MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

KARNATAKA CET 2008

Mathematics

1. On the set Z , of all integers $*$ is defined by $a^{*}b = a + b - 5$. If $2^{*}(x^{*}3) = 5$ then x=

A. 5

B. 10

C. 0

D. 3

Answer: B

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2. Which of the following is false ?

A. If $a * b = a^b$ all $a, b \in$ N then $*$ is commutative in N.

B. Addition is associative in N.

C. Addition is commutative in N.

D. Multiplication is associative in N.

Answer: A

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3. $\vec{a} \cdot \hat{i} = \vec{a} \cdot \left(\hat{i} + \hat{j}\right) = \vec{a} \cdot \left(\hat{i} + \hat{j} + \hat{k}\right) = 1$ then $\vec{a} =$

A. $\hat{i}$

B. $\hat{i} + \hat{j} - \hat{k}$

C. $\hat{i} + \hat{j}$

D. $\hat{i} - \hat{k}$

Answer: A

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4. If $\left|\overrightarrow{a}\right| = \left|\overrightarrow{b}\right| = \left|\overrightarrow{a} + \overrightarrow{b}\right| = 1$, then the value of $\left|\overrightarrow{a} - \overrightarrow{b}\right|$ is equal to

A. $\sqrt{5}$

B. $\sqrt{3}$

C. $\sqrt{2}$

D. 1

Answer: B

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5. The projection of $\vec{a} = 3\hat{i} - \hat{j} + 5\hat{k}$ on $\vec{b} = 2\hat{i} + 3\hat{j} + \hat{k}$ is

A. $\frac{8}{\sqrt{14}}$

B. $\sqrt{14}$

C. $\frac{8}{\sqrt{35}}$

D. $\frac{8}{\sqrt{39}}$

Answer: A

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6. The locus of a point which moves such that the sum of its distances from two fixed points is a constant is

A. an ellipse

B. a hyperbola

C. a circle

D. a parabola

Answer: A

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7. The centroid of the triangle ABC where A= (2,3), B= (8,10) and C= (5,5) is

A. (6,6)

B. (15,18)

C. (5,6)

D. (6,5)

Answer: C

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8. If $3x^2 + xy - y^2 - 3x + 6y + K = 0$ represents a pair of lines , then K=

A. 1

B. -9

C. 0

D. 9

Answer: B

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9. The equation of the smallest circle passing through the points (2,2) and (3,3) is

A. $x^2 + y^2 + 5x - 5y + 12 = 0$

B. $x^2 + y^2 - 5x + 5y - 12 = 0$

C. $x^2 + y^2 - 5x + 5y + 12 = 0$

D. $x^2 + y^2 - 5x - 5y + 12 = 0$

Answer: D

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10. The characteristic roots of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 4 & 5 & 6 \end{bmatrix}$ are

A. 4,5,6

B. 2,4,6

C. 1,3,6

D. 1,2,4

Answer: C

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11. If f(x) is an even funiction and f (x) exists , then f' (e) + f' (- e) is

A. ≥ 0

B. < 0

C. > 0

D. 0

Answer: D

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12. If α is a number satisfying the equation $\alpha^2 + \alpha + 1 = 0$ then α^{31} is equal to

A. 1

B. i

C. α

D. α^2

Answer: C

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13. The derivative of $\sin\left(x^3\right)$ w,r,t . $\cos\left(x^3\right)$ is

A. $-\cot\left(x^3\right)$

B. $\cot\left(x^3\right)$

C. $-\tan\left(x^3\right)$

D. $\tan\left(x^3\right)$

Answer: A

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14. A unit vector perpendicular to both the vectors $\hat{i}+\hat{j}$ and $\hat{j}+\hat{k}$ is

A. $\dfrac{\hat{i}+\hat{j}+\hat{k}}{\sqrt{3}}$

B. $\frac{\hat{i}-\hat{j}+\hat{k}}{\sqrt{3}}$

C. $\frac{-i-\hat{j}+\hat{k}}{\sqrt{3}}$

D. $\frac{\hat{i}+j-\hat{k}}{3}$

Answer: B

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15. If $A=\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix}$ and $B=\begin{vmatrix} c_1 & c_2 & c_3 \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{vmatrix}$

then

A. B=0

B. $B = A^2$

C. $A = -B$

D. A=B

Answer: D

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16. If $f: R \to R$ is defined by $f(x) = x^3$ then $f^{-1}(8) =$

A. $\{2, -2\}$

B. $\{2, 2\}$

C. $\{2\}$

D. $\{2, \omega, 2\omega^2\}$

Answer: C

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17. R is a relation on N given by $R = \{(x, y) \mid 4x + 3y = 20\}$. Which of the following belongs to R?

A. $(3, 4)$

B. $(2, 4)$

C. $(-4, 12)$

D. $(5, 0)$

Answer: D

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18. If $\log_{10} 7 = 0.8451$ then the position of the first significant figure of 7^{-20} is

A. 20

B. 15

C. 16

D. 17

Answer: D

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19. $\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} +$ ... upto n terms =

A. $\frac{n}{6n + 4}$

B. $\frac{n}{3n + 7}$

C. $\frac{n}{4n + 6}$

D. $\frac{1}{6n + 4}$

Answer: A

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20. The ten 's digit in $1! + 4! + 7! + 10! + 12! + 13! + 15! + 16! + 17!$ is divisible by

A. 5

B. 7

C. 4

D. $3!$

Answer: D

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21. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then A^{-1}=

A. $\begin{bmatrix} -2 & 4 \\ 1 & 3 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$

C. $\frac{-1}{2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

D. $\frac{1}{2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

Answer: C

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22. The set {-1,0,1} is not a multiplicative group because of the failure of

A. Identity law

B. Inverse law

C. Closure law

D. Associative law

Answer: B

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23. The angle of elevation of the top of a TV tower from three points A,B and C in a straight line through the foot of the tower are $\alpha, 2\alpha$ and 3α respectively . If $AB = a$, the height of the tower is

A. $a \sin 2\alpha$

B. $a \sin 3\alpha$

C. $a \tan \alpha$

D. $a \sin \alpha$

Answer: A

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24. The angles A,B and C of a triangle ABC are in A.P.

If $b: c = \sqrt{3}: \sqrt{2}$, then the angle A is

A. 75°

B. 45°

C. 30°

D. 15°

Answer: A

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25. $\sin\left(2\sin^{-1}\sqrt{\frac{63}{65}}\right) =$

A. $\frac{8\sqrt{63}}{65}$

B. $\frac{\sqrt{63}}{65}$

C. $\frac{2\sqrt{126}}{65}$

D. $\frac{4\sqrt{65}}{65}$

Answer: C

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26. A variable line $\frac{x}{a}+\frac{y}{b}=1$ is such that a+b=4. The locus of the midpoint of the portion of the line intercepted between the axes is

A. $x + y = 1$

B. $x + y = 2$

C. $x + y = 4$

D. $x + y = 8$

Answer: B

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27. The point (5,-7) lines outside the circle

A. $x^2 + y^2 - 5x + 7y - 1 = 0$

B. $x^2 + y^2 - 8x + 7y - 2 = 0$

C. $x^2 + y^2 - 8x = 0$

D. $x^2 + y^2 - 5x + 7y = 0$

Answer: C

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28. If the circles $x^2 + y^2 = 9$ and $x^2 + y^2 + 2\alpha x + 2y + 1 = 0$ touch each other internally , then α=

A. $\frac{4}{3}$

B. $\frac{-4}{3}$

C. $\pm\frac{4}{3}$

D. 1

Answer: C

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29. The locus of the midpoints of the line joining the focus and any point on the parabola $y^2 = 4ax$ is a parabola with the equation of directrix as

A. x=0

B. $x = \frac{a}{2}$

C. $x + a = 0$

D. $2x + a = 0$

Answer: A

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30. The tangents drawn at the extremeties of a focal chord of the parabola $y^2 = 16x$

A. intersect at an angle of 60°

B. intersect at an angle of 45°

C. intersect on x=0

D. interesect on the line x+4=0

Answer: D

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31. The equation $\frac{x^2}{2-\lambda}+\frac{y^2}{\lambda-5}-1=0$ represents an ellipse if

A. $2<\lambda<5$

B. $2>\lambda>5$

C. $\lambda>5$

D. $\lambda<2$

Answer: D

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32. The equation to the normal to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1 \text{at} \quad (-4, 0)$ is

A. $x = 1$

B. $y = 0$

C. $2x - 3y = 1$

D. x=0

Answer: B

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33. The converse of the contrapositive of the conditional $p \to \sim q$ is

A. $\sim q \to p$

B. $\sim p \to q$

C. $p \to q$

D. $\sim p \to \sim q$

Answer: B

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34. The perimeter of a certain sector of a circle is equal to the length of the are of the semicircle . Then the angle at the centre of the sector in radians is

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

B. $\frac{2\pi}{3}$

C. $\pi - 2$

D. $\pi + 2$

Answer: C

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35. The value of $\tan 67\frac{1^\circ}{2} + \cot 67\frac{1^\circ}{2}$ is

A. $2\sqrt{2}$

B. $2 - \sqrt{2}$

C. $\sqrt{2}$

D. $3\sqrt{2}$

Answer: A

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36. If e_1 and e_2 are the ecentricities of a hyperbola $3x^2 - 2y^2 = 25$ and its conjugate , then

A. $e_1 + e_2 = 4$

B. $e_1 + e_2 = \sqrt{2}$

C. $e_1^2 + e_2^2 = 2$

D. $e_1^2 + e_2^2 = 4$

Answer: D

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37. If p and q are prime numbers satisfying the condution $p^2 - 2q^2 = 1$, then the value of $p^2 + 2q^2$ is

A. 16

B. 17

C. 5

D. 15

Answer: B

38. If A(adiA)=5I where I is the identity matrix of order 3 , then |adjA| is equal to

A. 5

B. 10

C. 125

D. 25

Answer: D

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39. The number of solutions for the equation $\sin 2x + \cos 4x = 2$ is

A. 2

B. Infinite

C. 0

D. 1

Answer: C

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40. $\int e^x \cdot x^5 dx$ is

A.

$$e^x\left[x^5 - 5x^4 + 20x^3 - 60x^2 + 120x - 120 + C\right.$$

B. $e^x\left[x^5 + 5x^4 + 20x^3 - 60x^2 + 120x_{120}\right] + C$

C.

$$e^x\left[x^5+5x^4+20x^3+60x^2+120x+[120]+C\right.$$

D.

$$e^x\left[x^5-5x^4-20x^3-60x^2-120x-120\right]+C$$

Answer: A

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41. The maximum area of a rectangle that can be inscribeb in a circle of radius 2 units is square units

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A. 8

B. 5

C. 4

D. 8π

Answer: A

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42. If Z is a complex number such that $Z = -\overline{Z}$, then

A. Z is any complex number

B. Real part of Z is the same as its imaginary part

C. Z is purely real

D. Z is purely imaginary

Answer: B

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43. The value of $\sum_{k=1}^{6}\left[\sin\frac{2K\pi}{7}-i\cos\frac{2K\pi}{7}\right]$ is

A. $-i$

B. -1

C. i

D. 0

Answer: C

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44. $\lim_{x \to \infty} \sin\left(\frac{2}{x}\right)$ is equal to

A. 2

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

C. ∞

D. 0

Answer: A

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45. A stone is thrown vertically upwards and the height x ft, reached by the stone in t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in

A. 3 seconds

B. 1.5 seconds

C. 2 seconds

D. 2.5 seconds

Answer: D

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46. The genergal solution of $|\sin x| = \cos x$ is (when $n \in Z$) given by

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

B. $n\pi - \frac{\pi}{4}$

C. $n\pi + \frac{\pi}{4}$

D. $2n\pi \pm \frac{\pi}{4}$

Answer: D

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47. The real root of the equation $x^3 - 6x + 9 = 0$ is

A. 6

B. -3

C. -6

D. -9

Answer: B

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48. The digit in the unit's place of 5^{834} is

A. 3

B. 5

C. 0

D. 1

Answer: B

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49. The remainder when $3^{100} \times 22^{50}$ is divided 5 is

A. 3

B. 4

C. 1

D. 2

Answer: B

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50. $\int \frac{\sin x \cos x}{\sqrt{1-\sin^4 x}}$ dx=

A. $\tan^{-1}\left(\sin^2 x\right)+C$

B. $\tan^{-1}(2\sin x)+C$

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

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

Answer: C

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51. The maximum value of $\frac{\log x}{x}$ in $(2, \infty)$ is

A. e

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

C. 1

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

Answer: B

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52. If $f(x) = be^{ax} + ae^{bx}$, then f" (0) =

A. $ab(a + b)$

B. ab

C. 0

D. 2ab

Answer: A

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53. If $\sqrt{\frac{1+\cos A}{1-\cos A}} = \frac{x}{y}$, then the value of tan A =

A. $\frac{2xy}{x^2-y^2}$

B. $\frac{2xy}{y^2-x^2}$

C. $\frac{x^2+y^2}{x^2-y^2}$

D. $\frac{2xy}{x^2+y^2}$

Answer: A

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54. $\int \frac{\sec x}{\sec x + \tan x} dx =$

A. $\sec x + \tan x + C$

B. $\log \sin x + \log \cos x + C$

C. $\tan x - \sec x + C$

D. $\log(1 + \sin x) + C$

Answer: C

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55. If $\int f(x)dx = g(x)$, then $\int f(x)dx =$

A. $\frac{1}{2}[g'(x)]^2$

B. $f'(x)g(x)$

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

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

Answer: D

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56. The value of $\int_{-2}^{2}(ax^3+bx+c)\,dx$ depends on the

A. value of a

B. values of a and b

C. value of b

D. value of c

Answer: D

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57. the area of the region bounded by $y = 2x - x^2$ and x-axis is

A. $\frac{7}{3}$ sq units

B. $\frac{2}{3}$ sq units

C. $\frac{8}{3}$ sq units

D. $\frac{4}{3}$ sq units

Answer: D

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58. The differential equation $y\frac{dy}{dx} + x = c$ represents

A. a family of parabolas

B. a family of circles whoe centres are on the x-axis

C. a family of hyperbolas

D. a family of circles whose centres are one the y

- acxis

Answer: B

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59. If $\left(x^5\right) = 5x^3$, then f(x) =

A. $\frac{3}{x}$

B. $\sqrt[5]{x}$

C. $\frac{3}{\sqrt[5]{x^2}}$

D. $\frac{3}{\sqrt[5]{x}}$

Answer: C

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60. $f(x) = 2a - x$ in $-a < x < a = 3x - 2a$ in $a \leq x$. Then which of the following is true ?

A. f(x) is differentiable at all $x \geq a$

B. f(x) is continuous at all $x < a$

C. f(x) is discontinuous at x=a

D. f(x) is not differentiable at x=a

Answer: D