MATHS

BOOKS - KCET PREVIOUS YEAR PAPERS

MODEL TEST PAPER - 7

Mathematics

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

A. G is a subgroup

B. G is an infinite, non-A belian group

C. G is a finite A belian group

D. G is infinite, A belian

Answer: B

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

A. closure property fails

B. there is no identity

C. closure holds but not associativity

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

Answer: D

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

A. 17

B. 15

C. 22

D. 19

Answer: D

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

A. 8

B. 6

C. 2

D. 0

Answer: B

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5. a and b are positive integers such that $a^3 - b^2$ is a prime number. Then $a^2 - b^2 =$

A. $a + b$

B. ab

C. $a - b$

D. 1

Answer: A

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

A. n elements

B. n^2 elements

C. 2^n elements

D. none of these

Answer: C

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

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

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

Answer: D

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

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

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

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

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

Answer: D

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9. $1\lfloor 1+2\lfloor 2+3\lfloor 3+\ldots..+n\lfloor n=$

A. $\lfloor n+1$

B. $\lfloor n+1-1$

C. $\lfloor n+1+1$

D. $n\lfloor n+1$

Answer: B

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

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

B. q^q

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

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

Answer: C

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11. The Asymptotes of the hyperbola $16x^2 - 9y^2 = 144$ are

A. $\frac{x^2}{9} + \frac{y^2}{16} = 1$

B. $\frac{x^2}{9} + \frac{y^2}{16} = 0$

C. $\frac{y^2}{9} + \frac{x^2}{16} = 1$

D. $\frac{x^2}{9} - \frac{y^2}{16} = 0$

Answer: D

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12. The eccentricity of the rectangular hyperbola is

A. e

B. $\sqrt{2}$

C. ∞

D. $\sqrt{3}$

Answer: B

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

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

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

C. $\frac{\sqrt{13}}{3}$

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

Answer: C

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

A. a hyperbola

B. a parabola

C. an ellipse

D. another circle

Answer: A

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15. What does this equation

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

A. a pair of straight lines

B. ellipse

C. a parabola

D. hyperbola

Answer: D

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16. $\int \log x dx =$

A. log x

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

C. $x \log x$

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

Answer: B

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

A. $\cos ecx + \cot x$

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

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

D. $\cos ecx - \cot x$

Answer: C

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18. In what ratio should a given line be divided into 2 parts so that the rectangle contained by them is maximum ?

A. $1:1$

B. $3:2$

C. $4:3$

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

Answer: A

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19. A point of infection 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: B

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

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

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

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

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

Answer: C

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

A. 2

B. 4

C. 3

D. 1

Answer: A

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22. The length of the subtangent 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. $-\frac{my_1}{n}$

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

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

Answer: D

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

A. $\cot\theta$

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

C. $\tan\theta$

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

Answer: C

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24. If $y = x^x$, $\frac{dy}{dx}$=

A. xx^{-1}

B. $x^x(1 + \log x)$

C. $x^x . \log x$

D. $\frac{x^x}{\log x}$

Answer: B

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

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

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

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

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

Answer: A

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

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

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

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

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

Answer: C

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27. If $xy = x + y$, $\frac{dy}{dx} =$

A. $\frac{xy}{1-x}$

B. $\frac{y}{1-xy}$

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

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

Answer: D

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

A. $\cos x^0$

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

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

D. none of these

Answer: C

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29. $Lt_{n\to\infty}\left(1+\frac{2}{n}\right)^{2n}=$

A. e

B. e^4

C. e^2

D. e^6

Answer: B

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30. $Lt_{n\to 0}\frac{x}{\sqrt{1+x}-\sqrt{1-x}}=$

A. 1

B. 2

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

D. 0

Answer: A

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31. The projection of $a = 3i - j + 5k$ on $b = 2i + 3j + k$ is

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

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

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

D. $\sqrt{14}$

Answer: B

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32. If $|a| = 3, |b| = 4$ and $|a + b| = 1$, then $|a - b| =$

A. 4

B. 7

C. 6

D. 8

Answer: B

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33. If $|a| = 5, |b| = 6$ and the angle between a and b is 60° ,then a. b =

A. 30

B. $15\sqrt{3}$

C. 15

D. $5\sqrt{3}$

Answer: C

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34. If $|a+b| = |a-b|$ then

A. a and b are perpendicular

B. $|a| = |b|$

C. a and b are parallel

D. there is no relationship between a and b

Answer: A

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

A. $2i + 2j + 2k$

B. $\frac{I + j + k}{2\sqrt{3}}$

C. $\frac{I + j + k}{\sqrt{3}}$

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

Answer: C

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36. If the position vectors of A and B are 3i - 2i + k and 2i + 4j - 3k then the length of AB is

A. $\sqrt{14}$

B. $\sqrt{43}$

C. $\sqrt{29}$

D. $\sqrt{53}$

Answer: D

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

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

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

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

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

Answer: D

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38. The area bounded by the curve $y = x^2 - 7x + 10$ and the x - axis is

A. $\frac{5}{2}$

B. $\frac{9}{2}$

C. $\frac{11}{3}$

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

Answer: B

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

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. 2

D. 4

Answer: C

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40. $Lt_{n\to\infty}\left[\frac{1}{n+1}+\frac{1}{n+1}+\ldots \text{ to n terms}\right]=$

A. $\log 2$

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

C. $\log 3$

D. $2\log 2$

Answer: A

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

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

B. $\pi\log 2$

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

D. $-\pi \log 2$

Answer: A

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42. $\int_0^{\pi/2} \frac{dx}{1+\tan x} =$

A. π

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

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

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

Answer: C

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

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

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

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

C. πa^2

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

Answer: D

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

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

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

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

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

Answer: B

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

A. a^2

B. b^2

C. $a^2 - b^2$

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

Answer: B

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

A. 9

B. 27

C. 12

D. 36

Answer: C

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48. If the major axis of an ellipse is 3 times its minor axis its ecentricity is

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

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

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

D. $\frac{1}{3}$

Answer: A

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

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

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

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

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

Answer: C

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

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

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

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

D. none

Answer: D

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51. The equation of the parabola with focus (2,0) and directirix $x + 3 = 0$ is

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

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

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

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

Answer: C

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52. The circumcircle of the triangle with vertices at (0,0), (a,0) and (0,b) is

A. $x^2 + y^2 + ax + by = 0$

B. $x^2 + y^2 - bx - ay = 0$

C. $x^2 + y^2 - ax - by = 0$

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

Answer: C

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53. 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. 5

C. 1

D. -3

Answer: A

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

A. 6

B. sqrt(6)

C. 16

D. sqrt(18)

Answer: B

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55. The angle between the pair of lines given by $3x^2 + 5xy - 2y^2 + x + 9y - 4 = 0$ is

A. $\tan^{-1} 7$

B. 90°

C. $\tan^{-1} 5$

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

Answer: A

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56. The general value of θ which satisfies the equation $(\cos\theta + i\sin\theta)(\cos 3\theta + i\sin 3\theta)\ldots[\cos(2n-1)\theta + i\sin(2n-1)\theta] = 1$ is

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

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

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

D. 0

Answer: D

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

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

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

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

D. x

Answer: B

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

A. 2

B. 8

C. 4

D. 6

Answer: C

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59. $(1+i)^5 + (1-i)^5$ =

A. -8

B. 8

C. 8i

D. 32

Answer: A

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60. If $\cos^{-1} x = \cot^{-1} \frac{4}{3} + \tan^{-1} \frac{1}{7}$, the x =

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

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

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

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

Answer: B

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