MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

KARNATAKA CET 2009

Mathematics

1. The function $f(x) = \frac{\log(1+ax) - \log(1-bx)}{x}$ is not defined at $x = 0$. The value which should be assigned to f at x=0 so that it is continuous at x=0 is

A. $\log a + \log b$

B. 0

C. $a - b$

D. $a + b$

Answer: D

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2. If

$$f(x) = 1 + nx + \frac{n(n-1)}{2}x^2 + \frac{n(n-1)(n-2)}{6}x^3 + \ldots\ldots\ldots\ldots\ldots\ldots$$

then $f(1) =$

A. $n(n-1)2^{n-2}$

B. $n(n-1)2^n$

C. $n(n-1)2^{n-1}$

D. $(n-1)2^{n-1}$

Answer: A

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3. If $f(x) = \log_{x^2}(\log_e x)$, then $f'(x)$ at x=e is

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

B. 0

C. 1

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

Answer: A

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4. If $y = \sin^n x \cos nx$, then $\frac{dy}{dx}$ is

A. $n \sin^{n-1} x \cos nx$

B. $n \sin^{n-1} x \cos(n+1)x$

C. $n \sin^{n-1} x \sin(n+1)x$

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

Answer: B

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5. If $f(x) = (g(x)) + \frac{g(-x)}{2} + \frac{2}{[h(x) + h(-x)]^{-1}}$ where g and h are differentiable functions then `f'(0)

A. $3/2$

B. 0

C. 1

D. 43832

Answer: B

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6. The tangent to a given curve $y = f(x)$ is perpendicular to the x-axis if

A. $\frac{dx}{dy} = 1$

B. $\frac{dy}{dx} = 0$

C. $\frac{dy}{dX} = 1$

D. $\frac{dx}{dy} = 0$

Answer: D

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7. The minimum value of $26^{\cos 2x} 81^{\sin 2x}$ is

A. $\frac{1}{243}$

B. $\frac{1}{27}$

C. -5

D. $1/5$

Answer: A

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8. A stone is thrown vertically upwards from the top of a tower 64 metres high according to the law $s = 48tg - 16t^{\circ}$. The greatest height attained by the stone above the ground is

A. 100 metre

B. 64 metre

C. 36 metre

D. 32 metre

Answer: A

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9. The length of the subtangent at t on the curve $x = a(t + \sin t), y = a(1 - \cos t)$ is

A. $2a\sin\frac{t}{2}$

B. $2a\sin^3\left(\frac{t}{2}\right)\sec\left(\frac{t}{2}\right)$

C. $a \sin t$

D. $2a \sin\left(\frac{t}{2}\right) \tan\left(\frac{t}{2}\right)$

Answer: C

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

A. $\frac{1}{2} e^{\tan^{-1} x} + c$

B. $\frac{1}{2} x e^{\tan^{-1} x} + c$

C. $x e^{\tan^{-1} x} + c$

D. $e^{\tan^{-1} x} + c$

Answer: C

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11. $\int \cos ec(x-a)\cos ecx dx =$

A. $\frac{1}{\sin a}\log[\sin(x-ax)\cos ecx]+C$

B. $\frac{1}{\sin a}\log[\sin(x-a)\sin x]+C$

C. $\frac{-1}{\sin a}\log|\sin x\cos ec(x-a)|+C$

D. $\frac{-1}{\sin a}\log[\sin(x-a)\sin x]+C$

Answer: A

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12. If $f(x)=\int_{-1}^{x}|t|dt$, then for any $x\geq 0$, $f(x)=$

A. $1+x^2$

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

C. $1-x^2$

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

Answer: D

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13. $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x}+\sqrt{4-x}}dx =$

A. 2

B. 0

C. 1

D. 3

Answer: C

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14. The area bounded betwene the parabola $y^2 = 4x$s and the line $y = 2x - 4$ is equal to

A. 9 sq. units

B. 15 sq. units

C. $\frac{17}{3}$ sq. units

D. $\frac{19}{3}$ sq. units

Answer: A

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15. The differential equation of the family of circles passing through the origin and having their centres on the x-axis is

A. $x^2 = y^2 + xy\frac{dy}{dx}$

B. $x^2 = y^2 + 3xy\frac{dy}{dx}$

C. $y^2 = x^2 + 2xy\frac{dy}{dx}$

D. $y^2 = x^2 - 2xy\frac{dy}{dx}$

Answer: C

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16. A population grows at the rate of 10% of the population per year. How logn does it take for the population to double?

A. 5 log 2 years

B. 2 log 10 years

C. 20 log 2 years

D. 10 log 2 years

Answer: D

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17. On the set of all natural number N, which one of the following * is a binary operation?

A. $a \cdot b = a + 3b$

B. $a \cdot b = 3a - 4b$

C. $a \cdot b = \sqrt{ab}$

D. $a \cdot b = \dfrac{a-b}{a+b}$

Answer: A

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18. If $\int_0^1 f(x)dx = 5$, then the value of $\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots + 100\int_0^1 x^9 f\left(x^{10}\right)dx$ is equal to

A. 275

B. 55

C. 125

D. 625

Answer: C

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19. If $ax + by = 1$, where a,b,x and y are integers, then which one of the following is not true?

A. $(b, y) = 1$

B. $(a, b) = 1$

C. $(a, y) = 1$

D. $(x, y) = 1$

Answer: D

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20. The digit in the unit place of the number $\lfloor (2009) + 3^{7886}$ is

A. 1

B. 9

C. 7

D. 3

Answer: B

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21. If $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix} = 0$ then a,b,c are

A. equal

B. in A.P

C. in G.P

D. in H.P

Answer: B

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22. The value of $\begin{vmatrix} 1 & \log_x y & \log_x z \\ \log_y x & 1 & \log_y z \\ \log_z x & lo_z y & 1 \end{vmatrix} =$

A. xyz

B. log xyz

C. 0

D. 1

Answer: C

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23. If $\begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 1 & 0 & 2 \end{bmatrix}$ then $|adjA| =$

A. 43839

B. 81

C. 0

D. 9

Answer: B

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24. If A and B are square matrices of the same order such that $(A+B)(A-B)=A^2-B^2$, then $(ABA)^2=$

A. A^2B^2

B. A^2

C. B^2

D. I

Answer: C

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25. If $\bar{a}.\ \bar{b} = -\left|\overrightarrow{a}\right|\left|\overrightarrow{b}\right|$, then the angle between $\bar{a}$ and $\bar{b}$ is

A. 90°

B. 60°

C. 45°

D. 180°

Answer: D

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26. If $\overrightarrow{a} + 2\overrightarrow{b} + 3\overrightarrow{c} = \overrightarrow{O}$, then $\overrightarrow{a} \times \overrightarrow{b} + \overrightarrow{b} \times \overrightarrow{c} + \overrightarrow{c} \times \overrightarrow{a} =$

A. $\overrightarrow{O}$

B. $6\left(\overrightarrow{b} \times \overrightarrow{c}\right)$

C. $2\left(\overrightarrow{b} \times \overrightarrow{c}\right)$

D. $3\left(\overrightarrow{c} \times \overrightarrow{a}\right)$

Answer: B

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27. If the volume of the parallelopiped with $\vec{a}$, $\vec{b}$ and $\vec{c}$ as coterminous edges is 40 cubic units, then the volume of he parallelopiped having $\vec{b}+\vec{c}$, $\vec{c}+\vec{a}$ and $\vec{a}+\vec{b}$ as coterminous edges in cubic units is

A. 160

B. 40

C. 80

D. 120

Answer: C

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28. In the group G={0,1,2,3,4,5} under addition moduel 6, $\left(2 \oplus_6 e^{-1} \oplus_6 4\right)^{-1} =$

A. 5

B. 0

C. 2

D. 3

Answer: D

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29. Which one of the following is not true?

A. Cancellation laws hold in a group.

B. Identity element in a group in unique.

C. Inverse of an element in a group is unique.

D. Fourth roots of unity form an additive abelian group.

Answer: D

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30. the number of subgroups of the group $(Z_5, \oplus_5)$ is

A. 4

B. 2

C. 1

D. 3

Answer: B

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31. The negation of $p \wedge (1 \rightarrow \sim r)$ is

A. $p \vee (q \wedge r)$

B. $\sim p \vee (q \wedge r)$

C. $\sim p \wedge (q \wedge r)$

D. $p \vee (q \vee r)$

Answer: B

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32. If $n = \lfloor(2020)$, then

$$\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} + \ldots\ldots\ldots\ldots + \frac{1}{\log_{2020} n} =$$

A. $\lfloor(2020)$

B. 0

C. 2020

D. 1

Answer: D

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33. If n is a positive integer, then $n^3 + 2n$ is divisible

A. 15

B. 3

C. 2

D. 6

Answer: B

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34. Let $f: N \to N$ defined by

$$f(n) = \begin{cases} \frac{n+1}{2} & \text{if n is odd} \\ \frac{n}{2} & \text{if n is even} \end{cases}$$ then f is

A. surjective but not injective

B. bijective

C. injective but not surjective

D. neither injective nor surjective

Answer: A

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35. If α and β are the roots of $x^2 + x + 1 = 0$, then $\alpha^{16} + \beta^{16} =$

A. 2

B. 0

C. 1

D. -1

Answer: D

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36. The total number of terms in the expansion of $(x+y)^{100}+(x-y)^{100}$ after simplification

A. 100

B. 50

C. 51

D. 202

Answer: C

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37. $\cot^{-1}(2.1^2)+\cot^{1}(2.2^2)+\cot^{-1}(2.3)^2+\ldots\ldots\ldots\ldots$ up to ∞ =

A. $\pi/2$

B. $\pi/5$

C. $\pi/4$

D. $\pi/3$

Answer: C

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38. If x takes negative permissible value, then $\sin^{-1} x$ is equal to

A. $\pi - \cos^{-1}\sqrt{1-x^2}$

B. $\cos^{-1}\sqrt{1-x^2}$

C. $-\cos^{-1}\sqrt{1-x^2}$

D. $\cos^{-1}\sqrt{x^2-1}$

Answer: C

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39. If $1 + \sin x + \sin^2 x + \ldots\ldots\ldots\ldots$ upto $\infty = 4 + 2\sqrt{3}, 0 < x < \pi$ and $x \neq \frac{\pi}{2}$, then x=

A. $\frac{\pi}{3}, \frac{2\pi}{3}$

B. $\frac{\pi}{6}, \frac{\pi}{3}$

C. $\frac{\pi}{3}, \frac{5\pi}{6}$

D. $\frac{2\pi}{3}, \frac{\pi}{6}$

Answer: A

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40. The complex number $\frac{1+2i}{1-i}$ lies in

A. fourth quadrant

B. first quadrant

C. second quadrant

D. third quadrant

Answer: C

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41. If P is the point in the Argand diagrma correspoinding to the complex number $\sqrt{3}+i$ and if OPQ is an isosceles right angled triangle, right angled at O, then Q represents the complex number

A. $\sqrt{3}-i$ or $1-i\sqrt{3}$

B. $-1\pm i\sqrt{3}$

C. $-1+i\sqrt{3}$ or $1-i\sqrt{3}$

D. $1\pm i\sqrt{3}$

Answer: C

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42. The smallest positive integral value of n such that $\left[\frac{1+\sin\frac{\pi}{8}+i\cos\frac{\pi}{8}}{1+\sin\frac{\pi}{8}-i\cos\frac{\pi}{8}}\right]^n$ is purely imaginary is n=

A. 2

B. 8

C. 4

D. 3

Answer: C

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43. Which one of the following is possible?

A. $\tan\theta = 45$

B. $\cos\theta = \frac{7}{3}$

C. $\sin\theta = \frac{a^2 + b^2}{a^2 - b^2}, (a \neq b)$

D. $\sec\theta = \frac{4}{5}$

Answer: A

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44. If one side of a triangle is double the other and the angles opposite to these sides differ by 60°, then the triangle is

A. isosceles

B. right angled

C. obtuse angled

D. acute angled

Answer: B

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45. $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4\left(\sin^6 x + \cos^6 x\right) =$

A. 14

B. 11

C. 12

D. 13

Answer: D

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46. A cow is tied to a post by a rope. The cow moves along the circular path always keepign the rope tight. If it describes 44 metre, when it has traced ut $72^\circ k$ at the centre, the length of the rope is

A. 45 metres

B. 35 metres

C. 22 metres

D. 56 metres

Answer: B

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47. If $\begin{vmatrix} 1+\sin^2\theta & \cos^2\theta & 4\sin 2\theta \\ \sin^2\theta & 1+\cos^2\theta & 4\sin 2\theta \\ \sin^2\theta & \cos^2\theta & 4\sin 2\theta - 1 \end{vmatrix} = 0$ and $0 < \theta < \frac{\pi}{2}$ then $\cos 4\theta =$

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

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

C. $\frac{\sqrt{3}}{2}$

D. 0

Answer: B

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48. The locus of the midpoint of a chord of the circle $x^2 + y^2 = 4$ which subtends a right angle at the origin is

A. $x + y = 1$

B. $x + y = 2$

C. $x^2 + y^2 = 1$

D. $x^2 + y^2 = 2$

Answer: D

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49. The length of the chord joining the points $(4\cos\theta, 4\sin\theta)$ and $\left(4\cos\left(\theta + 60^2\right), 4\sin(\theta + 60^\circ)\right)$ of the circle $x^2 + y^2 = 16$ is

A. 16

B. 2

C. 4

D. 8

Answer: C

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50. The number of common tangents to the circles $x^2 + y^2 - y = 0$ and $x^2 + y^2 + y = 0$ is

A. 0

B. 1

C. 2

D. 3

Answer: D

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51. The co ordinates of the cenre of the smallest circle passing through the origin and having $y = x + 1$ as a diameter are

A. $(-1, 0)$

B. $\left(\frac{-1}{2}, \frac{1}{2}\right)$

C. $\left(\frac{1}{2}, \frac{-1}{2}\right)$

D. $\left(\frac{1}{2}, \frac{1}{3}\right)$

Answer: B

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52. The length of the diameter of the circle which cuts three circles

$x^2 + y^2 - xy - 14 = 0$

$x^2 + y^2 + 3x - 5y - 10 = 0$

$x^2 + y^2 - 2x + 3y - 27 = 0$ M

orthogonally, is

A. 4

B. 2

C. 8

D. 6

Answer: A

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53. For the parabola $y^2 = 4x$ the point P whose focal distance is 17 is

A. (2,8) or (2,-8)

B. (16,8) or (16,-8)

C. (8,8) or (8,-8)

D. (4,8) or (4,-8)

Answer: B

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54. The angle between the tangents drawn to the parabola $y^2 = 12x$ from the point (-3,2) is

A. 30°

B. 45°

C. 90°

D. 60°

Answer: C

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55. The number of values oif c such that the line $y = 4x + c$ touches the curve $\frac{x^2}{4} + y^2 = 1$ is

A. infinite

B. 0

C. 1

D. 2

Answer: D

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56. If the circle $x^2 + y^2 = a^2$ intersects the hyperbola $xy = c^2$ in four points $P(x_1, y_1), Q(x_2, y_2), R(x_3, y_3)$ and $S(x_4, y_4)$ then

A. $y_1y_2y_3y_4 = 2c^4$

B. $x_1 + x_2 + x_3 + x_4 = 0$

C. $y_1 + y_2 + y_3 + y_4 = 2$

D. $x_1x_2x_3x_4 = 2c^4$

Answer: B

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57. The foot of the perpendicular from the point (2,4) upon $x + y = 4$ is

A. (1,3)

B. (3,-1)

C. (2,2)

D. (4,0)

Answer: A

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58. The vertices of triangle ar (6,0),(0,6) and (6,6). The distance between its circumcentre and cenroid is

A. 1

B. $2\sqrt{2}$

C. 2

D. $\sqrt{2}$

Answer: D

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59. The angle between the pair of lines $x^2 + 2xy - y^2 = 0$ is

A. 0

B. $\pi/3$

C. $\pi/6$

D. $\pi/2$

Answer: D

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60. $\lim_{n \to \infty} \frac{3.2^{n+1} - 4.5^{n+1}}{5.2^n + 7.5^n} =$

A. $\frac{-20}{7}$

B. 0

C. $\frac{3}{5}$

D. $\frac{-4}{7}$

Answer: A

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