MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

MOCK TEST 1

Mathematics

1. If $f: R$ to R is defined by $f(x) = x^2 - 6x + 4$ then , $f(3x + 4)$=

A. $3x^2 + 2x + 2$

B. $9x^2 + 6x - 4$

C. $2x + 2$

D. $x^2 + 6x + 9$

Answer: B

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2. The domain of $\frac{\sqrt{7+x}+\sqrt{7-x}}{x}$ is

A. $[-7, 0) \cup (0, 7]$

B. R-{0}

C. (-7,7)

D. [-7,7]

Answer: A

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3. $4^n - 3n + k$ is divisible by 9 for $n \in N$. Then the numerlcally least -ve integral value of k is ,

A. -5

B. -1

C. -3

D. 0

Answer: B

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4. If $A = \begin{bmatrix} 1 & 4 \\ 2 & 8 \end{bmatrix}$, $B = \begin{bmatrix} 3 & 2 \\ 1 & 3 \end{bmatrix}$ then AB=

A. $\begin{bmatrix} 9 & 16 \\ 13 & 20 \end{bmatrix}$

B. $\begin{bmatrix} 7 & 14 \\ 14 & 28 \end{bmatrix}$

C. $\begin{bmatrix} 10 & 14 \\ 14 & 24 \end{bmatrix}$

D. $\begin{bmatrix} 13 & 14 \\ 15 & 16 \end{bmatrix}$

Answer: B

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5. The inverse of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ is,

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

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

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

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

Answer: D

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6. The equations $x + y + z = 0, x + 2y - 4z = 0, 2x - y - z = 0$ have

A. no solution

B. infinity many solution

C. unique solution

D. none

Answer: C

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7. If a,b,c are the position vectors of the vertices of a triangle ABC , then the position vector of its centriod is

A. $\frac{a+b+c}{3}$

B. $\frac{a-b+c}{3}$

C. $-\frac{a+b+c}{3}$

D. $\frac{a-b-c}{3}$

Answer: A

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8. If the position vector of P,Q are I + j + k and I + 4j + 7k respectively then the position vector of the point which divides $\overline{PQ}$ in the ratio 2 : 1 is

A. 2i + j + k

B. 3i + 2j + 4k

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

D. I + 3j + 5k

Answer: D

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9. The angle between a diagonal of a cube and the diagonal of a face of the cube is

A. $\sin^{-1}\left(\frac{1}{3}\right)$

B. $\cos^{-1}\left(\frac{1}{3}\right)$

C. $\cos^{-1}\left(\sqrt{\frac{2}{3}}\right)$

D. $\cos^{-1}\left(\frac{2}{3}\right)$

Answer: C

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10. $(a \times b)^2 + (a.\, b)^2 =$

A. $(a+b)^2$

B. a^2b^2

C. $(a-b)^2$

D. ab

Answer: B

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11. If a and b are vectors , satisfying $|a| = |b| = 2$ and $(a, b) = 38,$ then the area of triangle constructed with the vector a - b and a + b is

A. 2 sq. units

B. 3 sq. units

C. 1 sq. units

D. 4 sq. units

Answer: A

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12. The volume of the parallelopiped whose edges are given by $I + 2j + 3k, 2i + 3j + 2k, 2i + 3j + k$ is

A. 8

B. 6

C. 7

D. 12

Answer: B

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13. The value of $\cos 22\frac{1^\circ}{2}$ is

A. $\sqrt{2}+1$

B. $\frac{\sqrt{3}+1}{2\sqrt{2}}$

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

D. $\frac{\sqrt{\sqrt{2}-1}}{2\sqrt{2}}$

Answer: C

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14. The value of $\frac{\tan 70^\circ - \tan 20^\circ}{\tan 50^\circ} =$

A. 1

B. -1

C. -2

D. 2

Answer: D

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15. Solution of $4\cos^2 x + 2\sin^2 x = 3$ is

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

B. $n\pi \pm \frac{\pi}{3}$

C. $n\pi \pm \frac{\pi}{6}$

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

Answer: A

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16. If $a_1, a_2, a_3, \ldots, a_n$ is an A.P. with common difference d, then

$$\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right)+\tan^{-1}\left(\frac{d}{1+a_2a_3}\right)+\ldots\tan^{-1}\left(\frac{d}{1+a_{n-1}a_n}\right)\right] =$$

A. $\frac{nd}{1+x_1x_n}$

B. $\frac{(n-1)d}{x_1+x_n}$

C. $\frac{x_n-x_1}{x_n+x_1}$

D. $\frac{(n-1)d}{1+x_1x_n}$

Answer: D

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17. If $\sin h^{-1}(4)+\sin h^{-1}(5)=\beta$, then $\sin h(\beta)$ =

A. $5\sqrt{10}+4\sqrt{12}$

B. $4\sqrt{26}+5\sqrt{17}$

C. $4\sqrt{20}+5\sqrt{15}$

D. $4\sqrt{21}+5\sqrt{11}$

Answer: B

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18. In a right angled triangle ABC , $r:R:r_1$=

A. $1:2:3$

B. $5:12:10$

C. $2:5:12$

D. $7:6:8$

Answer: C

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19. In Δabc, if$b=\sqrt{2}+1, A=60^\circ, C=30^\circ,$ then c =

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

B. $\sqrt{2}+1$

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

D. $\frac{\sqrt{2}+1}{2}$

Answer: D

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20. A flag staff on top of the tower 30mt of height subtends an angle of - $\tan^{-1}\left(\frac{1}{3}\right)$ at a point on the ground 50mt from the foot of the tower. The height of the flag staff is

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21. If $K \neq 1$ then, $\left|\frac{z-z_1}{z-z_2}\right| = K$ is α

A. Straight line

B. Ellipse

C. Circle

D. Parabola

Answer: C

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22. If, $\left(\frac{2+2i}{2-2i}\right)^3+\left(\frac{2-2i}{2+2i}\right)^3=\alpha+ib$, then α and b are

A. $0, 0$

B. $0, 1$

C. $1, 1$

D. ,1,2`

Answer: A

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23. If $\cos\alpha + \cos\beta + \cos\gamma = 0 = \sin\alpha + \sin\beta + \sin\gamma$ then $\cos(2\alpha - \beta - \gamma) + \cos(2\beta - \gamma - \alpha) + \cos(2\gamma - \alpha - \beta) =$

A. 3

B. 2

C. 1

D. 0

Answer: A

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24. If ω is a complex cube root of unity , then $\cos\left[\left(\omega^7 + \omega^{11}\right)\pi + \frac{\pi}{3}\right]$

A. 3

B. 2

C. 1

D. 0

Answer: B

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25. If $x^8 + 1 = 0$, then X =

A. $cis\left[(2k+1)\frac{\pi}{8}\right], K = 0, 1, 2, 3, 4, 5, 6, 7$

B. $cis\left[(2k-1)\frac{\pi}{8}\right], K = 0, 1, 2, 3, 4, 5, 6, 7$

C. $cis\left[(3k+1)\frac{\pi}{8}\right], K = 0, 1, 2, 3, 4, 5, 6, 7$

D. $cis\left[(3k-1)\frac{\pi}{8}\right], k = 0, 1, 2, 3, 4, 5, 6, 7$

Answer: A

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26. $\sqrt{a + \sqrt{a + \sqrt{a + ...\infty}}} = ...$

A. $\frac{1 - \sqrt{4a - 1}}{2}$

B. $\frac{1+\sqrt{4a-1}}{2}$

C. $\frac{1+\sqrt{4a+1}}{2}$

D. $\frac{-1-\sqrt{4a+1}}{2}$

Answer: C

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27. $y=\frac{x^2-4x+1}{x^2-4x+3}$ does not lie between

A. $\left[\frac{3}{7}, 1,\right]$

B. $\left(\frac{-3}{7}, -1\right)$

C. $\left[\frac{-3}{7}, -1\right]$

D. $\left(\frac{3}{7}, 1\right)$

Answer: D

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28. The remainder when $x^5 - 2x^4 + 4x^3 + 3x^2 + 5x - 7$ is divided by x - 1 is

A. 4

B. 3

C. 2

D. 1

Answer: A

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29. The equation whose roots are reciprocal of $3x^4 + 2x^2 - 2x - 3 = 0$ is

A. $x^4 + 3x^3 - 2x^2 + 3x - 3 = 0$

B. $3x^4 + 2x^3 - 2x^2 - 3 = 0$

C. $3x^4 - 2x^3 + 2x^2 + 3$

D. $3x^4 - 2x^3 - 2x^2 + 3 = 0$

Answer: B

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30. The sum of all 4 digit numbers that can be formed using the digit 0,1 ,2, 3,4 without using zero is

A. $3, 33, 000$

B. $5, 55, 500$

C. $6, 66, 600$

D. $2, 22, 200$

Answer: C

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31. How many straight lines can be drawn by joining 15 distinct points on a circle ?

A. 100

B. 95

C. 90

D. 105

Answer: D

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32. The term independent of 'x' in the expansion of $\left(x^2+\frac{1}{x}\right)^{12}$ is

A. 505

B. 500

C. 495

D. 490

Answer: C

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33. The sum of (n + 1) terms of the series $\frac{C_0}{2} - \frac{C_1}{3} + \frac{C_2}{4} \ldots\ldots$ is

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

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

C. $\frac{1}{n+1}$

D. $\frac{1}{n+2}$

Answer: B

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34. $\frac{x^2+5x+7}{(x+1)^3} =$

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

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

C. $\frac{2}{x+1}+\frac{1}{(x+1)^2}+\frac{3}{(x+1)^3}$

D. $\frac{1}{x+1}+\frac{2}{(x+1)^2}+\frac{3}{(x+1)^3}$

Answer: A

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35. The range of the series of value 10,12,13,11,7,6 is

A. 7

B. 8

C. 6

D. 9

Answer: A

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36. Standard deviation of first 'n' natural numbers is

A. $\sqrt{\frac{n^2+1}{12}}$

B. $\sqrt{\frac{n-1}{nm}}$

C. $\sqrt{\frac{n^2-1}{12}}$

D. none

Answer: C

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37. Three persons A,B and C are to speak at a function along with 7 other persons. If the persons speak in random orders the probability that A speaks before B and B speaks before C is

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

B. $\frac{3}{8}$

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

D. none

Answer: C

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38. If p(A) $= \frac{3}{5}, p(B) = \frac{2}{5}, P(A \cap B) = \frac{1}{5}$ then, $P\left(\overline{A} \cap \overline{B}\right) =$

A. $\frac{6}{5}$

B. 1

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

D. $\frac{1}{5}$

Answer: D

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39. A,B,C are 3 newspaper from a city. 20% of the population red A, 16% read B, 14% read C, 8% both A and B, 5% both A and C, 4% both B and C, 2% all the three. Find the percentage of the populations who read atleast one newspaper.

A. 0.4

B. 0.35

C. 0.25

D. 0.3

Answer: B

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40. A bag contains 6 white and 4 black balls. A fair die is rolled and a number of balls equal to that appearing on the die is chosen from the bag at random. The probability that all the balls selected are white is

A. $\frac{1}{7}$

B. $\frac{1}{5}$

C. $\frac{1}{8}$

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

Answer: B

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41. For a binomial variate X if $n = 5$, and $P(X = 1) = 2P(X = 3)$, then p=

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

B. $\frac{1}{10}$

C. $\frac{1}{15}$

D. $\frac{1}{20}$

Answer: A

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42. The locus of a point P such that area of ΔPAB is 9 sq. units where $A = (2, 3)$ and $B(-4, 5)$ is

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

B. $x - 3y - 2 = 0$

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

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

Answer: C

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43. If the axes are rotated through an angle 60° then the cpprdinates of a point $\left(2, -4\sqrt{3}\right)$ in the old system are

A. $\left(5\sqrt{3}, -7\right)$

B. $(7, -\sqrt{3})$

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

D. $(-1, -5)$

Answer: B

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44. Area of the triangle formed by the line passing through the points (1,2),(-3,4) with the coordinate axes is

A. $\frac{25}{4} sq.\ units$

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

C. $\frac{25}{2} sq.\ units$

D. 25 sq. units

Answer: A

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45. For $a \neq b \neq c$ if the lines x + 2ay + a = 0 , x + 3by + b = 0 and x + 4cy + c = 0 ar concurrent , then a , b, c are in

A. A.G.P

B. G. P

C. A .P

D. H.P

Answer: D

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46. The equations of the lines passing through (4, 5) and making equal angles with the lines $3x = 4y + 7, 5y = 12x + 6$ are

A. $9x - 7y - 1 = 0, 7x + 9y - 73 = 0$

B. $y + 2 = 0, \sqrt{3}x - y - \left(2 + 3\sqrt{3}\right) = 0$

C. $3x + y = 4, x - 3y = -2$

D. none of the above

Answer: A

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47. If the slope of one of the lines $2x^2 + 3xy + \lambda y^2 = 0$ is 2 then the angle between the lines is

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

B. $\frac{\pi}{6}$

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

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

Answer: C

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48. The point of intersection of the pair of lines represented by $xy + 2x + 2y + 4 = 0$ is

A. $(-2, 2)$

B. $(-2, -2)$

C. $(2, -2)$

D. $(2, 2)$

Answer: B

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49. The ratio in which the line segment joining the points $A(-3, -2, -1), B(1, 2, 1)$ is divided by the xz-plane is

A. $3:1$

B. $2:1$

C. $1:2$

D. $1:1$

Answer: D

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50. If the d.r.'s of two lines are $(1, 0, 0)$ and $(0, 1, 0)$ then the angle between those two lines is,

A. $\frac{\pi}{6}$

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

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

D. none

Answer: B

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51. The perpendicular distance from the origin to the plane $x + y + Z + 3 = 0$ is

A. $\sqrt{3}$

B. $\sqrt{2}$

C. 1

D. 2

Answer: A

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52. $Lt_{x \to 0} \frac{\sqrt{4+x} - \sqrt[3]{8+3x}}{x}$ =

A. -3

B. 0

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

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

Answer: B

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53. If $f(x) = x$ for $x < 0$ then $Lt_{x \to 0} f(x)$=

$= 0f \text{ or } x = x0$

$= x^2 f \text{ or } x > 0$

A. 1

B. -1

C. 0

D. 2

Answer: C

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54. Let $f(x) = \dfrac{x + x^2 + \ldots + x^n - n}{x - 1}$, $x \neq 1$, the value of f (1)

A. $\dfrac{n+1}{2}$

B. $\dfrac{n(n-1)}{2}$

C. n

D. $\dfrac{n(n+1)}{2}$

Answer: D

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55. $\dfrac{d}{dx}\left\{\dfrac{a - b\cos x}{a + b\cos x}\right\} =$

A. $\dfrac{2ab\sin x}{(a - b\cos x)^2}$

B. $\dfrac{2ab\sin x}{(a + b\cos x)^2}$

C. $\dfrac{ab\sin x}{(a - b\cos x)^2}$

D. $\dfrac{ab\sin x}{(a - b\cos x)^2}$

Answer: B

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56. $\frac{d}{dx}\left[\cos^{-1}\left(4x^3 - 3x\right)\right] =$

A. $\frac{4}{\sqrt{1-x^2}}$

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

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

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

Answer: D

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57. If $ax^2 + 2hxy + by^2 = 1$ then $(hx + by)^3 y_2 =$

A. $h^2 - ab$

B. 0

C. $ab - h^2$

D. $ab - h^3$

Answer: A

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58. If there is an error of 0.02 cm , while measuring the side of an equilateral triangle as 2 cm , then the percentage error in area is

A. 1

B. 3

C. 2

D. 4

Answer: C

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59. The length of the subtangent of the curve $x^2 + 3xy + 2y^2 = 0$ at (1,2) is

A. $\frac{4}{11}$

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

C. $\frac{11}{2}$

D. $\frac{11}{4}$

Answer: D

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60. A particle moves on a line according to the law $s = at^2 + bt + c$. If the displacement after one second is 16 cm, the velocity after 2 second is 24 cm/sec and the acceleration is 8 cm/$\sec^2$, then $(a, b, c) =$

A. (8,4,4)

B. (4,8,4)

C. (8,8,4)

D. (4,4,8)

Answer: B

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61. The constant c of Lagrange's mean value theorem for $f(x) = 2\sin x + \sin 2x \text{in}[0, \pi]$ is

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

B. $\frac{\pi}{6}$

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

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

Answer: A

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62. The equation of the diameter of the circle $x^2 + y^2 - 4x - 6y + 3 = 0$ that is perpendicular $2x + 5y - 6 = 0$ is

A. $5x - 2y = 4$

B. $5x + 2y = 4$

C. $5x - 2y = -4$

D. $5x + 2y = -4$

Answer: A

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63. The equation of the circle touching both axes, lying in the first quadrant and having the radius 3 is

A. $x^2 + y^2 + 6x + 6y + 9 + 0$

B. $x^2 + y^2 - 6x - 6y + 9 = 0$

C. $x^2 + y^2 - 6x - 6y - 9 = 0$

D. $x^2 + y^2 + 6x - 6y + 0$

Answer: B

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64. If the points (k,1) (2,-3) are conjugate w.r.t. $x^2 + y^2 + 4x - 6y - 12 = 0$ then k

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

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

C. 1

D. -3

Answer: B

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65. The radical axis of the circles $x^2 + y^2 + 2x - 3y - 5 = 0$ is

A. $4x - 7y - 20 = 0$

B. $4x + 7y - 20 = 0$

C. $4x + 7y + 20 = 0$

D. $4x - 7y + 20 = 0$

Answer: C

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66. The condition that the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ to bisect the circumference of the circle $x^2 + y^2 + 2g^1x + 2f^1y + c^1 = 0$ is

A. $g(g - g^1) + f(f - f^1) = c - c^1$

B. $g^1(g - g^1) + f^1(f - f^1) = c - c^1$

C. $2g^1(g - g^1) + 2f^1(f - f^1) = c - c^1$

D. $2g(g - g^1) + 2f(f - f^1) = c - c^1$

Answer: C

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67. The equation of the parabola having focus (1,2) and directrix $x + 2y + 6 = 0$ is

A. $4x^2 + 4xy + y^2 + 22x - 44y - 11 = 0$

B. $4x^2 - 4xy + y^2 - 22x + 44y - 11 = 0$

C. $4x^2 + 4xy + y^2 + 22x + 54y + 11 = 0$

D. $4x^2 - 4xy + y^2 - 22x - 44y - 11 = 0$

Answer: D

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68. If the points (2,4) ,(k,6) are conjugate with respect to the parabola $y^2 = 4x$ then k =

A. -12

B. -2

C. $\frac{7}{2}$

D. 10

Answer: D

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69. The condition that the line $lx + my + n = 0$ to be a normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

A. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{\left(a^2 - b^2\right)^2}{n^2}$

B. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{\left(a^2 - b^2\right)^2}{n^2}$

C. $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{\left(a^2 + b^2\right)^2}{n^2}$

D. $\frac{a^2}{l^2} - \frac{b^2}{m^2} = \frac{\left(a^2 + b^2\right)^2}{n^2}$

Answer: B

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70. The length of the latus - rectum of the ellipse $9x^2 + 25y^2 - 18x - 100y - 116 = 0$ is

A. $9/2$

B. $8/5$

C. $8/3$

D. $18/5$

Answer: B

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71. The foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbla $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide. Then, the value of b^2 is

A. 7

B. 1

C. 9

D. 5

Answer: A

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72. $\int \frac{1+\sin^2 x}{1+\cos 2x} dx =$

A. $\tan x + \frac{x}{2} + c$

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

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

D. $2\tan x - \frac{x}{2} + c$

Answer: C

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73. $\int \frac{1}{\sqrt{x}+x} dx =$

A. $2\log\left(1+\sqrt{x}\right)+c$

B. $\log\left(x+\sqrt{x}\right)+c$

C. $2\log\left(x+\sqrt{x}\right)+c$

D. $\log\left(1+\sqrt{x}\right)+c$

Answer: A

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74. $\int \frac{1}{(1+x^2)\sqrt{1-x^2}} dx =$

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

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

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

D. none

Answer: C

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75. $\int \frac{(x+1)dx}{x(1+xe^x)} =$

A. $\log(1+xe^x)xe^x + c$

B. $\log\left[\frac{xe^x}{1+xe^x}\right] + c$

C. $\log\left[\frac{1+xe^x}{xe^x}\right] + C$

D. $\log(1+xe^x) + C$

Answer: D

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76. $\int_0^1 \frac{dx}{e^x + e^{-x}} =$

A. $\tan^{-1}(e) - \frac{\pi}{2}$

B. $\tan^{-1}(e) + \frac{\pi}{4}$

C. $\tan^{-1}(e) - \frac{\pi}{4}$

D. none

Answer: C

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77. $\int_0^{\pi/4} \left[\sqrt{\frac{1-\sin 2x}{1+\sin 2x}} dx = \right.$

A. $\log 2$

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

C. $-\log 2$

D. $\frac{-1}{2}\log 2$

Answer: B

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78. The area of the region bounded by the curves $y = 2^x, y = 2x - x^2$ and the lines $x = 0, x = 2$ is

A. $\frac{3}{\log 2} - \frac{4}{3}$

B. $\frac{3}{\log 2} + \frac{4}{3}$

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

D. $\frac{1}{\log 2} - \frac{4}{3}$

Answer: A

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79. The solution of $e^{x-y}dx + e^{y-x}dy = 0$ is

A. $e^x - e^y = C$

B. $e^{2x} - e^{2y} = C$

C. $e^{2x} + e^{2y} = c$

D. $e^x + e^y = C$

Answer: B

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80. Integrating factor of $\sin x \frac{dy}{dx} + y \cos x = \sin 2x$ is

A. $-\sin x$

B. $-\cos x$

C. cosx

D. sinx

Answer: C

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Physics

1. If a unit vector is represented by $0.5\hat{i} + 0.8\hat{j} + c\hat{k}$,the value of c is

A. $\sqrt{0.89}$

B. 0.2

C. 0.3

D. $\sqrt{0.11}$

Answer: D

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2. A thermos flask contains 250 g coffee at $90^\circ C$. To this 20 g of milk at $5^\circ C$ is added. After equilibrium is established, the temperature of the liquid is

(Assume no heat loss to the thermos bottle . Take specific heat of coffee and milk as $1.00 cal / g^\circ C$)

A. $3.23^\circ C$

B. $3.17^\circ C$

C. $83.7^\circ C$

D. $37.8^\circ C$

Answer: C

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3. A copper rod of length 75 cm and an iron rod of length 125cm are joined together end to end . Both are of circular cross section with diameter 2 cm . The free ends of the copper and iron are maintained at $100^\circ C$ and$0^\circ C$ respectively . The surface of the bars are insulated thermally . The temperature of the copper -iron junction is [Thermal conductivity of the copper is $386.4W/m-K$ and that of iron is $48.46W/m-K$].

A. $100^\circ C$

B. $0^\circ C$

C. $93^\circ C$

D. $50^\circ C$

Answer: C

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4. Total emf produd in a thermocouple does not depend on

A. The metals in the thermocouple

B. Thomson coefficients of the metals in the thermocouple

C. Temperature of the junctions

D. The duration of time for which the current is passed through thermocouple

Answer: D

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5. A ball is projected vertically down with an initial velocity from a height of 20 m on to a horizontal floor. During the impact it loses 50% of the energy and rebounds to the same height, the initial velocity of its projection is

A. $20ms^{-1}$

B. $15ms^{-1}$

C. $10ms^{-1}$

D. $5ms^{-1}$

Answer: A

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6. Moment of inertia of a body about an axis is $4kg - m^2$. The body is initially at rest and a torque of 8 N-m starts along the same axis. Work done by the R, about an axis which is a tangent and parallel to its torque in 20 s, in joules, is

A. 40

B. 640

C. 2560

D. 3200

Answer: D

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7. An electrically charged particle enters into a uniform magnetic induction field in a direction perpendicular to the field with a velocity v. Then, it travels

A. In a straight line without acceleration

B. With force in the direction of the field

C. In a circular path with a radius directly proportional to v^2

D. In a circular path with radius directly proportional to its velocity

Answer: D

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8. At a certain place, the angle of dip is 60° and the horizontal component of the earth's magnetic field (B_H) is 0.8×10^{-4} T. The earth's overall magnetic field is

A. $1.5 \times 10^{-4} T$

B. $1.6 \times 10^{-3} T$

C. $1.5 \times 10^{-3} T$

D. $1.6 \times 10^{-4} T$

Answer: D

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9. Wires A and B have resistivities p_A and p_B. If the diameter of the wire B is twice that of A and the Two wires have same resistance, then $\frac{L_b}{L_A}$ is

A. 2

B. 1

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

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

Answer: A

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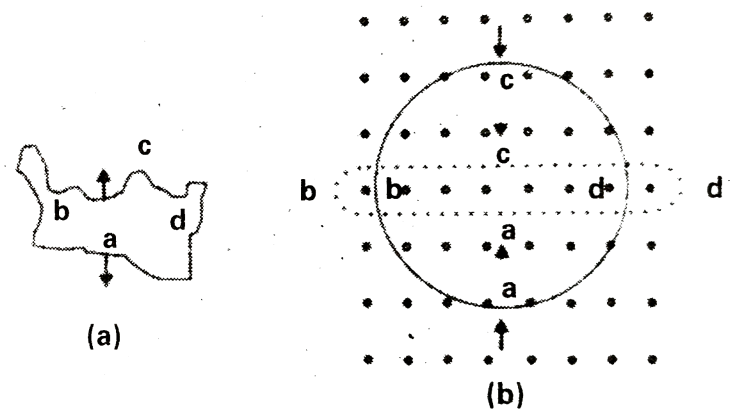
10. Use Lenz's law to determine the direction of induced current in the situations described by fig. a, b.

A circular loop being deformed into a narrow straight wire.



A. Towards left

B. In a direction opposite to change of the magnetic fleux

C. Towards right

D. In the direction of change of the magnetic flux

Answer: B

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11. A motor of power P_0 is used to deliver water at a certain rate through a given horizontal pipe. To increase the rate of flow of water through the

same pipe n times, the power of the moter is increased to P_1 to P_0 is

A. $n:1$

B. $n^2:1$

C. $n^3:1$

D. $n^4:1$

Answer: A

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12. A body of mass 5 kg makes an elastic collision with another body at rest and continues to move in the original direction after collision with velocity equal to $\frac{1}{10}$th of its original velocity . Then the mass of the second body is

A. $4.09kg$

B. $0.5kg$

C. 5 kg

D. $5.09kg$

Answer: A

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