

A. $y = x(\log x - 1) + 1$

B. $y = x(\log x - 1) + 4$

C. y = x (log x - 1) + 3

D. y = x (log x + 1) + 1

Answer:

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6. If $f(x) = \begin{cases} \frac{x^2 - (a+2)x + a}{x-2} & , \ x \neq 2 \\ 2 & , \ x = 2 \end{cases}$ is continuous at x = 2 , then the value of a is

A. -1

B. -6

C. 0

D. 1

Answer:

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7. If $\log_2\left(9^{x-1}+7\right)-\log_2\left(3^{x-1}+1\right)=2$, then values of x are

A. 1 , 2

B. 0 , 2

C. 0 , 1

D. 1, 4

Answer:

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8. If $x-1$ is a factor of $x^5-4x^3+2x^2-3x+k=0$ then k is

A. 3

B. 4

C. -4

D. 2

Answer:

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9. If A and B have n elements in common , then the number of elements common to A $\times B$ and $B \times A$ is

A. 0

B. n

C. 2n

D. n^2

Answer:

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10. The 13^{th} term in the expansion of $\left(x^2+\frac{2}{x}\right)^n$ is independent of x , then the sum of the divisors of n is

A. 39

B. 36

C. 37

D. 38

Answer:

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11. If one of the slopes of the pair of the lines $ax^2+2hxy+by^2=0$ is n times the other , then

A. $4ab=(n+1)^2h$

B. $4(n+1)^2ab = nab$

C. $4h^2 = (n+1)^2ab$

D. $4nh^2 = (n+1)^2ab$

Answer:

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12. If $f(x) = \begin{vmatrix} \sin x & \cos x & \tan x \\ x^3 & x^2 & x \\ 2x & 1 & x \end{vmatrix}$, then $Lt_{x \to 0} \frac{f(x)}{x^2} =$

A. 1

B. 0

C. 3

D. 2

Answer:

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13. The number of solutions of equation $z^2 + \bar{z} = 0$, where $z \in C$ are

A. 6

B. 1

C. 4

D. 5

Answer:

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14. The least and the greatest distances of the point (10 , 7) from the circle $x^2 + y^2 - 4x - 2y - 20 = 0$ are

A. 5 , 15

B. 10 , 5

C. 15 , 20

D. 12 , 16

Answer:

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15. If a $\equiv b$ (mod m) and x is an integer , then which of the following is incorrect ?

A. $(a \div x) \equiv (b \div x)$ (mod m)

B. $(a + x) \equiv (b + x)$ (mod m)

C. $(a - x) \equiv (b - x)$ (mod m)

D. $ax \equiv bx$ (mod m)

Answer:

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16. Inverse of a diagonal non-singular matrix is

A. diagonal matrix

B. scalar matrix

C. skew symmetric matrix

D. zero matrix

Answer:

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17. If $ax^4 + bx^3 + cx^2 + dx + e = \begin{vmatrix} x^3 + 3x & x - 1 & x + 3 \\ x + 1 & -2x & x - 4 \\ x - 3 & x + 4 & 3x \end{vmatrix}$, then e =

A. -1

B. 1

C. 0

D. 2

Answer:

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18. If $\vec{a}$, $\vec{b}$ and $\vec{c}$ are three non-coplanar vectors and $\vec{p}$, $\vec{q}$ and $\vec{r}$ are vectors defined by $\vec{p} = \frac{\vec{b} \times \vec{c}}{\left[\vec{a}\ \vec{b}\ \vec{c}\right]}, \vec{q} = \frac{\vec{c} \times \vec{a}}{\left[\vec{a}\ \vec{b}\ \vec{c}\right]}$ and $\vec{r} = \frac{\vec{a} \times \vec{b}}{\left[\vec{a}\ \vec{b}\ \vec{c}\right]}$, then the value of $\left(\vec{a} + \vec{b}\right) \cdot \left(\vec{b} + \vec{c}\right) \cdot \vec{q} + \left(\vec{c} + \vec{a}\right) \cdot \vec{r}$ =

A. 3

B. 0

C. 1

D. 2

Answer:

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19. 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 $\left|\vec{b}\right| =$

A. 12

B. 16

C. 8

D. 3

Answer:

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20. Which of the following is false ?

A. Set of even integers is a group under usual addition

B. (N,.) is a group

C. (N, +) is a semi-group

D. (Z , +) is a group

Answer:

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21. $2\cos^{-1}x = \sin^{-1}\left(2x\sqrt{1-x^2}\right)$ is valid for all values of x satisfying

A. $0 \leq x \leq \frac{1}{\sqrt{2}}$

B. $-1 \leq x \leq 1$

C. $0 \leq x \leq 1$

D. $\frac{1}{\sqrt{2}} \leq x \leq 1$

Answer:

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22. If α is a complex number such that $\alpha^2 - \alpha + 1 = 0$, then α^{2011} =

A. 1

B. $-\alpha$

C. α^2

D. α

Answer:

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23. If $\cos\alpha + 2\cos\beta + 3\cos\gamma = 0, \sin\alpha + 2\sin\beta + 3\sin\gamma = 0$ and $\alpha + \beta + \gamma = \pi$, then $\sin 3\alpha + 8\sin 3\beta + 27\sin 3\gamma =$

A. 9

B. -18

C. 0

D. 3

Answer:

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24. If the conjugate of $(x+iy)(1-2i)$ is $1+i$, then

A. $x = -\frac{1}{5}$

B. $x - iy = \frac{1+i}{1-2i}$

C. $x + iy = \frac{1-i}{1-2i}$

D. $x = \frac{1}{5}$

Answer:

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25. If the straight line 3x + 4y = k touches the circle $x^2 + y^2 = 16x$, then the values of k are

A. $16, -64$

B. $16, 64$

C. $-16, -64$

D. $-16, 64$

Answer:

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26. The locus of the point of intersection of perpendicular tangents to the ellipse is called

A. director circle

B. hyperbola

C. ellipse

D. auxiliary circle

Answer:

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27. If $m \sin^{-1} x = \log_e y$, then $(1 - x^2)y'' - xy' =$

A. $-2y$

B. $m^2 y$

C. $-m^2 y$

D. $2y$

Answer:

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28. If $y = e^{\log_e [1 + x + x^2 + \ldots]}$, then $\frac{dy}{dx} =$

A. $\frac{-1}{(1-x)^2}$

B. $\frac{1}{(1+x)^2}$

C. $\frac{1}{(1-x)^2}$

D. $\frac{-1}{(1+x)^2}$

Answer:

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29. The length of the sub - tangent to the curve $x^m y^n = a^{m+n}$ at any point (x_1, y_1) on it is

A. $\frac{n}{m}|x_1|$

B. $\frac{n}{m}x_1$

C. $\frac{m}{n}|x_1|$

D. $\frac{n}{m}|y_1|$

Answer:

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30. If a ball is thrown vertically upward and the height 's' reached in time 't' is given by $s = 22t - 11t^2$, then the total distance travelled by the ball

is

A. 22 units

B. 44 units

C. 33 units

D. 11 units

Answer:

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31. The sum of two positive numbers is given . If the sum of their cubes is minimum , then

A. one is thrice the other

B. they are equal

C. one is twice the other

D. they are unequal

Answer:

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32. $\int_{\pi/6}^{\pi/3} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx =$

A. $\frac{\pi}{6}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{12}$

Answer:

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33. $Lt_{x \to 0} \frac{x2^x - x}{1 - \cos x} =$

A. $\frac{1}{2}$

B. 2 log 2

C. log 2

D. $\frac{1}{2}$ log 2

Answer:

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34. $\frac{3x+1}{(x-1)(x-3)} = \frac{A}{x-1} + \frac{B}{x-3}$, then $\frac{\sin^{-1}(A)}{B}$ =

A. $\frac{\pi}{4}$

B. $\frac{\pi}{2}$

C. $\frac{\pi}{3}$

D. $\frac{\pi}{6}$

Answer:

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35. If α, β, γ are the roots of the equation $x^3 + 4x + 2 = 0$,then $\alpha^3 + \beta^3 + \gamma^3$ =

A. -6

B. 2

C. 6

D. -2

Answer:

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36. The value of ${}^{10}C_2 + {}^{10}C_3 + \ldots + {}^{10}C_9$ is

A. $2^{10} - 1$

B. 2^{10}

C. 2^{11}

D. $2^{10} - 2$

Answer:

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37. $p \rightarrow \ -q$ can also be written as

A. $\sim q \rightarrow \sim p$

B. $p \rightarrow q$

C. $\sim p \vee \sim q$

D. $q \rightarrow p$

Answer:

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38. If $f: R \rightarrow R$ is defined by f (x) = $2x + 3$, then $f^{-1}x$

A. does not exist because 'f' is not surjective

B. is given by $\frac{x-3}{2}$

C. is given by $\frac{1}{2x+3}$

D. does not exist because 'f' is not injective

Answer:

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39. $\frac{\sin 70^\circ + \cos 40^\circ}{\cos 70^\circ + \sin 40^\circ} =$

A. 1

B. $\frac{1}{\sqrt{3}}$

C. $\sqrt{3}$

D. $\frac{1}{2}$

Answer: C

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40. The points (11,9) , (2 , 1) and (2 , -1) are the midpoints of the sides of the triangle . Then the centroid is

A. $(5, 3)$

B. $(-5, -3)$

C. $(5, -3)$

D. $(3, 5)$

Answer: A

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41. The reflection of the point (1 , 1) along the line y = -x is

A. $(1, -1)$

B. $(0, 0)$

C. $(-1, 1)$

D. $(-1, -1)$

Answer: D

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42. The number of circles that touch the co-ordinate axes and the line whose slope is -1 and y-intercept is 1 , is

A. 3

B. 1

C. 4

D. 2

Answer: D

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43. If f(x) is an even function , then f'(x) is

A. nothing can be said

B. an odd function

C. an even function

D. may be even or may be odd

Answer: B

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44. The perimeter of a sector is a constant . If its area is to be maximum , then the sectional angle is

A. 2^c

B. $\frac{\pi^c}{2}$

C. $\frac{\pi^c}{3}$

D. 4^c

Answer: A

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45. The last digit of number 7^{886} is

A. 1

B. 9

C. 7

D. 3

Answer: B

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46. If (24 , 92) = 24 m + 92 n , then (m , n) is

A. $(-4, 3)$

B. $(-1, 4)$

C. $(4, -1)$

D. $(4, -3)$

Answer: C

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47. The characteristic equation of a matrix A is $\lambda^3 - 5\lambda^2 - 3\lambda + 2 = 0$, then |adj(A)| =

A. 4

B. 9

C. 25

D. $\frac{1}{2}$

Answer: A

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48. If $\hat{i}+\hat{j}-\hat{k}$ and $2\hat{i}-3\hat{j}+\hat{k}$ are adjacent sides of a parallelogram , then the lengths of its diagonals are

A. $\sqrt{21}, \sqrt{13}$

B. $\sqrt{3}, \sqrt{14}$

C. $\sqrt{14}, \sqrt{14}$

D. $\sqrt{21}, \sqrt{3}$

Answer: A

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49. If the volume of the parallelepiped formed by three non-coplanar vector $\vec{a}$, $\vec{b}$ and $\vec{c}$ is 4 cubic units , then $\left[\vec{a}\times\vec{b}\,\vec{b}\times\vec{c}\,\vec{c}\times\vec{a}\right]$ =

A. 8

B. 64

C. 16

D. 4

Answer: C

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50. Which of the following is a subgroup of the group $G = \{2^n \mid n \in N\}$ under multiplication ?

A. $\{4^n \mid n \in Z\}$

B. $\{4^n n \in N\}$

C. $\{3^n n \in Z\}$

D. $\{6^n \mid n \in N\}$

Answer: A

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51. In the group G = { 1 , 2 , 3 ,4 , 5 , 6} under $\otimes_7$, the solution of $4 \otimes_7 x$ = 5 is

A. 5

B. 3

C. 2

D. 4

Answer: B

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52. The number of real solutions of the equation $\tan^{-1}\sqrt{x(x+1)} + \sin^{-1}\sqrt{x^2+x+1} = \frac{\pi}{2}$ is

A. infinitely many

B. one

C. four

D. two

Answer: D

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53. If $\sin 2x = 4\cos x$, then x =

A. $2n\pi \pm \frac{\pi}{2}, n \in Z$

B. $n\frac{\pi}{2} \pm \frac{\pi}{4}, n \in Z$

C. no value

D. $n\pi + (-1)^n \frac{\pi}{4}, n \in Z$

Answer: A

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54. If α and β two different complex numbers with $|\beta| = 1$, then $\left|\frac{\beta - \alpha}{1 - \overline{\alpha}\beta}\right|$ is equal to

A. 2

B. $\frac{1}{2}$

C. 1

D. $\frac{1}{3}$

Answer: C

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55. The equations of the two tangents from (-5 , -4) to the circle $x^2 + y^2 + 4x + 6y + 8 = 0$ are

A. $x - 7y = 23, 6x + 13y = 4$

B. $x + 2y + 13 = 0, 2x - y + 6 = 0$

C. $2x + y + 13 = 0, x - 2y = 6$

D. $3x + 2y + 23 = 0, 2x - 3y + 4 = 0$

Answer: B

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56. If $x = t^2 + 2$ and $y = 2t$ represent the parametric equation of the parabola

A. $(x - 2)^2 = 4y$

B. $x^2 = 4(y - 2)$

C. $(y - 2)^2 = 4x$

D. $y^2 = 4(x - 2)$

Answer: D

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57. If $x - y = 1$ is a tangent to the hyperbola , the point of contact is

A. $(5, 4)$

B. (4, 3)

C. (3 , 4)

D. (2 , 1)

Answer: B

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58. If

$$y = \tan^{-1}\left(\frac{1}{1+x+x^2}\right) + \tan^{-1}\left(\frac{1}{x^2+2x+3}\right) + \tan^{-1}\left(\frac{1}{x^2+5x+7}\right.$$

+ ....n terms , then y(0) is

A. $-\frac{n^2}{1+n^2}$

B. $\frac{\pi}{2}$

C. $\frac{2n}{1+n^2}$

D. $\frac{n^2}{1+n^2}$

Answer:

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59. If $f(x) = \sin\left[\pi^2\right]x + \cos\left[-\pi^2\right]x$ then $f'(x)$ is here $\left[\pi^2\right]$ and $\left[-\pi^2\right]$ greatest integer function not greater than its value

A. -1

B. $\sin 9x + \cos 9x$

C. $9\cos 9x - 10\sin 10x$

D. 0

Answer: C

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60. The tangent to the curve $xy = 25$ at any point on it cuts the coordinate axes at A and B , then the area of the triangle OAB is

A. 100 sq. units

B. 50 sq. units

C. 25 sq. units

D. 75 sq. units

Answer: B

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