MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

MODEL TEST PAPER - 8

Mathematics

1. A survey shows that 63% of the Americans like cheese whereas 76% like apples. If x % of the Americans like both these and apples, then

A. x = 39

B. x = 63

C. $39 \leq x \leq 63$

D. none of these

Answer: C

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2. Let Z be the set of integers and o be a bonary operation of z defined as aob = a + b - ab for all a, b $\in$ Z. The inverse of an element a $(\neq 1) \in$ Z is

A. $a/(a-1)$

B. $a/(1-a)$

C. $(a-1)/a$

D. none of these

Answer: A

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3. The product of cube root of -1 is equal to

A. 0

B. 1

C. -1

D. none of these

Answer: C

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4. Let z be a complex number such that $|z| = 4$ and $\arg(z) = 5\pi/6$, then z =

A. $-2\sqrt{3}+2i$

B. $2\sqrt{3}+2i$

C. $2\sqrt{3}-2i$

D. $-\sqrt{3}+i.$

Answer: A

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5. POO is a straight line through the origin O. P and O represent the complex numbers a + ib and c + id respectively and OP = OO. Then

A. $|a+ib|=|c+id|$

B. a + c = b + d

C. both (a) and (b)

D. none of these.

Answer: C

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6. If the complex numbers sinx $+i\cos 2x$ and $\cos x - i\sin 2x$ are conjugate to each other, then x is equal to

A. $n\pi$

B. $\left(n+\frac{1}{2}\right)\pi$

C. 0

D. none of these

Answer: D

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7. In the Argand plane, the vector z = 4 - 3i is turned in the clockwise sense through 180° and stretched 3 times. The complex number represented by new vector is

A. $-6+9i$

B. $-12+9i$

C. $12+9i$

D. $12-9i$

Answer: C

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8. If a, b, c are in A.P., p, q, r are in HP and ap, bq, cr are in GP, then $\frac{P}{r}+\frac{r}{P}$ is equal to

A. $\frac{a}{c} - \frac{c}{a}$

B. $\frac{a}{c} + \frac{c}{a}$

C. $\frac{b}{q} + \frac{q}{b}$

D. $\frac{b}{q} - \frac{q}{b}$.

Answer: B

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9. The sum of n terms of the series

$1^2 - 2^2 + 3^2 - 4^2 + 5^2 - 6^2 + \ldots$ is

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

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

C. $-n(n+1)$

D. both a and b

Answer: d

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10. If a, b, c are in GP and a + x, b + x, c + x are in

HP, then the value of x is (a, b, c are distinct numbers)

A. c

B. b

C. a

D. none of these.

Answer: B

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11. $If^{12}P, \ =^{11} \ P_6 + 6.^{11} \ P_5, \ \text{then r is equal to}$

A. 6

B. 5

C. 7

D. none of these

Answer: A

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12. The number of ways in which any four letters can be selected from the word CORGOO is

A. 15

B. 11

C. 7

D. none of these.

Answer: C

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13. A library has a copies of one Book, b copies of each of two books, c copies of each of three books, and single copies of d books. The total number of ways in which these books can be distributed is

A. $\frac{(a+b+c+d)}{a,\ b,\ c,}$

B. $\frac{(a+2b+3c+d)}{a,\ (b,\ )^2(c,\ )^5}$

C. $\frac{(a+2b+3c+d),}{a,\ b,\ c,}$

D. none of these

Answer: B

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14. If the 4^{th} term in the expansion of $\left(ax + \frac{1}{x}\right)^{''}$ is $\frac{5}{2}$ then the values of a and n are

A. $1/2, 6$

B. $1, 3$

C. $1/2, 3$

D. cannot be found.

Answer: A

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15. A matrix A satisfying the equation

$$\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} A = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}$$ is

A. $\begin{bmatrix} 1 & 4 \\ -1 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -4 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$

D. none of these

Answer: C

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16. If A, B, C are invertible matrices, then

$(ABC)^{-1}$ is equal to

A. $A^{-1}B^{-1}C^{-1}$

B. $B^{-1}C^{-1}A^{-1}$

C. $C^{-1}A^{-1}B^{-1}$

D. $C^{-1}B^{-1}A^{-1}$

Answer: D

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17. If a, b, c are different, then value of x satisfying the equation

$$\begin{vmatrix} 0 & x^2-a & x^3-b \\ x^2+a & 0 & x^2+c \\ x^4+b & x-c & 0 \end{vmatrix} = 0 \text{ is}$$

A. a

B. b

C. c

D. 0

Answer: D

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18. Let P and Q be points on the line joining

A (-2, 5) and B (3, 1) such that AP = PQ = QB. Then the mid-point of PQ is

A. $(1/2, 3)$

B. $(-1/2, 4)$

C. $(2, 3)$

D. $(-1, 4)$.

Answer: A

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19. The equation of the line passing through the intersection of the lines x - 3y + 1 = 0 and $2x + 5y - 9 = 0$ and at distance $\sqrt{5}$ from the origin is

A. $2x - 3y = 5$

B. $x + 2y = 5$

C. $2x + y = 5$

D. $x + 2y = 1.$

Answer: C

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20. If the angle between the two lines represented by $2x^2 + 5xy + 3y^2 + 6x + 7y + 4 = 0.\ is\ \tan^{-1}$ (m), then m is equal to

A. $1/5$

B. -1

C. $-2/3$

D. none of these.

Answer: A

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21. The value of a for which the lines represented by $ax^2 + 5xy + 2y^2 = 0$ are mutually perpendicular is

A. 2

B. -2

C. $25/8$

D. none of these.

Answer: B

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22. The equation of the straight line which passes through the point (1, -2) and cuts off equal intercepts from the axes will be

A. $x + y = 1$

B. $x - y = 1$

C. $x + y + 1 = 0$

D. $x - y - 2 = 0.$

Answer: C

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23. The joint equation of the straight lines x + y = 1 and x - y = 4 is

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

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

C. $(x + y - 1)(x - y - 4) = 0$

D. $(x + y + 1)(x - y + 4) = 0$

Answer: C

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24. The equation of the circle having radius 3 and touching the circle $x^2 + y^2 - 4x - 6y - 12 = 0$ at (-1,-1) is

A. $5x^2 + 5y^2 + 8x - 14y - 16 = 0$

B. $5x^2 + 5y^2 - 8x - 14y - 32 = 0$

C. $5x^2 + 5y^2 - 8x + 14y - 4 = 0$

D. $5x^2 + 5y^2 - 8x + 14y + 12 = 0$

Answer: B

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25. 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. $x + y = 2$

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

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

D. $x + y = 1.$

Answer: C

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26. The circles $x^2 + y^2 + x + y = 0$ and $x^2 + y^2 + x - y = 0$ intersect at an angle of

A. $\pi / 6$

B. $\pi / 4$

C. $\pi / 3$

D. $\pi/2$.

Answer: D

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27. If the radical axis of the circles

$x^2 + y^2 + 2gx + 2fy + c = 0$ and $2x^2 + 2y^2 + 3x + 8y + 2c = 0$

touches the circle $x^2 + y^2 + 2x + 2y + 1 = 0$, then

A. $g = 3/4$ and $f \neq 2$

B. $g \neq 3/4$ and $f = 2$

C. $g = 3/4$ or $f = 2$

D. none of these

Answer: C

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28. The slope of the tangent at the point (h, h) of the circle $x^2 + y^2 = a^2$ is

A. 0

B. 1

C. -1

D. depends on h.

Answer: C

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29. If the vertex of a parabola is the point (-3, 0) and the directrix is the line x + 5 = 0, then its equation is

A. $y^2 = 8(x + 3)$

B. $x^2 = 8(y + 3)$

C. $y^2 = -8(x + 3)$

D. $y^2 = 8(x + 5)$.

Answer: A

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30. The vertex of a parabola is the point (a, b) and latus-rectum is of length l. If the axis of the parabola is along the positive direction of y-axis, then its equation is

A. $(x + a)^2 = \frac{l}{2}(2y - 2b)$

B. $(x - a)^2 = \frac{l}{2}(2y - 2b)$

C. $(x + a)^2 = \frac{l}{4}(2y - 2b)$

D. $(x-a)^2 = \frac{l}{8}(2y-2b)$

Answer: B

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31. The equation to the ellipse (referred to its axes as the axes of x and y respectively) whose foci are $(\pm 2, 0)$ and eccentricity $1/2,$ is

A. $\frac{x^2}{12} + \frac{y^2}{16} = 1$

B. $\frac{x^2}{16} + \frac{y^2}{12} = 1$

C. $\frac{x^2}{16} + \frac{y^2}{8} = 1$

D. none of these

Answer: B

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32. The locus of the middle point of the portion of a tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ included between the axes is the curve

A. $\frac{x^2}{a^2}+\frac{y^2}{b^2}=4$

B. $\frac{a^2}{x^2}+\frac{b^2}{y^2}=4$

C. $\frac{x^2}{a^2}-\frac{y^2}{b^2}=4$

D. none of these

Answer: B

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33. The equations to the common tangents to the two hyperbolas $\frac{x^2}{a^2} - \frac{v^2}{b^2} = 1$ and $\frac{v^2}{a^2} - \frac{x^2}{b^2} = 1$ are

A. $y = \pm x \pm \sqrt{b^2 - a^2}$

B. $y = \pm x \pm \sqrt{a^2 - b^2}$

C. $y = \pm x \pm \left(a^2 - b^2\right)$

D. $y = \pm x \pm \sqrt{a^2 + b^2}$

Answer: B

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34. The vectors $2\hat{i} + 3\hat{j} - 4\hat{k}$ and $a\hat{i} + b\hat{j} - c\hat{k}$ are perpendicular if

A. a = 2, b = 3, c = 4

B. a = 4, b = 4, c = 5

C. a = 4, b = 4, c = -5

D. none of these

Answer: B

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35. If $\vec{a}.\vec{b} = \vec{a}.\vec{c}$ and $\vec{a} \times \vec{b} = \vec{a} \times \vec{c}, \vec{a} \neq 0$, then

A. $\vec{=} \vec{c}$

B. $\left(\vec{b} - \vec{c}\right) \| \vec{a}$

C. $\vec{b} - \vec{c} \perp \vec{a}$

D. none of these

Answer: A

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36. If $\vec{p} = \vec{a} - \vec{b}, \vec{q} = \vec{a} + \vec{b}$ and $\left|\vec{a}\right| = \left|\vec{b}\right| = 2$, then the value of $\left|\vec{p} \times \vec{q}\right|$ is equal to

A. $2\sqrt{16 - \left(\vec{a} . \vec{b}\right)^2}$

B. $2\sqrt{4 - \left(\vec{a} . Vecb\right)^2}$

C. $\sqrt{16 - \left(\vec{a} . \vec{b}\right)^2}$

D. $\sqrt{4 - \left(\vec{a} . Vecb\right)^2}$

Answer: A

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37. Let $a = \hat{I} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} - \hat{j} + \hat{k}$ and c be a unit vector $\perp$ to $\vec{a}$ and coplanar with $\vec{a}$ and $\vec{b}$, then it is given by

A. $\frac{1}{\sqrt{6}}\left(2\hat{i} - \hat{j} + \hat{k}\right)$

B. $\frac{1}{\sqrt{2}}\left(\hat{j} + \hat{k}\right)$

C. $-\frac{1}{\sqrt{6}}\left(\hat{i} - 2\hat{j} - \hat{k}\right)$

D. $\frac{1}{2}\left(\hat{j} - \hat{k}\right)$

Answer: A

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38. The value of $\lim_{x \to 0} \frac{\sqrt{\frac{1}{2}(1 - \cos 2x)}}{x}$ is

A. 1

B. -1

C. 0

D. none of these

Answer: D

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39. If f (x) $= \left(\frac{x^2 + 5x + 3^x}{x^2 + x + 2} \right)$ then $\lim_{x \to \infty} f(x)$ is equal to

A. e^4

B. e^3

C. e^2

D. 2^4

Answer: A

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40. If $y = \cos^{-1}\left(\frac{2\cos x - 3\sin x}{\sqrt{13}}\right), then \frac{dy}{dx}$ is

A. zero

B. constant =1

C. constant $\neq 1$

D. none of these

Answer: B

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41. The derivative of $\sec^{-1}\left(\frac{1}{2x^2 - 1}\right)$ with respect to $\sqrt{1 - x^2} at x = \frac{1}{2}$ is

A. 2

B. 4

C. 1

D. -2

Answer: B

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42. The abscissa of the point on the curve $ay^2 = x^3$, the normal at which cuts off equal intercepts from the coordinate axes is

A. $2a/9$

B. $4a/9$

C. $-4a/9$

D. $-2a/9$

Answer: B

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43. If $y = a\log x + bx^2 + x$ has its extremum value at $x = -1$ and $x = 2$, then

A. $a = 2, b = -1$

B. $a = 2, b = -\frac{1}{2}$

C. $a = -\frac{1}{2}, b = \frac{1}{2}$

D. none of these

Answer: B

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44. $\int \frac{1}{(1+x^2)\sqrt{1-x^2}}dx$ is equal to

A. $\frac{1}{2}\tan^{-1}\left(\frac{\sqrt{2}x}{\sqrt{1+x^2}}\right)+c$

B. $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sqrt{2}sx}{\sqrt{1+x^2}}\right)+c$

C. $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\sqrt{2}sx}{\sqrt{-x^2}}\right)+c$

D. none of these

Answer: C

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45. $\int \frac{\sqrt{\tan x}}{\sin x \cos x}dx$ is equal to

A. $2\sqrt{\tan x+C}$

B. $2\sqrt{\cot x}+C$

C. $\frac{\sqrt{\tan x}}{2} + C$

D. nonwe of these

Answer: A

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46. The value of the integral $\int_0^1 \frac{1}{x^2 + 2x\cos\alpha + 1} dx$ is equal to

A. $\sin\alpha$

B. $\alpha\sin\alpha$

C. $\alpha / \sin\alpha$

D. $\alpha / 2\sin\alpha$

Answer: D

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47. The order and degree of the differential equation $\rho = \frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}$ are respectively

A. 2, 2

B. 2, 3

C. 2, 1

D. none of these

Answer: A

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48. The equation of a curve passing through $(2, 7/2)$ and having gradient $1 - \frac{1}{x^2} at(x, y)$ is

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

B. $xy = x^2 + x + 1$

C. $xy = x + 1$

D. none of these

Answer: B

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49. In the group G = {2, 4, 6, 8} under multiplication modulo 10, the identy element is

A. 6

B. 8

C. 4

D. 2

Answer: A

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50. If a, b are positive integers, define $a^{*}b = \alpha$ where $ab \equiv \alpha$ (modulo 7), with this $*$ operation, the inverse of 3 in group G = { 1, 2, 3, 4, 5, 6}

A. 3

B. 1

C. 5

D. 4

Answer: C

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51. Z is the set of integers, (Z, **) is a group with a ** b $= 1 + b + 1, , b, \in$ G. Then inverse of a is

A. $-a$

B. $a + 1$

C. $-2 - a$

D. none of these

Answer: C

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52. Let G denote the set of all $n \times n$ non-singular matrices with rational numbers as entries. Then under multiplication

A. G is a subgroup

B. G is a finite abelian group

C. G is an infinite, non-abelian group

D. G is infinite, abelian

Answer: C

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53. In the group G = { 1, 2, 3, 4, 5 } under addition modulo 6, $\left(3+5^{-1}\right)^{-1}$ is

A. 0

B. 1

C. 2

D. 3

Answer: C

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54. If $(G, ^*)$ is a group such that $a^* b = b^* a$ for two element a and b, then

A. $a^{-1*}b^{-1} = b^{-1*}a^{-1}$

B. $a^* b = a^{-1*}b^{-1}$

C. $a^{-1*}b = a^* b^{-1}$

D. none of these

Answer: A

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55. The value of $\theta(0 < \theta < 360^\circ)$ satisfying cosec θ + 2 = 0 are

A. $210^\circ, 300^\circ$

B. $240^\circ, 300^\circ$

C. $210^\circ, 240^\circ$

D. $210^\circ, 330^\circ$

Answer: D

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56. If sin A = sin B, cos A = cos B, then the value of A in terms of B is

A. $n\pi + B$

B. $n\pi + (- 1)^n B$

C. $2n\pi + B$

D. $2n\pi - B$

Answer: C

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57. If $(1 + \tan\theta)(1 + \tan\phi) = 2,$ then $\theta + \phi =$

A. 30°

B. 45°

C. 60°

D. 75°

Answer: B

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58. $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$ is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/4$ or $-3\pi/4$

Answer: C

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59. $\cot\left[\cos^{-1}\left(\frac{7}{25}\right)\right] =$

A. $25/24$

B. $25/7$

C. $24/25$

D. none of these

Answer: D

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60. If $4\sin^{-1}x + \cos^{-1}x = \pi,$ then x equals

A. $1/2$

B. $\sqrt{3}/2$

C. $-1/2$

D. none of these

Answer: A

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