MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

MODEL TEST PAPER 3

Mathematics

1. If the equation $x^2 + 2(k+3)x + 12k = 0$ has equal roots, then $k =$

A. 1 or 3

B. 3

C. 2 or 3

D. 2

Answer: B

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2. If $f: R \to R$, $f(x) = \frac{3x-5}{4}$, then $f^{-1}(x)$ is equal to

A. $\frac{5x-3}{4}$

B. $\frac{3x+5}{4}$

C. $\frac{4x-5}{3}$

D. $\frac{4x+5}{3}$

Answer: D

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3. If the sum of $1^2 + \left(1^2 + 2^2\right) \ldots m$ terms $= \frac{m(m+1)}{6} k$ then k is equal to

A. $(m+2)$

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

C. $\frac{(m+1)(m+2)}{2}$

D. $\frac{m+2}{2}$

Answer: C

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4. The value of $\sqrt{\frac{1}{3}(\sqrt{27}+\sqrt{15})}$ is

A. $\pm 3^{-1/4}\left(\sqrt{\frac{5}{2}}+\sqrt{\frac{1}{2}}\right)$

B. $\pm\left(\sqrt{\frac{5}{2}}+\sqrt{\frac{1}{2}}\right)$

C. $\pm 2^{1/4}\left(\sqrt{\frac{5}{2}}+\sqrt{\frac{1}{2}}\right)$

D. $\pm 3^{-1/4}\left(\sqrt{\frac{3}{2}}+\sqrt{\frac{1}{2}}\right)$

Answer: A

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5. The sum of all numbers formed taking all the digits $\{1, 2, 3, 4\}$ is

A. 151338

B. 155518

C. 153318

D. 153138

Answer: C

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6. In the expansion of $(1+x)^{40}$, the coefficient of $(3r+1)^{th}$ term is equal to coefficient of $(7r+11)^{th}$ term, then $r =$

A. 1

B. 2

C. 3

D. 4

Answer: C

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7. The coefficient of x^{10} in $\frac{x}{(x-2)(x-1)}$ is

A. $15/16$

B. $65/1296$

C. $16/15$

D. $56/65$

Answer: A

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8. If $A = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$, the $(2I - A)(A - 3I)$ is

A. 1

B. -1

C. O_2

D. A^{-1}

Answer: C

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9. If $\begin{vmatrix} x-4 & 2x-6 & 3x-8 \\ x-8 & 2x-18 & 3x-32 \\ x-16 & 2x-54 & 3x-128 \end{vmatrix} = 0$, then $x^2 =$

A. 16

B. 36

C. 49

D. 64

Answer: D

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10. If $\begin{bmatrix}1 & x & 0\end{bmatrix}\begin{bmatrix}1 & 1 & 1\\ 2 & 2 & 2\\ 3 & 3 & 3\end{bmatrix}\begin{bmatrix}1\\ 1\\ x\end{bmatrix} = 0$ then $x =$

A. 2 or 14

B. -2 or $x = -1/2$

C. 2 or 16

D. -2 or 16.

Answer: B

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11. The value of $\lim_{x \to 0} e^{-4}\left(\frac{1-x}{1-x}\right)^{1/x}$ is equal to

A. e^2

B. e^4

C. 1

D. e^{-4}

Answer: C

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12. $\lim_{x \to 0} \frac{5^x + 4^x - 2^x - 1}{5x}$ is equal to

A. $\log 10/5$

B. 1

C. 0

D. logx.

Answer: A

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13. $f(x) = \frac{2x^2 + 3}{5}$, for $\infty < x \leq 1$

$= 6 - 5x$, for $1 < x < 3$

$= x - 3$, for $3 \leq x < 8$, then

A. f is continuous at $x = 1, x = 3$

B. f is discontinuous at $x = 1, x = 3$

C. f is continuous at $x = 1$, discontinuous at $x = 3$

D. f is discontinuous at $x = 1$, continuous at $x = 6$.

Answer: C

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14. $\frac{d}{dx}\left[2\cot^{-1}\left(\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}\right)\right] =$

A. 1

B. 0

C. $-1/2$

D. $1/2$

Answer: A

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15. If $x^{\log x} = y^x$ and $\frac{dy}{dx} = \frac{2y\log x + k\log y}{x^2}$, then $k =$

A. $-xy$

B. $2x$

C. $-2x$

D. none of these

Answer: D

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16. The value of differentiation of $\tan^{-1} x$ with respect to $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ is k. Then $k/2$ is

A. $1/2$

B. 1

C. 2

D. -1

Answer: B

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17. The sub normals at any point of the curve $y = x^n$ is constant. Then $n =$

A. 1

B. $1/2$

C. 0.75

D. -1

Answer: B

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18. The percentage increase in the volume of the cube when its side increases 1/4 % is

A. 0.25

B. 0.5

C. 0.75

D. 1

Answer: C

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19. The period T and length l are increasing at the same rate is $T = 2\pi\sqrt{l/g}$. Then the length l in terms of π and g is

A. π / g

B. πg

C. πg^2

D. π^2 / g

Answer: D

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20. $\int \frac{dt}{\left(e^t + e^{-t}\right)^2} =$

A. $\frac{1}{4}$ sech t

B. $\frac{1}{4}$ tanh t

C. $\frac{1}{4}$ coth t

D. $\frac{1}{4}$ sinh t

Answer: B

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21. $\int e^t \left(\frac{t}{1+t^2} \right) dt =$

A. $\frac{e^t}{1+t}$

B. $\frac{e^t}{1+t^2}$

C. $\frac{-1}{1+t^2}$

D. $\frac{-e^t}{1+t}$

Answer: A

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22. $\int 9^{9^{9^x}} dx$ is equal to

A. $\frac{9^{9^{9^x}}}{\log 9}$

B. $\frac{9^{9^x}}{(\log 9)^2}$

C. $\frac{9^{9^{9^x}}}{(\log x)^2}$

D. $\frac{9^{9^{9^x}}}{(\log 9)^3}$

Answer: D

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23. $\int \frac{dx}{\cos(x-a)\cos(x-b)} = \frac{1}{p}\log q$, then $(p, q) =$

A. $\sin(b-a)\frac{\sec(x-a)}{\sec(x-b)}$

B. $\sin(a-b)\frac{\cos(x-a)}{\cos(x-b)}$

C. $\sin(b+a)\frac{\sec(x-a)}{\sec(x-b)}$

D. $\sin(a-b)\frac{\sec(x-a)}{\sec(x-b)}$

Answer: A

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24. Area of the region bounded by the curves $y = \sqrt{5 - x^2}$ and $y = |x - 1|$ is

A. $\frac{5\pi - 2}{4}$

B. $\frac{5\pi + 2}{4}$

C. $\frac{3\pi - 2}{4}$

D. $\frac{3\pi + 2}{4}$

Answer: A

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25. $\lim_{x \to \infty} \sum_{r=1}^{n-1} \sqrt{\frac{n + r}{n^2(n - r)}} =$

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

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

C. $\frac{\pi + 2}{2}$

D. $\frac{\pi - 2}{2}$

Answer: C

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26. If $\bar{a} = 3\hat{i} + 2\hat{j}, \bar{b} = 2\hat{i} + 2\hat{j} + \hat{k}, \bar{c} = 5\hat{i} - \hat{j} + \hat{k}$ then the unit vector $\bar{a} + \bar{b} + \bar{c}$ 1 in opposite direction is

A. $\hat{i}$

B. $-\hat{i}$

C. $-\hat{j}$

D. $\hat{j}$

Answer: C

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27. The projection of the vector $\hat{i} - 2\hat{j} + \hat{k}$ on the vector $4\hat{i}4\hat{j} + 7\hat{k}$ is

A. 17/9

B. 19/9

C. $7/3$

D. $1/9$

Answer: B

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28. If θ is the angle between the vectors $\hat{i} + \hat{j}$ and $\hat{j} + \hat{k}$, then $\theta =$

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: B

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29. The non-zero vectors $\bar{a}, \bar{b}, \bar{c}$ holds $\left|(\bar{a}.\ \bar{b}).\ \bar{c}\right| = |\bar{a}||\bar{b}|\ |\ \bar{c}$ if

A. $\bar{a}.\ \bar{b} = ,\ \bar{b}.\ \bar{c} = 0$

B. $\bar{b}.\ \bar{c} = 0, \bar{c}.\ \bar{a} = 0$

C. $\bar{c}.\ \bar{a} = 0, \bar{a}.\ \bar{b} = 0$

D. $\bar{a}.\ \bar{b} = \bar{b}.\ \bar{c} = \bar{c}.\ \bar{a} = 0.$

Answer: D

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30. If $\bar{a} = \hat{i} + \hat{j} - \hat{k}, \bar{b} = 2\hat{i} + 3\hat{j} + 2\hat{k}, \bar{c} = -\hat{i} + \hat{j} + 3\hat{k}$ then the volume of tetrahedron is

A. 1 sq. unit

B. 2 sq. unit

C. 3 cubic unit

D. 4 cubic unit.

Answer: A

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31. The value of $\frac{\sec x + \tan x - 1}{\tan x - \sec x + 1}$, if $\cos ec 2x = 2$ is

A. 0

B. 1

C. 1

D. 3

Answer: D

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32. The value of $\cos ec20^\circ . \cos ec40^\circ . \cos ec60^\circ . \cos ec80^\circ$ is

A. $3/16$

B. $16/3$

C. $5/16$

D. $16/5$

Answer: B

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33. If $\cot A \perp B \equiv 2, \cos A \cos B = 2/3$, then $\cos(A + B) =$

A. $1/3$

B. $2/3$

C. $1/5$

D. $2/5$

Answer: A

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34. The value of $\tan\left(2\tan^{-1}.\frac{1}{5}-\frac{\pi}{4}\right)$ is equal to

A. $-5/12$

B. $5/12$

C. $-7/17$

D. $7/17$

Answer: C

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35. In a triangle ABC, $\sum r\cos A/2 =$

A. Δ

B. $2S$

C. S

D. $3S$

Answer: C

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36. In a triangle ABC, $\frac{1}{bc}+\frac{1}{ca}+\frac{1}{ab}=\frac{k}{2}$, then $k=$

A. R

B. r

C. Rr

D. $1/Rr$

Answer: D

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37. Square root of $-3-4i$ is

A. $\pm(1+2i)$

B. $\pm(1-2i)$

C. $\pm(-1-2i)$

D. $\pm(2+i)$

Answer: B

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38. Find the value of $\log(-\theta)$ and hence the value of $\log(-10\theta)$.

A. πi

B. $1+\pi i$

C. $1-\pi i$

D. $-1-\pi i$

Answer: B

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39. The area of a triangle fanned by the complex numbers $2+I,\ -2-I, 1+i$ in the Argand diagram is

A. 1 square units

B. 2 square units

C. 3 square units

D. 1/2 square units

Answer: A

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40. If $3x + 2y - 1 = 0$ is a tangent to a hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$, then the point of contact is

A. $(24, 9)$

B. $(-24, 9)$

C. $(48, -18)$

D. $(1, 1)$

Answer: C

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41. The centre, radius of the circle $r^2 - 8r\cos\left(\theta - \frac{\pi}{3}\right) + 12 = 0$ is

A. $\left[\left(4, \frac{\pi}{3}\right), 2\right]$

B. $\left[\left(2, \frac{\pi}{3}\right), 2\right]$

C. $\left[\left(4, \frac{\pi}{3}\right), 1\right]$

D. $\left[\left(4, \frac{\pi}{3}\right), 3\right]$

Answer: A

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42. The line $x - y + k = 0$ is normal to the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$, then $k =$

A. 5

B. $5/7$

C. $2/5$

D. $5/2$

Answer: A

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43. The equation of the circle whose radius is 3 and touches internally with another circle $x^2 + y^2 - 2x + 4y - 6 = 0$ at $(-2, 2)$ is

A. $\left(x + \frac{1}{5}\right)^2 + \left(y + \frac{2}{5}\right)^2 = 9$

B. $\left(x - \frac{1}{5}\right)^2 + \left(y - \frac{2}{5}\right)^2 = 9$

C. $\left(x + \frac{1}{5}\right)^2 + \left(y - \frac{2}{5}\right)^2 = 9$

D. $\left(x - \frac{1}{5}\right)^2 + \left(y + \frac{2}{5}\right)^2 = 9$

Answer: B

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44. The radical centre of the circle $x^2 + y^2 + 4x + 7 = 0, 2x^2 + 2y^2 + 3x + 5y + 9 = 0$ and $x^2 + y^2 + y = 0$ is

A. $(-2, -1)$

B. $(-2, 1)$

C. $(2, -1)$

D. $(2, 1)$

Answer: A

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45. The angles between the circle $x^2 + y^2 - 2x - 6y - 39 = 0$ and $x^2 + y^2 + 10x - 4y + 20 = 0$ is

A. $\pi/6$

B. $\pi/2$

C. $2\pi/3$

D. $2\pi/6$

Answer: C

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46. The equation to pair of lines perpendicular to $x^2 + 3xy + 2y^2 = 0$ and passing through $(-1, -1)$ is

A. $x^2 + 3xy + 2y^2 - x + y = 0$

B. $x^2 - 3xy + 2y^2 - x + y = 0$

C. $x^2 - 3xy - 2y^2 + x - y = 0$

D. $x^2 - 3xy + 2y^2 + x + y = 0$

Answer: B

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47. The line $x + y - 2 = 0$ cuts the axes at A and B, then the incentre of triangle AOB is

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

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

C. $\left(\frac{2}{2+\sqrt{2}}, \frac{2}{2+\sqrt{2}}\right)$

D. $(2, 2)$

Answer: C

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48. A and B are two variable points on x and y axes such that $OA + OB = 1/2$. Then the locus of the foot of the perpendicular from the origin on the line AB is

A. $2(x^2 + y^2)(x + y) - xy = 0$

B. $2(x^2 + y^2)(x + y) + xy = 0$

C. $2(x^2 + y^2)(x + y) - 2xy = 0$

D. $2(x^2 + y^2)(x + y) + 2xy = 0$

Answer: B

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49. If p, q, r are in A. P. then the line $px + qy + r = 0$ passes through a fixed point

A. $(1, 2)$

B. $(-1, 2)$

C. $(1, -2)$

D. $(-1, -2)$

Answer: C

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50. If the axes are rotated through an angles 30° in the anticlockwise direction and the point is $(4, -2\sqrt{3})$ in the new system, the formal point is

A. $(2, 2\sqrt{3})$

B. $(5, \sqrt{3})$

C. $(\sqrt{3}, 3)$

D. $(\sqrt{3}, -5)$

Answer: D

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51. The locus of a point which is equidistant from $(a+b, a-b)$ and $(a-b, a+b)$ is

A. $x+y=0$

B. $x-y=0$

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

D. $x^2+y^2=0$

Answer: B

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52. If (5, 1) is a circumcentre and (7, 5) is the centroid of a triangle, then its orthocentre is

A. (3, -3)

B. (-3, 3)

C. (4, -4)

D. (-2, 2).

Answer: B

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53. In a triangle ABC, $D(1, 2)$ and $F(2, 3)$ are the mid points of BC and AB respectively. If C is $(4, 4)$ then area of the triangle ABC is

A. 1 sq. units

B. 2 sq. units

C. 4 sq. units

D. 6 sq. units

Answer: B

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54. The angle between the asymptotes of the hyperbola $2x^2 - 4y^2 = 1$ is

A. $\pi/2$

B. $\pi/3$

C. $\pi/4$

D. $\pi/6$

Answer: A

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55. The equation to the common tangent to the circle $x^2 + y^2 = 32$ and the parabola $y^2 = 32x$ is

A. $x - y + 8 = 0$

B. $x + y + 8 = 0$

C. $x = 8y$

D. $x + 8y = 0$

Answer: A

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56. The radius of any circle touching both the lines $3x + 4y - 1 = 0$ and $6x + 8y + 1 = 0$ is

A. $3/10$

B. $3/20$

C. $1/5$

D. $2/5$

Answer: B

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57. Which of the following is false?

A. $\lfloor m \lfloor n$ divides $\lfloor m+n$

B. If n is $+ve$ integer, then $(\lfloor n)^{n+1}$ divides $\lfloor n^2$

C. $2, 6, 10. \ldots (4n-6)(4n-2)$ is divided by $\lfloor n$

D. The product of r integers is always divisible by $\lfloor r$.

Answer: D

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58. The G. C. D. of 364 and 462 is

A. 3

B. 11

C. 14

D. 7

Answer: C

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59. Which of the following statements is false?

A. $98 \equiv -7 \pmod 3$

B. $67 \equiv 2 \pmod 5$

C. $123 \equiv -4 \pmod 7$

D. $240 \equiv 9 \pmod{11}$

Answer: C

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60. The negation of the proposition "if a quadrilateral is a square, then it is a rhombus" is

A. If a quadrilateral is not a square, then it is a rhombus

B. If a quadrilateral is a square, then it is not a rhombus

C. A quadrilateral is a square and it is not a rhombus

D. A quadrilateral is not a square and it is a rhombus

Answer: C

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