MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

MODEL TEST PAPER 9

Mathematics

1. The value of p such that the vectors $\hat{i}+3\hat{j}-2\hat{k}, 2\hat{i}-\hat{j}+4\hat{k}$ and $3\hat{i}+2\hat{j}+p\hat{k}$ are coplanar is

A. 4

B. 2

C. 8

D. 10

Answer: B

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2. $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} =$

A. a+b+c+abc

B. $a^2 + b^2 + c^2 + ab + bc + ca$

C. $3abc - a^3 - b^3 - c^3$

D. $a^3 + b^3 + c^3 - 3abc$

Answer: C

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3. If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}, A^2 =$

A. A

B. 2A

C. unit matrix

D. 3A

Answer: D

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4. If ω is a cube root of unity $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & \omega & 1 \end{vmatrix} =$

A. 0

B. 1

C. ω

D. ω^2

Answer: A

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5. The roots of the equation $\begin{vmatrix} x-1 & 1 & 1 \\ 1 & x-1 & 1 \\ 1 & 1 & x-1 \end{vmatrix} = 0$ are

A. 1,2

B. $-1, 2$

C. 1, -2

D. $-1, \ -2$

Answer: B

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6. The inverse of $\begin{bmatrix} 3 & -2 \\ -7 & 5 \end{bmatrix}$ is

A. $\begin{bmatrix} 3 & -7 \\ -2 & 5 \end{bmatrix}$

B. $\begin{bmatrix} 5 & -2 \\ -7 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 5 & 2 \\ 7 & 3 \end{bmatrix}$

D. $\begin{bmatrix} -3 & 7 \\ -2 & 5 \end{bmatrix}$

Answer: C

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7. From the matrix equation AB = AC we can conclude B = C provided

A. A is singular

B. A is non - singular

C. A is symmetric

D. A is square

Answer: B

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8. Let $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$. Then $A^n =$

A. $\begin{bmatrix} 1 & 2n \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 2 & n \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2^n \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & n \\ 0 & 2 \end{bmatrix}$

Answer: A

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9. In a triangle ABC if a = 2, $B = 60^\circ$ and $C = 75^\circ$, then b =

A. $\sqrt{3}$

B. $\sqrt{6}$

C. $\sqrt{9}$

D. $1 + \sqrt{2}$

Answer: B

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10. If $\tan^{-1} 2x + \tan^{-1} 3x = \frac{\pi}{4}$, then x =

A. 1

B. -1

C. $\frac{1}{6}$

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

Answer: C

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11. The general solution of $\tan 2\theta \tan \theta = 1$ is $\theta =$

A. $(2n+1)\frac{\pi}{3}$

B. $(2n+1)\frac{\pi}{4}$

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

D. $(2n+1)\frac{\pi}{6}$

Answer: A

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12. $\cos^{-1}.\frac{2}{\sqrt{5}}+\tan^{-1}.\frac{1}{3}=$

A. $\tan^{-1}.\frac{2}{3\sqrt{5}}$

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

C. $\tan^{-1}.\frac{1}{7}$

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

Answer: B

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13. $(1+i)^5+(1-i)^5=$

A. -8

B. 8 i

C. 8

D. 32

Answer: A

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14. The smallest integer n such that $\left(\frac{1+i}{1-i}\right)^n = 1$ is

A. 2

B. 4

C. 8

D. 6

Answer: B

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15. $\cos\left[\tan^{-1}\left\{\sin\left(\cot^{-1}x\right)\right\}\right] =$

A. $\left(\frac{x^2+2}{x^2+3}\right)^{\frac{1}{2}}$

B. $\left(\frac{x^2+3}{x^2+4}\right)^{\frac{1}{2}}$

C. $\left(\frac{x^2+1}{x^2+2}\right)^{\frac{1}{2}}$

D. x

Answer: C

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16. The general value of θ which satisfies the equation $(\cos\theta + i\sin\theta)(\cos 3\theta + I\sin 3\theta).....\{\cos(2n-1)\theta + I\sin(2n-1)\theta\} =$ is

A. $\frac{rn\pi}{r^2}$

B. $\frac{(n-1)\pi}{r^2}$

C. $\frac{(2n+1)\pi}{r^2}$

D. 0

Answer: D

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17. The length of the tangent from the point (1, -4) to the circle $2x^2 + 2y^2 - 3x + 7y + 9 = 0$ is

A. 6

B. $\sqrt{6}$

C. 16

D. $\sqrt{18}$

Answer: B

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18. For the circles $x^2 + y^2 - 2x + 3y + k = 0$ and $x^2 + y^2 + 8x - 6y - 7 = 0$ to cut each other orthogonally the value of k must be

A. -10

B. 1

C. 5

D. -3

Answer: A

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19. The equation to the parabola with focus (2, 0) and the directrix x + 3 = 0 is

A. $y^2 - 10x + 5 = 0$

B. $y^2 - 10x - 5 = 0$

C. $x^2 - 10y + 5 = 0$

D. $x^2 - 10y - 5 = 0$

Answer: B

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20. If $2y = 5x + k$ is a tangent to the parabola $y^2 = 6x$ then k =

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

B. $\frac{4}{5}$

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

D. none

Answer: D

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21. The length of the latus - rectum of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ is

A. $\frac{9}{5}$

B. $\frac{18}{5}$

C. $\frac{50}{3}$

D. $\frac{25}{3}$

Answer: B

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22. P is any point on the ellipse $9x^2 + 36y^2 = 324$ whose foci are S and S'.

Sp + S'P =

A. 9

B. 12

C. 27

D. 36

Answer: B

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23. The product of the perpendiculars from the foci on any tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

A. a^2

B. a^1-b^2

C. b^2

D. $\sqrt{a^2+b^2}$

Answer: C

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24. $\int\frac{e^{\sqrt{x}}}{\sqrt{x}}dx=$

A. $e^{\sqrt{x}}$

B. $\frac{e^{\sqrt{x}}}{2}$

C. $2e^{\sqrt{x}}$

D. $\sqrt{x}e^{\sqrt{x}}$

Answer: C

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25. $\int_0^a \sqrt{a^2 - x^2}dx =$

A. $\frac{a^2}{4}$

B. πa^2

C. $\frac{\pi a^2}{2}$

D. $\frac{\pi a^2}{4}$

Answer: D

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26. $\int_0^{\pi/2} \frac{dx}{a^2\cos^2 x + b^2 \sin^2 x} =$

A. $2\pi ab$

B. $\pi a^2 b^2$

C. $\frac{\pi}{a^2 b^2}$

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

Answer: D

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27. $\int_0^{\pi/2} \log \sin x dx =$

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

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

C. $\pi \log 2$

D. $-\pi \log 2$

Answer: A

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28. $\underset{n \to \infty}{Lt} \left[\frac{1}{n+1} + \frac{1}{n+2} + \ldots \text{to n terms} \right] =$

A. log 2

B. log 3

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

D. 2 log 2

Answer: A

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29. The area enclosed within the curve $|x| + |y| = 1$ is

A. $\sqrt{2}$

B. 2

C. $2\sqrt{2}$

D. 4

Answer: B

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30. $\int \frac{x^2+1}{x^4+1} dx =$

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

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

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

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

Answer: D

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31. If the position vectors of $\overrightarrow{A}$ and $\overrightarrow{B}$ are $3\hat{i}-2\hat{j}+\hat{k}$ and $2\hat{i}+4\hat{j}-3\hat{k}$ the length of $\overrightarrow{AB}$ is

A. $\sqrt{14}$

B. $\sqrt{29}$

C. $\sqrt{43}$

D. $\sqrt{53}$

Answer: D

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32. If $a=I+j, b=j+k$ and $c=k+i$, a unit vector parallel to $a+b+c$ is

A. $2\hat{i}+2\hat{j}+2\hat{k}$

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

C. $\frac{\hat{i}+\hat{j}+\hat{k}}{2\sqrt{3}}$

D. $\frac{\vec{a}+\vec{b}+\vec{c}}{\sqrt{3}}$

Answer: B

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33. If $\left|\vec{a}+\vec{b}\right| = \left|\vec{a}-\vec{b}\right|$ then

A. $\vec{a}$ and $\vec{b}$ are perpendicular

B. $\vec{a}$ and $\vec{b}$ are parallel

C. $\left|\vec{a}\right| = \left|\vec{b}\right|$

D. there is no relationship between a and b

Answer: A

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34. If $\left|\vec{a}\right| = 5, \left|\vec{b}\right| = 6$ and the angle between $\vec{a}$ and $\vec{b}$ is 60°, then $\vec{a}.\vec{b}$ =

A. 30

B. 15

C. $15\sqrt{3}$

D. $5\sqrt{3}$

Answer: B

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35. If $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4$ and $\left|\vec{a} + \vec{b}\right| = 1$, then $\left|\vec{a} - \vec{b}\right| =$

A. 5

B. 6

C. 7

D. 8

Answer: C

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36. $\underset{x \to 0}{Lt}\left[\frac{x}{\sqrt{1+x}-\sqrt{1-x}}\right] =$

A. 1

B. $1/2$

C. 2

D. 0

Answer: A

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37. If $y = \sin x^0$, $\frac{dy}{dx} =$

A. $\cos x^0$

B. $\frac{\pi}{180}\cos x^0$

C. $\frac{180}{\pi}\cos x^0$

D. none of these

Answer: B

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38. If $y = \tan^{-1}\left(\frac{x+a}{1-xa}\right)$ then $\frac{dy}{dx} =$

A. $\frac{1}{a^2+x^2}$

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

C. $\frac{a}{a^2+x^2}$

D. $\frac{a^2}{(1-xa)^2}$

Answer: B

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39. If $x^y = e^{x-y}$, $\frac{dy}{dx} =$

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

B. $\frac{1-x}{y+x\log y}$

C. $\frac{x-y}{1+\log x}$

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

Answer: A

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40. If $x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$, $\frac{dy}{dx} =$

A. $\cot\theta$

B. $\tan\theta$

C. $\tan.\frac{\theta}{2}$

D. $\cot.\frac{\theta}{2}$

Answer: B

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41. 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. $\frac{mx_1}{n}$

B. $-\frac{ny_1}{m}$

C. $-\frac{my_1}{n}$

D. $-\frac{nx_1}{m}$

Answer: D

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42. The distance s feet travelled by a particle in time t seconds is given by $s = t^3 - 6t^2 - 4t - 8$. Its acceleration vanishes at time t =

A. 2

B. 3

C. 4

D. 1

Answer: A

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43. The angle between the curves xy = 2 and $y^2 = 4x$ at their point of intersection is

A. $\tan^{-1}.\frac{1}{3}$

B. $\tan^{-1}3$

C. $\tan^{-1}2$

D. $\tan^{-1}.\frac{2}{3}$

Answer: B

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44. A point of inflection of the curve $y = e^{-x^2}$ is

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

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

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

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

Answer: C

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45. In what ratio should a given line be divided into a parts so that's the rectangle contained by them is maximum ?

A. $1:1$

B. $4:3$

C. $3:2$

D. $\sqrt{5}+1:\sqrt{5}-1$

Answer: A

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46. $\int \frac{1}{1-\cos x}dx =$

A. cosec x + cot x

B. $-\cot.\frac{x}{2}$

C. $-\tan.\frac{x}{2}$

D. cosec x -cot x

Answer: B

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47. $\int \log x dx =$

A. $\log x$

B. $x \log x$

C. $x(\log x - 1)$

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

Answer: C

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48. What does this equation

$x^2 - 4y^2 - 2x + 16y - 40 = 0$ represent?

A. a pair of straight lines B6

B. a parabola

C. ellipse

D. hyperbola

Answer: D

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49. The locus of the centre of a circle which touches externally two given circles is

A. a hyperbola

B. an ellipse

C. a parabola

D. circle

Answer: A

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50. The eccentricity of the hyperbola $4x^2 - 9y^2 - 8x - 32 = 0$ is

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

B. $\frac{\sqrt{13}}{3}z$

C. $\frac{\sqrt{13}}{2}$

D. $\frac{\sqrt{5}}{3}$

Answer: B

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51. The eccentricity of the rectangular hyperbola is

A. e

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

C. $\sqrt{2}$

D. $\sqrt{3}$

Answer: C

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52. If $x^{pq} = (x^p)^q$, then p =

A. $\frac{q^1}{q}$

B. $q^{\frac{1}{q-1}}$

C. q^q

D. $q^{\frac{1}{q+1}}$

Answer: B

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53. $\binom{51}{3} + \binom{50}{3} + \binom{49}{3} + \binom{48}{3} + \binom{47}{3} + \binom{47}{4} =$

A. $\binom{52}{1}$

B. $\binom{52}{2}$

C. $\binom{52}{3}$

D. $\binom{52}{4}$

Answer: D

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54. A parallelogram is cut by two sets of m lines parallel to the sides, the number of parallelograms thus formed is

A. $\frac{m^2}{4}$

B. $\frac{(m+1)^2}{4}$

C. $\frac{(m+2)^2}{4}$

D. $\frac{(m+1)^2(m+2)^2}{4}$

Answer: D

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55. A set contains n elements. The Power set contains

A. n elements

B. 2^n elements

C. n^2 elements

D. none of these

Answer: B

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56. a and b are positive integers such that $a^2 - b^2$ is a prime number. Then $a^2 - b^2 =$

A. a + b

B. a - b

C. ab

D. 1

Answer: A

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57. The last digit of the number 6^{500} is

A. 8

B. 2

C. 6

D. 0

Answer: C

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58. If $7x \equiv 3 \pmod 5$ then x can take the value

A. 17

B. 22

C. 15

D. 19

Answer: D

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59. $Z_n = \{0, 1, 2, \ldots., n-1\}$ fails to be a group under multiplication modulo n because

A. closure property fails

B. closure holds but not associativity

C. there is no identity

D. there is no inverse for an element of the set

Answer: D

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

A. G is a sub group

B. G is a finite Ablian group

C. G is an infinite, non - Abelian group

D. G is finite, Abelian

Answer: C

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