MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

MCQ's

QUESTION PAPER 1

1. The value of $\frac{\cos 10^\circ + \sin 10^\circ}{\cos 10^\circ - \sin 10^\circ}$ *is* -

A. $\tan 35^\circ$

B. $-\cot 35^\circ$

C. $-\tan 35^\circ$

D. $\tan 55^\circ$

Answer: D

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2. If $\tan\frac{\theta}{2} = t$, then the value of $\frac{1 - t^2}{1 + t^2}$ is

A. $\cos 2\theta$

B. $\sec\theta$

C. $\cos\theta$

D. $\tan\theta$

Answer: C

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3. largest angle of the triangle whose sides are $1, \sin\theta$ and $\cos\theta$ is-

A. $\frac{2\pi}{3} - \theta$

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

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

D. θ

Answer: B

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4. In triangle ABC, if $a^2 + b^2 + c^2 - bc - ca - ab = 0$, then the value of $\sin^2 A + \sin^2 B + \sin^2 C$ is -

A. $\frac{9}{4}$

B. $\frac{4}{9}$

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

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

Answer: A

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5. If $\tan\theta = -\frac{4}{3}$, then the value of $\sin\theta$ is -

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

B. $\frac{4}{5}$ or , $-\frac{4}{5}$

C. $\frac{4}{5} but \neq -\frac{4}{5}$

D. $-\frac{4}{5} but \neq \frac{4}{5}$

Answer: B

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6. The general solution of $\tan 5\theta = \tan 3\theta$ is

A. $(2n + 1)$

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

C. $n\pi$

D. none of these

Answer: C

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7. If $\tan\theta + \sec\theta = e^x$, then the value of $\cos\theta$ is -

A. $\dfrac{e^x - e^{-x}}{e^x + e^{-x}}$

B. $\dfrac{e^x - e^{-x}}{2}$

C. $\dfrac{2}{e^x\left(-e^{-x}\right)}$

D. $\dfrac{2}{e^x + e^{-x}}$

Answer: D

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8. The number of integral values of k for which the equation $7\cos x + 5\sin x = 2k + 1$ has a solution is -

A. 8

B. 6

C. 7

D. 9

Answer: A

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9. The value of $\frac{\tan x + 2\tan 2x}{\tan x}$ is -

A. less than 1

B. greater than 5

C. cannot lie within 1 and 5

D. either less than 1 or greater than 5

Answer: C

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10. The trigonometrical equation $\sin\theta + \cos\theta = 2$ has -

A. one solution

B. two solutions

C. infinite no. of solutions

D. no solution

Answer: D

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11. The value of

$$-2\left[\sin^6\left(\frac{\pi}{2}+\alpha\right)+\sin^6(5\pi-\alpha)\right]$$ is eqqual to -

A. 2

B. 1

C. 0

D. 4

Answer: B

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12. In a triangle ABC, if $\frac{b+c}{11}=\frac{c+a}{12}=\frac{a+b}{13}$, then the value of cos C is-

A. $\frac{16}{17}$

B. $\frac{17}{36}$

C. $\frac{5}{7}$

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

Answer: C

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13. The value of $\left(\sin 47^{\circ}-\sin 25^{\circ}+\sin 61^{\circ}-\sin 11^{\circ}\right)$ is -

A. $\cos 7^{\circ}$

B. $\sin 7^{\circ}$

C. $2\sin 7^{\circ}$

D. $2\cos 7^{\circ}$

Answer: A

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14. if in a triangle ABC, $A \ne B$ and $a\cos A = b\cos B$, then which of the following is correct ?

A. $a^2 = b^2 + c^2$

B. $c^2 = a^2 + b^2$

C. $b^2 = c^2 + a^2$

D. none of these

Answer: B

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15. If α, β and γ are angle such that $\tan\alpha + \tan\beta + \tan\gamma = \tan\alpha\tan\beta\tan\gamma$ and $x = \cos\alpha + I\sin\alpha, y = \cos\beta + I\sin\beta$ and $z =$ then the value of xyz is -

A. 1

B. - 1

C. 0

D. $1 \text{ or } (-1)$

Answer: D

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16. If $\sin x + \sin^2 x = 1,$ then the value of $\left(\cos^{12} x + 3\cos^{10} x + 3\cos^8 x + \cos^6 x\right)$ is-

A. 1

B. 4

C. 2

D. 3

Answer: A

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17. If $x = \dfrac{2\sin\theta}{1 + \sin\theta + \cos\theta}$ then the value of $\dfrac{1 + \sin\theta - \cos\theta}{1 + \sin\theta}$

A. $-\dfrac{x}{2}$

B. $\dfrac{x}{2}$

C. x

D. $-x$

Answer: C

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18. The root of the equation $1 - \cos\theta = \sin\dfrac{\theta}{2}$ are -

A. $\dfrac{n\pi}{4}$

B. $2n\pi$

C. $n\pi$

D. $\dfrac{n\pi}{2}$ where $n \in \mathbb{Z}$

Answer: B

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19. In triangle ABC, if $b^2 = c^2 + a^2$ then the value of $(\tan A + \tan C)$ is -

A. $\tan A \tan C$

B. $\tan B$

C. $\frac{c^2}{ab}$

D. $\frac{b^2}{ac}$

Answer: D

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20. If $x - y = (4n + 1)\frac{\pi}{4}$ (where n is an integer) and $(x + y)$ is not an odd multiple of $\frac{\pi}{2}$, then the value of $\frac{\sin 2x - \sin 2y}{\cos 2x + \cos 2y}$ is -

A. -1

B. 0

C. 1

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

Answer: C

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21. If $1 + \cos\theta = k$ where θ is acute, then the value of $\sin\frac{\theta}{2}$ is-

A. $\sqrt{2 - k}$

B. $\sqrt{\frac{2 - k}{2}}$

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

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

Answer: B

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22. The value of the expression $\cos 1^{\circ} \cos 2^{\circ} \cos 3^{\circ} \ldots \cos 179^{\circ}$ is -

A. 1

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

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

D. 0

Answer: D

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23. If $\Delta = a^2 - (b - c)^2$, where Δ is the area of the triangle ABC, then tan A is equal to-

A. $\frac{8}{17}$

B. $\frac{11}{15}$

C. $\frac{15}{16}$

D. $\frac{8}{15}$

Answer: D

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24. If $12\cot^2\theta - 31\text{cosec}\theta + 32 = 0$, then the value of $\sin\theta$ is-

A. $\frac{4}{5}$ or $\frac{3}{4}$

B. $\frac{2}{3}$ or $-\frac{3}{4}$

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

D. 1 or $\frac{3}{5}$

Answer: A

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25. The value of $\left(\cos^{6}5^{\circ} - 15\cos^{4}5^{\circ}\sin^{2}5^{\circ} + 15\cos^{2}5^{\circ}\sin^{4}5^{\circ} - \sin^{6}5^{\circ}\right)$ is equal to-

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

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

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

D. 1

Answer: B

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26. Two roots of the quadratic equation $2x^{2} + 3ix + 2 = 0$ are-

A. $-\frac{i}{2}, -2i$

B. $2i, -\frac{i}{2}$

C. $2i, \frac{i}{2}$

D. $-2i, \frac{i}{2}$

Answer: D

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27. Fifth term of G.P. is 2, then the product of its firs 9 terms is-

A. 256

B. 1024

C. 512

D. none of these

Answer: C

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28. The number of numbers that can be formed using the digits $1, 2, 3, 4, 5$ (repetiton of digits is not permissible) such that the ten's digit is greater than thousand's digits, is-

A. 60

B. 45

C. 30

D. none of these

Answer: A

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29. If $\left(\frac{1+i}{1-i}\right)^m = 1,$ then least integral value of m is-

A. 2

B. 4

C. 8

D. none of these

Answer: B

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30. Let x and y be two variables and $x > 0, xy = 1,$ then the minimum value of $(x + y)$ is-

A. 1

B. 2

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

D. 4

Answer: B

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31. If the first term of an A.P. is 2 and common difference is 4, then the sum of its first 40 terms is-

A. 3200

B. 1600

C. 2000

D. 2800

Answer: A

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32. If a,b,c are integers not all simultaneously equal, then the minimum value of $\left|a+b\omega+c\omega^2\right|$ is-

A. 0

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

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

D. 1

Answer: D

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33. Let $n \geq 5b \neq 0,$ if in the binomial of $(a - b)^n,$ the sum of the 5th and 6th terms is zero, then the value of $\frac{a}{b}$ is-

A. $\frac{5}{n - 4}$

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

C. $\frac{n - 5}{6}$

D. $\frac{1}{5(n - 4)}$

Answer: B

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34. Imaginary part of $\frac{1}{1 + \cos\theta - i\sin\theta}$ is-

A. $-\frac{1}{2}\tan\frac{\theta}{2}$

B. $\frac{1}{2}\cot\frac{\theta}{2}$

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

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

Answer: D

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35. If $(1 - i)$ is a root of the equation $x^2 + ax + b = 0$, then the values of a and b are-

A. $a = 2, b = 1$

B. $a = -2, b = 2$

C. $a = 2, b = 2$

D. $a = 2, b = -2$

Answer: B

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36. The standard deviation of 50 values of a vartiable x is 15 is each value of the vartiable is divided by (-3), then the standard deviation of the new set of 50 values of x will be-

A. 15

B. -5

C. 5

D. -15

Answer: C

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37. Sum of infinite number of terms in G.P. is 20 and the sum of their squares is 100, then the common ratio of the G.P. is-

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

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

C. 5

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

Answer: A

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38. If $r > 1, n > 2$ are positive integers and the coefficients of $(r + 2)$ th and 3rd terms in the expansion of $(1 + x)^{2n}$ are equal, then n is equal to-

A. 3r

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

C. 2r

D. $2r + 1$

Answer: C

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39. How many words can be formed from the letters of the word COMMITTEE?

A. $9!$

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

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

D. $\frac{9!}{(2!)^3}$

Answer: D

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40. The solution set of the inequation $x + \frac{1}{x} \geq 2$ is-

A. $0 < x < \infty$

B. $0 \leq x < \infty$

C. R - $\{0\}$

D. $1 \leq x < \infty$

Answer: A

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41. What is the chance that a leap year selected at random will contain 53 Tuesdays of Saturdays?

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

B. $\frac{3}{7}$

C. $\frac{4}{7}$

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

Answer: C

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42. If the n the term of the G.P. $5, -\frac{5}{2}, \frac{5}{4}, -\frac{5}{8} \ldots is \frac{5}{1024}$, then the value of n is-

A. 11

B. 12

C. 13

D. 10

Answer: A

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43. The number of solutions for the equations $x^2 - 5|x| + 6 = 0$ is-

A. 4

B. 1

C. 3

D. 2

Answer: A

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44. If n be any integer, then $n(n+1)(2n+1)$ is-

A. an odd number

B. a perfect square

C. divisible by 6

D. none of these

Answer: C

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45. IF $i^2 = -1$, then the value of $\sum_{i-1}^{200} i^n$ is-

A. 100

B. 0

C. 50

D. -50

Answer: B

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46. The probability that the same number appears on throwing three dice simultaneously is-

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

B. $\frac{5}{36}$

C. $\frac{1}{36}$

D. none of these

Answer: C

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47. The number of straight lines that can be formed by joning 20 points of which 4 are collinear is-

A. 185

B. 190

C. 184

D. 186

Answer: A

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48. If $z = \frac{-2}{1 + \sqrt{3}i}$, then the value of arg(z) is-

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

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

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

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

Answer: D

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49. If in the expansion of $(1 + x)^m(1 - x)^n$ the coefficient of x and x^2 are 3 and (-6) respectively, then the value of n is-

A. 7

B. 8

C. 9

D. 10

Answer: C

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50. Let ω be an imaginary cube root of unity, then the value of $2(\omega + 1)\left(\omega^2 + 1\right) + 3(2\omega + 1)\left(2\omega^2 + 1\right)\ldots + (n + 1)(n\omega + 1)\left(n\omega^2 + 1\right)$ is-

A. $\left[\frac{n(n + 1)}{2}\right]^2 + n$

B. $\left[\frac{n(n + 1)}{2}\right]^2$

C. $\left[\frac{n(n + 1)}{2}\right]^2 - n$

D. none of these

Answer: A

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51. The locus of a point whose difference of distance from points $(3, 0)$ and $(-3, 0)$ is 4, is-

A. $5x^2 - 4y^2 = 20$

B. $4x^2 - 5y^2 = 20$

C. $3x^2 - 2y^2 = 6$

D. $2x^2 - 3y^2 = 6$

Answer: A

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52. A triangle with vertices $(4, 0), (-1, -1)$ and $(3, 5)$ is-

A. isosceles and right angled

B. isosceles but not right angled

C. right angled but not isosceles

D. neither right angled nor isosceles

Answer: A

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53. The lines $3x - 4y + 4 = 0$ and $6x - 8y - 7 = 0$ are tangents of a circel, then radius of the circel is-

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

B. $\frac{3}{4}$

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

D. 2

Answer: B

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54. The equation of the stringht line which is perpendicular to the line $y = x$ and passes through $(3, 2)$ is -

A. $x - y = 5$

B. $x + y = 1$

C. $x - y = 1$

D. $x + y = 5$

Answer: D

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55. The area of the circle which passes through the point $(4, 6)$ and whose centre is $(1, 2)$ is-

A. 5π square unit

B. 10π square unit

C. 25π square unit

D. 35π square unit

Answer: C

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56. The niclination of the straight line passing through the point $(-3, 6)$ and the mid-point of the line joning the points $(4, -5)$ and $(-2, 9)$ is-

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

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

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

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

Answer: D

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57. The angle between the straight lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is-

A. 30°

B. 45°

C. 60°

D. 90°

Answer: D

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58. If the two circles $2x^2 + 2y^2 - 3x + 6y + k = 0$ and $x^2 + y^2 - 4x + 10y + 16 = 0$ cut orthogonally, then the vlaue of k is-

A. 4

B. 41

C. 14

D. 2

Answer: A

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59. The normal at the point $(3, 4)$ on a circle cuts the circle at the point $(-1, -2)$, then the equation of the circle is-

A. $x^2 + y^2 + 2x - 2y - 13 = 0$

B. $x^2 + y^2 - 2x - 2y - 11 = 0$

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

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

Answer: D

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60. If the straight lines $x + q = 0, y - 2 = 0$ and $3x + 2y + 5 = 0$ are concurrent, then the value of q is-

A. 1

B. 2

C. 3

D. 4

Answer: C

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61. A line through $(0, 0)$ cuts the circel $x^2 + y^2 - 2ax = 0$ at A and B , then the locus of the centre of the circle drawn on AB as diameter is-

A. $x^2 + y^2 - 2ay = 0$

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

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

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

Answer: D

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62. In three dimensional space the point $(-2, -3, -4)$ is on the octant-

A. $OX'Y'Z'$

B. $OXYZ'$

C. $OXY'Z$

D. $OX'YZ'$

Answer: A

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63. If the tangent at the point p on the circle $x^2 + y^2 + 6x + 6y - 2 = 0$ meets the straight line $5x - 2y + 6 = 0$ at the point Q on the y-axis, then the length of PQ is-

A. 4

B. $2\sqrt{5}$

C. 5

D. $3\sqrt{5}$

Answer: C

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64. The coordinates of the foot of the perpendicular drawn from the point $P(x, y, z)$ upon the zx- plane are-

A. $(x, 0, 0)$

B. $(0, 0, z)$

C. $(x, y, 0)$

D. $(x, 0, z)$

Answer: D

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65. A triangle is formed by the coordinates $(0, 0), (21, 0)$ and $(0, 21)$. Then the number of integral coordinates strictly the triangle is-

A. 190

B. 105

C. 231

D. 205

Answer: A

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66. If $A = \left\{x : x^2 - 5x + 6 = 0\right\}. B = \{2, 4\}$ and $C = \{4, 5\}$, then $A \times (B \cap C)$ is-

A. null set

B. $\{(4, 2), (4, 3)\}$

C. $\{(2, 4), (3, 4)\}$

D. $\{(2, 4), (3, 4), (4, 4)\}$

Answer: C

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67. If the equation of latus rectum of a parabola is $x + y - 8 = 0$ and the equation of the tangent at the vertex is $x + y - 12 = 0$, then the length of the latus rectum is-

A. $4\sqrt{2}$

B. $8\sqrt{2}$

C. $2\sqrt{2}$

D. 8

Answer: B

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68. If the angle between the lines joining the end points of minor axis of an elipes with its one focus is $\frac{\pi}{2}$, then the eccentricity of the ellipse is-

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

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

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

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

Answer: B

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69. If the function f be defined by $f(x) = \frac{2x+1}{1-3x}$, then $f^{-1}(x)$ is-

A. $\frac{x-1}{3x+2}$

B. $\frac{3x+2}{x-1}$

C. $\frac{1-3x}{2x+1}$

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

Answer: A

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70. Let $A = \{a, b, c\}$ and $B = \{1, 2, 3\}$ be two sets, then which of the following is a relation from A to B ?

A. $\{(a, 3), (b, 1), (2, \infty\}$

B. $\{(a, 2), (3, b), (c, 1)\}$

C. $\{(1, c), (b, 2), (c, 1), (3, b)\}$

D. $\{(a, 2), (b, 1), (c, 3), (b, 2), (a, 3)\}$

Answer: D

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71. If A is the set whose elements are obtained by adding 1 to each of the even number , then the set-builder nation of A is-

A. $A = \{x : x \text{ is even}\}$

B. $A\{X : X \text{ is odd and } x > 1\}$

C. $A\{x : x \text{ is odd and } x \in \mathbb{Z}\}$

D. $A = \{x : x \text{ is an integer}\}$

Answer: C

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72. Which focus of the curve $y^2 + 4x - 6y + 13 = 0$ is at

A. $(2, 3)$

B. $(2, -3)$

C. $(-2, 3)$

D. $(-2, -3)$

Answer: A

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73. The focus of the curve $y^2 + 4x - 6y + 13 = 0$ is at-

A. $(2, 3)$

B. $(3, -3)$

C. $(-1, 3)$

D. $(-2, -3)$

Answer: C

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74. The eccentricity of an ellipes, with its centre at the origin, is $\frac{1}{2}$. If one of the directrices is $x = 4$, then the equation of the ellipse is-

A. $4x^2 + 3y^2 = 12$

B. $3x^2 + 4y^2 = 1$

C. $4x^2 + 3y^2 = 1$

D. $3x^2 + 4y^2 = 12$

Answer: D

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75. The domain of definition of the function $f(x) = \sqrt{\log_e\left(x^2 - 6x + 6\right)}$ is-

A. $\left(-\infty, 3 - \sqrt{3}\right] \cup \left[3 + \sqrt{3}, \infty\right)$

B. $\left(-\infty, 3 - \sqrt{3}\right] \cup [5, \infty)$

C. $\left(-\infty, 3 - \sqrt{3}\right) \cup \left(3 + \sqrt{3}, \infty\right)$

D. $(-\infty, 1] \cup [5, \infty)$

Answer: B

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76. If $f(x) = \dfrac{x - 1}{x + 1}$, then the value of $f(2x)$ in terms of $f(x)$ is-

A. $\dfrac{f(x)+1}{f(x)+3}$

B. $\dfrac{3f(x)-1}{f(x)+3}$

C. $\dfrac{3f(x)+1}{f(x)+3}$

D. $\dfrac{f(x)-1}{f(x)-3}$

Answer: C

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77. If $f(x) = \log\dfrac{1+x}{1-x}$ then-

A. $f(x)$ is odd

B. $f(x)$ is even

C. $f(x_1)f(x_2) = f(x_1 + x_2)$

D. $\dfrac{f(x_1)}{f(x_2)} = f(x_1 + x_2)$

Answer: A

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78. Let $f(2) = 4$ and $f'(2) = 4$, then $\lim_{x \to 2} \frac{xf(2) - 2f(x)}{x - 2}$ is equal to-

A. -2

B. 2

C. 3

D. -4

Answer: D

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79. Let $A = \{-1, 0, 1, 2, 3\}$ and $f: A \to \mathbb{Z}$ be given by $f(x) = x^2 - 5x + 7$, where $\mathbb{Z}$ is the set of integers, then per-image of 7 is-

A. 2 and 3

B. 0

C. 5 and 0

D. 1

Answer: B

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80. $\lim_{x \to 0} \frac{\sqrt{1 - \cos 2x}}{\sqrt{2}x}$ is equal to-

A. 1

B. -1

C. 0

D. the limit does not exist

Answer: D

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81. The distance between the directrices of the hyperabola $x = 8\sec\theta, y = 8\tan\theta$ is-

A. $16\sqrt{2}$

B. $4\sqrt{2}$

C. $8\sqrt{2}$

D. $6\sqrt{2}$

Answer: C

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82. The value of $\lim_{x \to 4} \dfrac{x^{7/2} - 4^{7/2}}{\log_e(x - 3)}$ is-

A. 112

B. 80

C. 96

D. 56

Answer: A

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83. The derivative of the function $f(x) = 3|x + 2|$ at the point, x = -3 is -

A. 0

B. 3

C. -3

D. does not exist

Answer: C

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84. If $A = \{-2, 1, 0, -1, 2\}, B = \{-6, -5, -3, j0, 3\}$ and the mappiong $f: A \to B$ is defined by $f(x) = 2x^2 + x - 6$, state which of the following is the image (-1):

A. 0

B. -5

C. -3

D. 3

Answer: B

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85. $\lim x \to -2 \dfrac{\sin^{-1}(x+2)}{x^2 + 2x}$ is equal to-

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

B. 1

C. 0

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

Answer: D

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86. If $f(x) = \cot^{-1}\left(\frac{3x - x^3}{1 - 3x^2}\right)$ and $g(x) = \cos^{-1}\left(\frac{1 - x^2}{1 + x^2}\right)$ then $\lim_{x \to a} \frac{f(x) - f(a)}{g(x) - g(a)}$ is equal to-

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

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

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

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

Answer: A

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87. The function $f(x) = p[x+1] + q[x-1]$ where [x] is the greatest integer function, and $\lim_{x \to 1+} f(x) = \lim_{x \to 1-} f(x) = f(1)$ when-

A. $p = 0$

B. $q = 0$

C. $p + q = 0$

D. $p - q = 0$

Answer: C

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88. Let $f\left(\frac{x+y}{2}\right) = \frac{1}{2}|f(x) + f(y)|$for all real x and y, if $f'(0)$ exists and equal to (-1), and $f(0) = 1$ then $f(2)$ is equal to-

A. 1

B. 2

C. 3

D. -1

Answer: D

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89. The range of the function $y = \dfrac{x}{1 + x^2}$ is-

A. $0 < \ \leq \frac{1}{2}$

B. $-\frac{1}{2} \leq y \leq \frac{1}{2}$

C. $\mathbb{R}$

D. $-\frac{1}{2} \leq y < 0$

Answer: B

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90. If $|x - 1| + |x - 2| + |x - 3| \geq 6$, then which of the following is correct ?

A. $x \leq 0$ and $x \geq 4$

B. $0 \leq x \leq 4$

C. $x \leq -2$ and $x \geq 4$

D. none of these

Answer: A

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QUESTION PAPER 2

1. If ABC is a right angled triangle, then the value of $\left(\cos^2 A + \cos^2 B + \cos^2 C\right)$ is -

A. 2

B. 1

C. 0

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

Answer: B

Watch Video Solution

2. If $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$, then the general value of $\theta$is-

A. 7

B. 24

C. -25

D. -7

Answer: C

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3. If $\cos\alpha + \cos\beta = \cos\frac{3\pi}{7}$ and $\sin\alpha + \sin\beta = \sin\frac{3\pi}{7}$, then the value of $\cos^2\frac{\alpha - \beta}{2}$ is-

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

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

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

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

Answer: A

Watch Video Solution

4. The coefficient of $\cos^3\theta$ in the expansion of $\cos 7\theta$ in powers of $\cos\theta$ is-

A. 56

B. -56

C. 112

D. -112

Answer: A

Watch Video Solution

5. If $A = 580^\circ$, then which one of the following is correct ?

A. $\sin\frac{A}{2} = \frac{1}{2}\left(\sqrt{1+\sin A} + \sqrt{1+\sin A}\right)$

B. $\sin\frac{A}{2} = -\frac{1}{2}\left(\sqrt{1+\sin A} - \sqrt{1-\sin A}\right)$

C. $\sin\frac{A}{2} = \frac{1}{2}\left(\sqrt{1-\sin A} - \sqrt{1-\sin A}\right)$

D. $\sin\frac{A}{2} = \frac{1}{2}\left(\sqrt{1+\sin A} - \sqrt{1-\sin A}\right)$

Answer: D

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6. The value of $\left(\sin 1950^\circ - \cos 1950^\circ\right)$ is equal to-

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

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

C. 0

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

Answer: B

Watch Video Solution

7. Two sides of a triangle are given by the roots of the equation $x^2 - 5x + 6 = 0$ and the angle between the sides is $\frac{\pi}{3}$. Then the perimeter of the triangle is-

A. $5+\sqrt{3}$

B. $5+\sqrt{2}$

C. $5+\sqrt{7}$

D. $5+\sqrt{5}$

Answer: C

Watch Video Solution

8. The value of $\left[\sqrt{3}\cot 20^\circ - 4\cos 20^\circ\right]$ is equal to-

A. 2

B. 0

C. -1

D. 1

Answer: D

Watch Video Solution

9. If $x = \cos^2\theta + \sin^4\theta$, then for all real values of θ -

A. $1 \le x \le 2$

B. $\frac{13}{16} \leq x \leq 1$

C. $\frac{1}{2} \leq x \leq \frac{3}{4}$

D. $\frac{3}{4} \leq x \leq 1$

Answer: D

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10. In a triangle ABC, $(\sin A + \sin B + \sin C)(\sin A + \sin B - \sin C) = 3\sin A \sin B$, then which one of the following is correct ?

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

B. $C = \frac{\pi}{3}$

C. $C = \frac{\pi}{9}$

D. none of these

Answer: B

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11. The value of $\sin\frac{\pi}{14}\sin\frac{3\pi}{14}\sin\frac{5\pi}{14}\sin\frac{7\pi}{14}$ is-

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

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

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

D. 1

Answer: A

Watch Video Solution

12. If the radius of the circumcircle of the isosceles triangle ABC is equal to $AB(=AC)$, then the angle A is equal to-

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

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

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

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

Answer: A

Watch Video Solution

13. If $0 < \theta < \frac{\pi}{2}$ and $\sin\frac{\theta}{2} = \sqrt{\frac{x - 1}{2x}}$, then the value of $\tan\theta$ is-

A. $\sqrt{x^2 + 1}$

B. $\sqrt{\frac{x + 1}{x + 1}}$

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

D. $\sqrt{\frac{x + 1}{x - 1}}$

Answer: C

Watch Video Solution

14. If $\sin A = \sin B$ and $\cos A = \cos B$, then the value of A in terms of B is-

A. $n\pi + B$

B. $2n\pi + B$

C. $n\pi - B$

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

Answer: B

Watch Video Solution

15. If in a triangle ABC,$A = 45^\circ, B = 75^\circ,$ then the value of $\left(a + \sqrt{2}c\right)$ is-

A. b

B. 3b

C. 2b

D. 4b

Answer: C

Watch Video Solution

16. If $\sin(\pi\cos\theta) = \cos(\pi\sin\theta)$, then the vlaue of $\cos\left(\theta \pm \frac{\pi}{4}\right)$ is equal to-

A. $\cos\frac{\pi}{8}$

B. $\frac{1}{2}\cos\frac{\pi}{8}$

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

D. $\frac{1}{2}\cos\frac{\pi}{4}$

Answer: D

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17. The general solution of the equation $4\sin 4\theta - 1 = \sqrt{5}$ is-

A. $\frac{n\pi}{4} + (-1)^n\frac{3\pi}{20}$

B. $\frac{n\pi}{4} + (-1)^n\frac{3\pi}{40}$

C. $\frac{n\pi}{2} + (-1)^n\frac{3\pi}{20}$

D. none of these

Answer: B

Watch Video Solution

18. If $\tan A + \cot A = 4$, then the value of $\left(\tan^4 A + \cot^4 A\right)$ is

A. 194

B. 195

C. 196

D. 197

Answer: A

Watch Video Solution

19. The general solution of the equation $\sin\theta + \cos\theta = 1$ is-

A. $\theta = 2n\pi$

B. $\theta = n\pi + \left\{(-1)^n + 1\right\}\frac{\pi}{4}$

C. $\theta = 2n\pi + \frac{\pi}{2}$

D. $\theta = n\pi + \left\{(-1)^n - 1\right\}\frac{\pi}{4}$

Answer: D

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20. For $\theta > \frac{\pi}{3}$, the value of $f(\theta) = \left(\sec^2\theta + \cos^2\theta\right)$ always lies in the interval-

A. $[2, \infty)$

B. $(0, 2)$

C. $[0, 1]$

D. $[1, 2]$

Answer: A

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21. In which of the following interval, the equation $\cos^2 x + \sin x + 1 = 0$ has one solution ?

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

B. $\left(-\frac{\pi}{4}, \frac{\pi}{4}\right)$

C. $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$

D. $\left(\frac{3\pi}{4}, \frac{5\pi}{4}\right)$

Answer: C

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22. In a triangle ABC, medians AD and BE are deawn. IF $AD = 4, \angle DAB = \frac{\pi}{6}$ and $\angle ABE = \frac{\pi}{3}$, then the area of the trianlge ABC is-

A. $\frac{32}{3\sqrt{3}}$

B. $\frac{32}{3}$

C. $\frac{64}{3}$

D. $\frac{64}{3\sqrt{3}}$

Answer: A

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23. The value of $\tan 31^\circ \tan 32^\circ \tan 33^\circ \ldots \tan 59^\circ$ is-

A. 2

B. 1

C. -1

D. 0

Answer: B

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24. In a triangle ABC, if $3a = b + c,$ then the value of $\cot\frac{B}{2}\cot\frac{C}{2}$ is-

A. 4

B. 3

C. 1

D. 2

Answer: D

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25. The value of $\left(\tan 9^\circ - \tan 27^\circ - \tan 63^\circ + \tan 81^\circ\right)$ is-

A. -1

B. 1

C. 2

D. 4

Answer: D

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26. The number of intergral roots of the equation $e^{x-8} + 2x - 17 = 0$ is -

A. 2

B. 1

C. 3

D. 4

Answer: B

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27. The sum of the coefficients in the expansion of $\left(1 + x - 3x^2\right)^{100}$ is-

A. 1

B. 100

C. -100

D. -1

Answer: A

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28. The locus of the point z satisfying are $\left(\frac{z-1}{z+1}\right)=k$ (where I is non-zero) is a-

A. stringht line parallel to x-axis

B. straight line parallel to y-axis

C. circle with centre on x-axis

D. circle with centre on y-axis

Answer: D

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29. Total numbe of four digit odd numbers that can be formed using the digits $0, 1, 2, 3, 4, 5, 6, 7$ are-

A. 216

B. 375

C. 720

D. 400

Answer: C

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30. The number of diagonals of a polyogn of 20 sides is-

A. 150

B. 170

C. 125

D. 210

Answer: B

Watch Video Solution

31. $10^n + 3.4^{n+2} + 5$ is always divisible by (for all $n \in N$)-

A. 7

B. 5

C. 17

D. 9

Answer: D

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32. If a,b,c are in A. P. then $\frac{a}{bc}, \frac{1}{c}, \frac{2}{b}$ will be in-

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: D

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33. If ω is an imaginary cube root of unity, then the value of $\left(1+\omega-\omega^2\right)\left(1-\omega+\omega^2\right)$ is-

A. 1

B. 2

C. 4

D. 8

Answer: C

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34. The roots of the equation $x^2 - (1 - 2i)x - 2i = 0$ are -

A. $-1, 2i$

B. $1, 2i$

C. $1, 2i$

D. $-1, -2i$

Answer: B

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35. State which of the following is not true:

A. $2 + 3i > 1 + 4i$

B. $6 + 2i > 3 + 3i$

C. $5 + 5i > 5 + 7i$

D. none of these

Answer: D

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36. A die is thrown. If the shows six, we drawna ball from a bag contining 2 black balls and 6 white balls. If it does not show six then we toss an anbiased coin. Then the number of event points I the sample of this experiment is-

A. 18

B. 14

C. 12

D. 10

Answer: A

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37. The mean deviation about of the set of numbers $7, 9, 24, 14$ and 26 is-

A. 7.5

B. 8

C. 7.2

D. 7

Answer: C

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38. If $S_n = nP + \frac{1}{2}n(n - 1)Q,$ where S_n is the sum of first n terms of an A.P. then the common difference of the A.P. will be-

A. $P + Q$

B. $2P + 3Q$

C. $2Q$

D. Q

Answer: D

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39. In n parallel lines in a plane are intersected by a family of m parallel lines, then the number of parallelograms formed in the network will be -

A. ${}^{m+n}C_2$

B. ${}^{m+n}C_4$

C. ${}^{m}C_2 \times {}^{n}C_2$

D. ${}^{mn}C_2$

Answer: C

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40. If $0 \le x \le 1$, then the minimum value of $\left(x^2 + x + 1\right)$is-

A. $\frac{3}{4}$

B. 1

C. 3

D. none of these

Answer: B

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41. How many terms are there in the expansion of $(4x + 7y)^{10} + (4x - 7y)^{10}$

?

A. 6

B. 5

C. 11

D. 22

Answer: A

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42. If $u_1 = \sqrt{2}, u_2 = \sqrt{2\sqrt{2}}, u_3 = \sqrt{2\sqrt{2\sqrt{2}}}, \ldots$ then the value of $u_{10} : u_9$ is-

A. $\sqrt{2}$

B. $2^{1/10}$

C. $2^{1/20}$

D. none of these

Answer: D

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43. The real values of x and y for which the complex numbers $9y^2 - 4 - 10xi$ and $8y^2 + 20i^7$ are conjugate to each other are-

A. $x = -2, y = \pm 2$

B. $x = 2, y = \pm 2$

C. $x = -2, y = \pm 1$

D. $x = 2, y = \pm 1$

Answer: A

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44. The value of $\left(2^{\frac{1}{4}}.\, 4^{\frac{1}{8}} 8^{\frac{1}{16}} \ldots \infty\right)$ is-

A. 1

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

C. 2

D. 4

Answer: C

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45. If ω is a complex number such that $\omega^3 = 1$, then the value of $\left(1 + \omega - \omega^2\right)^4 + \left(1 + \omega^2 - \omega\right)^4$ is-

A. 16

B. -16

C. 32

D. -32

Answer: B

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46. The first three terms in the expansion of $(1 + ax)^n$ are 1, $6x$ and $16x^2$, then the values of a and n are -

A. $a = 2, n = 9$

B. $a = 2, n = 3$

C. $a = \frac{3}{2}, n = 6$

D. $a = \frac{2}{3}, n = 9$

Answer: D

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47. A coin an a six faced die both unbiased are thrown simulaneously. The probability of getting a head on the coin and an odd number on the die is-

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

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

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

D. $\frac{3}{4}$

Answer: B

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48. The sum of the series $\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\ldots+\frac{1}{\sqrt{n}+\sqrt{n+1}}$ is equal to-

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

B. $n - 1$

C. $\sqrt{n+1} - 1$

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

Answer: C

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49. Solution set of the inequation $10 \leq -5(x-2) < 20$ is-

A. $(-2, 0)$

B. $[-2, 0)$

C. $(-2, 0]$

D. $[-2, 0]$

Answer: C

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50. If the cube roots of unity are $1, \omega, \omega^2$ then the roots of the equation $(x-2)^3 + 27 = 0$ are-

A. $1, 2 + 3\omega, 3\omega^2$

B. $-2, -2, 3\omega, -2 - 3\omega^2$

C. $-1, 2 - 3\omega, 2 - 3\omega^2$

D. $1, 3 - 2\omega, 3 - 2\omega^2$

Answer: C

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51. A point movs in such a manner that the sum of the squares of its distances from the points $(a, 0)$ and $(-a, 0)$ is $2b^2$. Then the locus of the moving point is-

A. $x^2 - y^2 = b^2 + a^2$

B. $x^2 - y^2 = b^2 - a^2$

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

D. $x^2 + y^2 = b^2 + a^2$

Answer: C

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52. The length of the chord joining the points in which the straight line $\frac{x}{3} + \frac{y}{4} = 1$ cuts the circle $x^2 + y^2 = \frac{169}{25}$ is-

A. 1

B. 2

C. 4

D. 8

Answer: B

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53. If p is the length of the perpendicular from the origin on the line whose intercepts on the axes are a and b, then-

A. $p^2 = a^2 + b^2$

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

C. $p^2 = a^2 - b^2$

D. $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

Answer: D

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54. In three dimensional spaces, the perpendicular distance of the point $p(x, y, z)$ from the Y-axis is-

A. $\sqrt{x^2 + z^2}$

B. $\sqrt{x^2 + y^2}$

C. z

D. x

Answer: A

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55. If the circel $x^2 + y^2 + 6x - 2y + k = 0$ bisects the circumference of the circel $x^2 + y^2 + 2x - 6y - 15 = 0$, then the value of k is-

A. 21

B. -21

C. 23

D. -23

Answer: D

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56. The lines $4x + 4y = 1, 8x - 3y = 2$ and $y = 0$ are-

A. concurrent

B. sides of an isosceles triangle

C. sides of an equiliateral triangle

D. none of these

Answer: A

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57. If the distrance of a point on the ellipse $4x^2 + 9y^2 = 36$ from its centre is 2, then the eccentric angle of the point is-

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

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

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

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

Answer: B

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58. Locus of centroid of the triangle whose vertices are $(a\cos t, a\sin t), (b\sin t, -b\cos t)$ and $(1, 0)$, where t is a parameter, is-

A. $(3x + 1)^2 + 9y^2 = a^2 - b^2$

B. $(3x - 1)^2 + 9y^2 = a^2 - b^2$

C. $(3x - 1)^2 + 9y^2 = a^2 + b^2$

D. $(3x + 1) + 9y^2 = a^2 + b^2$

Answer: C

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59. The image of the point $(4, -3)$ with respect to the line $x - y = 0$ is,

A. $(-4, -3)$

B. $(3, 4)$

C. $(-4, 3)$

D. $(-3, 4)$

Answer: D

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60. A straight line through the origin O meets the parallel lines $4x + 2y = 9$ and $2x + y + 6 = 0$ divides the segment PQ in the ratio-

A. $3:4$

B. $1:2$

C. $4:3$

D. $2:1$

Answer: A

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61. If $a + b + c = 0$, then the straight lines $4ax + 3by + c = 0$ always pass through a fixed whose coordinates are-

A. $(4, 3)$

B. $\left(\frac{1}{4}, \frac{1}{3}\right)$

C. $\left(\frac{1}{2}, \frac{1}{3}\right)$

D. $\left(-\frac{1}{4}, -\frac{1}{3}\right)$

Answer: B

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62. In three dimensional space the equation of xy-plane is-

A. $x = 0$

B. $y = 0$

C. $x + y = 0$

D. $z = 0$

Answer: D

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63. If $\left(x_i, \frac{1}{x_i}\right)(i = 1, 2, 3, 4)$ are the four distinct points on a circle, then the value of $x_1, x_2. x_3. x_4$ is-

A. 0

B. 4

C. 1

D. -1

Answer: C

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64. Equation of the circle which passes through the points of intersection of circles $x^2 + y^2 = 6$ and $x^2 + y^2 - 6x + 8 = 0$ and the point $(1, 1)$ is-

A. $x^2 + y^2 - 6x + 4 = 0$

B. $x^2 + y^2 - 3x + 1 = 0$

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

D. $x^2 + y^2 - 6x - 6y + 10 = 0$

Answer: B

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65. If the chord $u = mx + 1$ of the circel $x^2 + y^2 = 1$ subtends an angle of $45°$ at the major segment of the circle, then the value of m is-

A. ± 1

B. ± 2

C. ± 3

D. ± 4

Answer: A

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66. In a class of 30 pupils, 12 take mathematics, 16 take physics and 18 lake chemistry. If all the 30 pupish take at least one subject and no one take all those, then the number of pupish taking 2 subjects is-

A. 16

B. 10

C. 12

D. 8

Answer: A

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67. If $a \neq 0$ and the line $2bx + 3cy + 4d = 0$ passes through the points of intersection of the parabolas $y^2 = 4ax$ and $x^2 = 4ay$, then-

A. $d^2 + (2b - 3c)^2 = 0$

B. $d^2 + (3b + 2c)^2 = 0$

C. $d^2 + (3b + 2c)^2 = 0$

D. $d^2 + (2b + 3c)^2 = 0$

Answer: D

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68. Solve : $\frac{5^x}{5^y} = 25, \frac{4^y}{2^x} = 2$

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

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

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

D. $\frac{3}{4}$

Answer: B

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69. Any point on the hpyerbola $\frac{(x+1)^2}{16} - \frac{(y+2)^2}{4} = 1$ is of the form -

A. $(4\sec\theta, 2\tan\theta)$

B. $(4\sec\theta + 1, 2\tan\theta + 1)$

C. $(4\sec\theta - 1, 2\tan\theta - 2)$

D. $(4\sec\theta - 1, 2\tan\theta + 2)$

Answer: C

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70. The locus of the point $P(x, y)$ satisfying the relation $\sqrt{(x-3)^2 + (y-1)^2} + \sqrt{(x+3)^2 + (y-1)^2} = 6$ is-

A. a hypebola

B. an ellipse

C. a parabola

D. a straight line

Answer: D

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71. If $P(A)$ is the power set of A= {1,3,5,7}` then-

A. $\{1, 3\} \subset P(A)$

B. $\{1, 3\} \subseteq P(A)$

C. $\{1, 3\} \in P(A)$

D. none of these

Answer: C

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72. Let $A + \{-1, 0, 1, 2, 3\}$ and $f : A \to Z$ be given by $f(x) = x^2 - 5x + 7$, where $\mathbb{Z}$ is the set of integers. Then the pre-image of 7 is/ are-

A. 0

B. 0 or 5

C. 2 or 3

D. no per image of 7

Answer: A

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73. Range of the relation $R = \left\{x, \frac{1}{x}\right\} : 0 < x < 5$ and x is an integer " is

A. $\{1, 2, 3, 4\}$

B. $\{0, 1, 2, 3, 4\}$

C. $\left\{0, 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right\}$

D. $\left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\right\}$

Answer: D

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74. Domain of the relation $R = \{(x, y) : x \in \mathbb{N}, . Y \in \mathbb{N} \text{ and } 2x + y = 41\}$ is-

A. $\{3, 4, 5, \dots, 20\}$

B. $\{1, 2, 3, \dots 19, 20\}$

C. $\{1, 2, 3, \dots, 18\}$

D. $\{1, 3, 5, \dots, 35, 37, 39\}$

Answer: B

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75. If for all values of x and y , $f(x+y)=f(x)f(y)$ and $f(5)=2, f'(0)=3$, then the value of $f'(5)$ is-

A. 4

B. 5

C. 6

D. 3

Answer: C

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76. The domain of definition of the function $\sin^{-1}\left[\log_3\left(\frac{x}{3}\right)\right]$ is-

A. $[-9, -1]$

B. $[-1, 9]$

C. $[1, 9]$

D. $[-9, 1]$

Answer: C

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77. The equation of the parabola with vertex at the origin and directix is $y = 2$ is-

A. $y^2 = -8x$

B. $y^2 = 8x$

C. $x^2 = 8y$

D. $x^2 = -8y$

Answer: D

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78. $\lim_{x \to 0} \frac{1 - \cos mx}{1 - \cos nx}$ is equal to-

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

B. $\frac{n^2}{m^2}$

C. $\frac{m}{n}$

D. $\frac{n}{m}$

Answer: A

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79. The period of the function $f(x) = \sin 2x$ is-

A. 2π

B. π

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

D. 3π

Answer: B

Watch Video Solution

80. If the function $f(x) = \begin{cases} \frac{x^2 - 9}{x - 3} & \text{when} x \neq 3 \\ 2x + a & \text{when} x = 3 \end{cases}$ is such that $\lim_{x \to 3} f(x) = f(3)$, then the value of a is-

A. 3

B. 6

C. 0

D. 4

Answer: C

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81. If $3f(x) + 2f(-x) = 5(x - 2)$ then the value fo $f(1)$ is-

A. 0

B. 5

C. -2

D. 3

Answer: D

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82. $\lim_{x \to 0} \frac{a^x - b^x}{e^x - 1}$

A. $\log_e \frac{a}{b}$

B. $\log_e \frac{b}{a}$

C. 0

D. $\log_e(ab)$

Answer: A

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83. The function $f(x) = \sin\left|\log\left(x + \sqrt{x^2 + 1}\right)\right|$ is-

A. even

B. odd

C. neither even nor odd

D. none of these

Answer: B

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84. If $f(x - 2) = 2x^2 + 3x - 5,$ then the value of $f(2)$ is-

A. 9

B. 44

C. 22

D. 39

Answer: D

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85. If $f(x) = \cos\left[\pi^2\right]x + \cos\left[-\pi^2\right]x$, thenthe value of $f\left(\frac{\pi}{2}\right)$ is-

A. 1

B. 2

C. -1

D. 0

Answer: C

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86. The value of $\lim_{x \to \frac{\pi}{2}} \tan^2 x\left(\sqrt{2\sin^2 x + 3\sin x + 4} - \sqrt{\sin^2 x + 6\sin x + 2}\right)$ is-

A. $\frac{1}{16}$

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

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

D. $\frac{1}{12}$

Answer: D

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87. If $f(x + y, x - y) = xy$, then the arithmetic mean of $f(x, y)$ and $f(y, x)$ is-

A. 0

B. 1

C. x

D. y

Answer: A

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88. The range of $f(x) = \cos\frac{x}{3}$ is-

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

B. $[-1, 1]$

C. $[-3, 3]$

D. none of these

Answer: B

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89. The differential coefficient of the function $f(x) = |x - 1| + |x - 3|$ at the point $x = 2$ is-

A. -2

B. 2

C. 0

D. does not exist

Answer: C

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90. If $f(x) = \tan^{-1}\left(\frac{\cos x - \sin x}{\cos x + \sin x}\right)$ then the value of $\frac{d}{dx}f(x)$ is-

A. -1

B. 1

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

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

Answer: A

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QUESTION PAPER 3

1. The value of $\left(\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \ldots + \cos 180^\circ\right)$ is -

A. $\sqrt{2}$

B. 1

C. -1

D. 0

Answer: C

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2. The number of solutions of $\tan x + \sec x = 2\cos x$ in $(0, 2\pi)$ is

A. 4

B. 3

C. 2

D. 1

Answer: B

Watch Video Solution

3. If $\cos B = \dfrac{c^2 + a^2 - b^2}{2xc}$, then the value of x is

A. ab

B. b

C. 2b

D. a

Answer: D

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4. If $\cos(x - y) + 1 = 0$, then the value of $(\cos x + \cos y)$ and $(\sin x + \sin y)$ is-

A. $0, 0$

B. $1, 0$

C. $0, 1$

D. $1, 1$

Answer: A

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5. The measures of the sides of a triangle are $3, 5$ and 7 then the greatest angle of the triangle is-

A. 120°

B. 150°

C. 135°

D. 90°

Answer: A

Watch Video Solution

6. If $\sin x + \sin y + \sin z = 3$, then the value of $(\cos x + \cos y + \cos z)$ is-

A. 1

B. -3

C. 0

D. -1

Answer: C

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7. If $\cos A = \frac{1}{7}$ and $\cos B = \frac{13}{14}$ where A and B both are acute angles, then the value of $(A - B)$ is-

A. 75°

B. 30°

C. 45°

D. 60°

Answer: D

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8. $\left(\sec 50^\circ + \tan 50^\circ\right)$ is equal to-

A. $\tan 20^\circ + \tan 50^\circ$

B. $\tan 20^\circ + 2\tan 50^\circ$

C. $2\tan 20^\circ + \tan 50^\circ$

D. $2\left(\tan 20^\circ + \tan 50^\circ\right)$

Answer: B

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9. The value of $\operatorname{cosec}^2\theta\cot^2\theta - \sec^2\theta\tan^2\theta - \left(\cot^2\theta - \tan^2\theta\right)\left(\sec^2\theta\operatorname{cosec}^2\theta - 1\right)$ is-

A. 1

B. 0

C. -1

D. 2

Answer: B

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10. If the angles of a triangle are in the ratio $4:1:1$, then the ratio of the largest side to its perimeter is-

A. $\sqrt{3}:\left(\sqrt{3}+2\right)$

B. $1:\left(2+\sqrt{3}\right)$

C. $2:3$

D. $1:\left(\sqrt{3}+1\right)$

Answer: A

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11. If $\pi < A < \frac{3\pi}{2}$ and $\tan A = \frac{4}{3}$, then the value of $(5\sin 2A + 4\cos A + 3\sin A)$ is-

A. $\frac{4}{9}$

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

C. $-\frac{1}{3}$

D. 0

Answer: D

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12. The maximum value of $\left(4\sin^2 x + 3\cos^2 x\right)$ is-

A. 6

B. 5

C. 4

D. 3

Answer: C

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13. If $\sin 6\theta = 32\cos^5\theta\sin\theta - 32\cos^3\theta\sin\theta + 3x,$ then the value of x is-

A. $\cos\theta$

B. $\sin\theta$

C. $\sin 2\theta$

D. $\cos 2\theta$

Answer: C

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14. If $w = x + y + z$ then $(\sin x + \sin y + \sin z - \sin w)$ is equal to-

A. $4\cos\frac{y+z}{2}\cos\frac{y+z}{2}\cos\frac{z+y}{2}$

B. $4\sin\frac{y+z}{2}\sin\frac{z+x}{2}\sin\frac{x+y}{2}$

C. $4\sin\frac{x+y}{2}\sin\frac{y+z}{2}\cos\frac{z+x}{2}$

D. $4\sin\frac{x+y}{2}\cos\frac{y+z}{2}\cos\frac{z+x}{2}$

Answer: B

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15. If $\sin\theta + \cos\theta = m$ and $\sin^3\theta + \cos^3\theta = n$, state which of the following is true-

A. $m^3 - 3m + 2n = 0$

B. $n^3 - 3n + 2m = 0$

C. $m^3 + 3m + 2n = 0$

D. $m^3 - 3m + n = 0$

Answer: A

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16. If $\alpha = \frac{\pi}{18}$ radian then the value of $(\cos\alpha + \cos 2\alpha + \cos 3\alpha + \ldots + \cos 18\alpha)$ is-

A. $1 \text{ or }, -1$

B. 1

C. 0

D. -1

Answer: D

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17. The sides of a triangle are $\sin\alpha, \cos\alpha$ and $\sqrt{1 + \sin\alpha\cos\alpha}$ where $0 < \alpha < \frac{\pi}{2}$. Then the greatest angle of the triangle is-

A. 120°

B. 150°

C. 135°

D. 90°

Answer: A

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18. In a triangle ABC if $b = 2, B = 30°$, then the area of the circumcircal of triangle ABC in square units is-

A. 6π

B. 4π

C. 2π

D. π

Answer: B

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19. The value of $\cot\left(82\frac{1}{2}\right)^{\circ}$ is-

A. $\sqrt{6} - \sqrt{3} + \sqrt{2} - 2$

B. $\sqrt{6} + \sqrt{3} + \sqrt{2} - 2$

C. $\sqrt{6} - \sqrt{3} + \sqrt{2} + 2$

D. $\sqrt{6} - \sqrt{3} - \sqrt{2} - 2$

Answer: A

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20. If $\tan\theta + \sec\theta = 4$, then the value of $\sin\theta\left(0 < \theta < \frac{\pi}{2}\right)$ is-

A. $\frac{8}{15}$

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

C. $\frac{15}{17}$

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

Answer: C

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21. If $\sin C$ and $\cos C$ are the two roots of the quadatic equation $2x^2 - px + 1 =$, where $0 < C < \frac{\pi}{2}$, then how many possible values can p have ?

A. 4

B. 3

C. 2

D. 1

Answer: D

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22. If $11\theta = 90^\circ$, then the value of the expression $\tan\theta\tan2\theta\tan3\theta\tan4\theta\tan5\theta\tan6\theta\tan7\theta\tan8\theta\tan9\theta\tan10\theta$ is equal to-

A. 0

B. 1

C. -1

D. 2

Answer: B

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23. The base angles of a triangle are $\left(22\frac{1}{2}\right)^{\circ}$ and $\left(112\frac{1}{2}\right)^{\circ}$. If b is the base and h is the height of the triangle then-

A. $b = 2h$

B. $b = 3h$

C. $b = \left(1 + \sqrt{3}\right)h$

D. $2b = 3h$

Answer: A

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24. If $\alpha + \beta = \frac{\pi}{2}$ and $\beta + \gamma = \alpha$, then the value of $\tan\alpha$ is -

A. $\tan\beta + \tan\gamma$

B. $2\tan\beta + \tan\gamma$

C. $\tan\beta + 2\tan\gamma$

D. $2(\tan\beta + \tan\gamma)$

Answer: C

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25. If $\cos(\alpha - \beta) = \frac{\sqrt{3}}{2}$ and $\cos(\alpha + \beta) = \frac{1}{e}$, then the number of ordered pairs(α, β) such that $\alpha, \beta \in [-\pi, \pi]$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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26. A polygon has 35 diagonals, then the number os its sided is-

A. 10

B. 9

C. 8

D. 7

Answer: A

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27. Two sequence $\{t_n\}$ and $\{s_n\}$ are difined by $t_n = \log\left(\frac{5^{n+1}}{3^{n-1}}\right)$ and $s_n = \left[\log\left(\frac{5}{3}\right)\right]^n$, then-

A. $\{t_n\}$ and $\{s_n\}$ both are A.P.

B. $\{t_n\}$ is an A.P. and $\{s_n\}$ is a G.P.

C. $\{t_n\}$ and $\{s_n\}$ both are G.P.

D. $\{s_n\}$ is a G.P. and $\{t_n\}$ is neither A.P. nor G.P.

Answer: B

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28. If the sum of the squares of the deviations of 25 observation taken from the mean 40 is 900, then the coefficient of variation is-

A. 20 %

B. 12.5 %

C. 15%

D. 18%

Answer: C

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29. If A and B are the coefficients of x^p and x^q respectively in the expansion of $(1+x)^{p+q}$, then-

A. $qA = pB$

B. $A = -B$

C. $A = \frac{1}{B}$

D. $A = B$

Answer: D

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30. Elevent books consisting of 5 mathematics, 4 physics and 2 chemistry are place don a shelf. The number of possible ways of arranging them, on the assumption that the books of the same subject are all together, is-

A. $5!4!2!$

B. $(11)!5!4!2!$

C. $5!4!3!2!$

D. none of these

Answer: C

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31. In the polynomial $(x-1)(x-2)(x-3)\ldots(x-100)$, the coefficient of x^{99} is-

A. 99

B. -5050

C. 5050

D. -99

Answer: B

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32. Six line segments of lengths $2, 3, 4, 5, 6, 7$ units are given. The number of triangles that can be formed by there lines is-

A. ${}^{6}C_3 - 7$

B. ${}^{6}C_3 - 6$

C. ${}^{6}C_3 - 5$

D. ${}^{6}C_3 - 8$

Answer: A

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33. For all positive values of x and y the value of $\frac{\left(1+x+x^2\right)\left(1+y+y^2\right)}{xy}$ is-

A. > 9

B. < 9

C. ≤ 9

D. ≥ 9

Answer: D

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34. The point represented by the complex number $(2 - i)$ is rotated about origin through an angle of $\frac{\pi}{2}$ in clockwise direction. The new position of the point will be-

A. $1 + 2i$

B. $-1-2i$

C. $2+i$

D. $-1+2i$

Answer: B

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35. The number of integral solutions of $\frac{x+1}{x^2+4} \geq \frac{1}{4}$ is-

A. 5

B. 4

C. 3

D. 6

Answer: A

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36. The solution set of the inequation of $\frac{x - 2}{x + 5} > 2$ is-

A. $(- \infty, \ - 5)$

B. $(- \infty, \ - 12)$

C. $(- 12, \ - 5)$

D. $(- 12, \ - 5)$

Answer: C

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37. If x, y, z are in A. P. then $\frac{1}{yz}, \frac{1}{zx}, \frac{1}{xy}$ are in-

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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38. The condition theta $x^3 - 2px + 2q$ may be divisible by a factor of the form $x^2 + 2ax + a^2$ is -

A. $ap + 2q = 0$

B. $27p^3 = 4q^2$

C. $3p = 2q$

D. $p^3 = q^2$

Answer: D

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39. The value of $\left(1 + \frac{C_1}{C_0}\right)\left(1 + \frac{C_2}{C_1}\right)\left(1 + \frac{C_3}{C_2}\right)...\left(1 + \frac{C_n}{C_{n-1}}\right)$ is-

A. $\frac{n+1}{n!}$

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

C. $\frac{(n+1)^n}{(n-1)!}$

D. $\frac{(n-1)^n}{n!}$

Answer: B

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40. The area of the triangle whose vertices are represented by the complex numbers O,z and $z(\cos\alpha + I\sin\alpha)(0 < \alpha < \pi)$ is equial to -

A. $\frac{1}{2}|z|^2\cos\alpha$

B. $\frac{1}{2}\left|z^2\right|$

C. $\frac{1}{2}|z|^2\sin\alpha\cos\alpha$

D. $\frac{1}{2}|z|^2\sin\alpha$

Answer: D

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41. The natural number n for which the inequality $2^n > 2n + 1$ is valid, is-

A. $n > 3$

B. $n \geq 2$

C. $n \geq 3$

D. none of these

Answer: C

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42. A boy goes to school from his home at a speed of x km/h and comes back at a speed of y km/h, then his average speed is-

A. A.M. of x and y

B. H. M. of x and y

C. G. M. of x and y

D. none of these

Answer: B

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43. A real value of x will satisfy the equation $\frac{3 - i4x}{3 + i4x} = \alpha - I\beta(\alpha, \beta$ real) if-

A. $\alpha^2 - \beta^2 = -1$

B. $\alpha^2 - \beta^2 = 1$

C. $\alpha^2 + \beta^2 = 1$

D. $\alpha^2 - \beta^2 = 2$

Answer: C

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44. If $(1 + x)^{15} = a_0 + a_1x + a_2x^2 + \ldots + a_{15}x^{15}$, then the value of $\sum_{r=1}^{15} r.\frac{a_r}{a_{r-1}}$ is-

A. 110

B. 120

C. 115

D. 135

Answer: B

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45. If $a, b, x \in R, a < b$ and $y = \frac{x^2 - ab}{2x - a - b}$, then-

A. $y \in (a, b)$

B. $y \in [a, \infty)$

C. $y \neq (-\infty, a]$

D. $y \neq (a, b)$

Answer: D

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46. There are n distinct points on the circumference of a circle. If the number of pentagons that can be formed with these points as vertices is equal to the number of possible triangles, then the value of n is-

A. 8

B. 15

C. 30

D. 7

Answer: A

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47. Two roots of the quadratic equation $3x^2 + 7ix + 6 = 0$ are-

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

B. $-3i, \ -\frac{2}{3}i$

C. $-\frac{2}{3}i, 3i$

D. $\frac{2}{3}i, \ -3i$

Answer: D

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48. How many zeros are there in (126) !?

A. 29

B. 30

C. 31

D. 32

Answer: C

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49. How many numbers of five digits can be formed from the numbers $0, 1, 2, 3, 4$ when repetition of digits is not allowed ?

A. 120

B. 96

C. 144

D. 48

Answer: B

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50. A sample of 4 items is drawn at random from a lot of 10 items, containing 3 defectives. If x denosts the number of decective items I the sampe, then $P(0 < x < 3)$ is equal to-

A. $\frac{3}{10}$

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

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

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

Answer: C

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51. Let α be the distance between the lines $x - y + 2 = 0$ and $x - y = 2$ and β be the distance between the lines $4x - 3y = 5$ and $6y - 8x = 1$, then the value of $\frac{\alpha}{\beta}$ is-

A. $\frac{20\sqrt{2}}{11}$

B. $\frac{11\sqrt{2}}{20}$

C. $\frac{11}{20\sqrt{2}}$

D. $\frac{20}{11\sqrt{2}}$

Answer: A

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52. If the circle $x^2 + y^2 - 4rx - 2ry + 4r^2 = 0$ and $x^2 + y^2 = 25$ touch each other, then r satisfies-

A. $4r^2 + 10r \pm 25 = 0$

B. $5r^2 + 10r \pm 16 = 0$

C. $4r^2 \pm 10r + 25 = 0$

D. $4r^2 \pm 10r - 25 = 0$

Answer: D

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53. If the equation of the base of an equilateral triangle is $2x - y = 1$ and the vertex is $(-1, 2)$, then the length of a side of the triangle is-

A. $\dfrac{2}{\sqrt{15}}$

B. $\dfrac{2\sqrt{2}}{\sqrt{15}}$

C. $2\sqrt{\dfrac{5}{3}}$

D. $\sqrt{5}$

Answer: C

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54. If a circle passes through the point (a, b) and cuts the circle $x^2 + y^2 = p^2$ orthogonally, then the equation of the locus of its centre is-

A. $x^2 + y^2 - 2ax - 3by + a^2 - b^2 - p^2 = 0$

B. $2ax + 2by - \left(a^2 + b^2 + p^2\right) = 0$

C. $x^2 + y^2 - 3ax - 4by + a^2 + b^2 - p^2 = 0$

D. $2ax + 2by - a^2 + b^2 = 0$

Answer: B

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55. If the vertex of a triangle is $(1, 1)$ and the mid-points of two sides therough this vertex are $(-1, 2)$ and $(3, 2)$ then the centroid of the triangle is-

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

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

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

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

Answer: C

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56. The triangle formed by joining the points $(3, -11, 5) -, (-1, -3, 4)$ and $(-2, 1, -4)$ is-

A. isosceles

B. equilateral

C. right angled

D. scalene

Answer: A

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57. The lines $5x - 12y = 5$ and $10x - 24y + 3 = 0$ are tangents to the same circle. Then the diameter of the circle is

A. 1 unit

B. $2\sqrt{3}$ unit

C. $3\sqrt{3}$ unit

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

Answer: D

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58. Which one of the following is the reflection of the point $(4, 3)$ on the line $x + y = 0$?

A. $(-4, 3)$

B. $(-2, -4)$

C. $(-3, -4)$

D. $(4, -3)$

Answer: B

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59. The triangle formed by the line $x + \sqrt{3}y = 0, x - \sqrt{3}y = 0$ and $x = 4$ is-

A. isosceles

B. equilateral

C. right angled

D. none of these

Answer: B

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60. The circle $x^2 + y^2 - 8x + 4 = 0$ touches -

A. x-axis

B. y-axis

C. both axes

D. neither x-axis nor y-axis

Answer: B

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61. If the area of the triangle with vertices $(x, 0)$ and $C(1, 2, 4)$ are the vertices of the triangle ABC, then the length of its median through the vertex A is -

A. -2

B. -4

C. -6

D. -8

Answer: C

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62. If $A(-1, 4, 2), B(3, -2, 0)$ and $C(1, 2, 4)$ are the vertices of the triangle ABC, then the length of its median through the vertex A is-

A. 5 unit

B. 7 unit

C. $\sqrt{10}$ unit

D. $\sqrt{43}$ unit

Answer: A

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63. The radius of the circel, having centre at $(2, 1)$ whose one of the chord is a diameter of the circel $x^2 + y^2 - 2x - 6y + 6 = 0$ is-

A. $\sqrt{3}$

B. 1

C. 2

D. 3

Answer: D

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64. The equation of the straight line passing through the point $(4, 3)$ and making intercepts on the coordinate axes whose sum is (-1), is-

A. $3x + 2y = 6$ and $x + 2y = 1$

B. $\frac{x}{2} - \frac{y}{3} = 1$ and $\frac{x}{-2} + \frac{y}{1} = 1$

C. $\frac{x}{2} + \frac{y}{3} = -1$ and $\frac{x}{-2} + \frac{y}{1} = -1$

D. $\frac{x}{2} - \frac{y}{3} = -1$ and $\frac{x}{-2} - \frac{y}{1} = -1$

Answer: B

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65. Thet equations to the sides of a triangle are $x - 3y = 0, 4x + 3y = 5$ and $3x + y = 0$. Then the line $3x - 4y = 0$ passes through the-

A. incentre

B. centroid

C. orthocentre

D. circumcentre of the triangle

Answer: C

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66. If A,B,C be any three sets then $A \times (B \cap C)$ is equal to-

A. $(A \cap B) \times (A \cap C)$

B. $(A \times B) \cap (A \times C)$

C. $(A \cup B) \times C$

D. $(A \cap B) \times C$

Answer: B

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67. For any three sets A_1, A_2, A_3 let $B_1 = A_1, B_2 = A_2 - A_1$ and $B_3 = A_3 - \left(A_1 \cup A_2\right)$: then which one of the following statement is always true ?

A. $A_1 \cup A_2 \cup A_3 \subset B_1 \cup B_2 B_3$

B. $A_1 \cup A_2 \cup A_3 = B_1 \cup B_2 \cup B_3$

C. $A_1 \cup A_2 \cup A_3 \subset B_1 B_2 \cup B_3$

D. none of these

Answer: A

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68. If $A = \{x: -1 \le x \le 2\}$ and $B = \{x: 0 < x \le 4\}$ then $A \cap B$ is equal to-

A. $\{0, 1, 2\}$

B. $\{1, 2\}$

C. $\{x: 0 < x \le 2\}$

D. $\{x: 0 \le x \le 2\}$

Answer: C

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69. A relation R is defined from a set $A = \{2, 3, 4, 5\}$ to a set $B = \{6, 8, 10, 30\}$ by $aRb \Rightarrow a$ is relatively prime to b. Then R as a set of ordered pairs is-

A. $\{(3, 8), (5, 6), (5, 8)\}$

B. $\{(2, 8), (3, 8), (5, 6), (5, 8)\}$

C. $\{(3, 8), (3, 10), (5, 6), (5, 8)\}$

D. none of these

Answer: C

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70. An equilateral teiangle is inscribed in the parabola $y^2 = x$ whose one vertex is the vartex of the parabola. Then the length of a side of the triangle is-

A. $\sqrt{3}$ unit

B. $2\sqrt{3}$ unit

C. 8 unit

D. $4\sqrt{3}$ unit

Answer: B

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71. If foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ coincide with the foci of the hyperbola $\left(\frac{x^2}{144} - \frac{y^2}{81}\right) = \frac{1}{25}$, then the value of b^2 is -

A. 5

B. 9

C. 7

D. 1

Answer: C

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72. What is the length of the focal distance from the point $P(x_1, y_1)$ on the parabola $y^2 = 4ax$?

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73. Equation of the circel passing throuugh the intersection of ellipses $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $\frac{x^2}{b^2} + 1$is-

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

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

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

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

Answer: D

View Text Solution

74. Let $A = \{1, 2, 3, 4\}$ and $\mathbb{R}$ be the set of real numbers. If $f: A \to \mathbb{R}$ be deined by $f(x) = x^2 - 1$, then f as a set of ordered pairs will be -

A. $\{(0, 1), (3, 8), (2, 4), (4, 15)\}$

B. $\{(1, 0), (2, 3), (3, 8), (4, 15)\}$

C. $\{(1, 0), (2, 3), (3, 9), (4, 16)\}$

D. $\{(1, 0), (2, 3), (3, 9), (4, 16)\}$

Answer: B

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75. If set A contains p elements and set B contains q elements then their total number of reletions from A to B is-

A. pq

B. $p + q$

C. 2^{pq}

D. $2p + q$

Answer: C

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76. Domain of the function $f(x) = \dfrac{x}{\log_e(1 + x)}$ is-

A. $x \in (-1, 0)$

B. $x \in (-1, 0) \cup (0, \infty)$

C. $x \in (0, \infty)$

D. $x \in [-1, 0]$

Answer: B

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77. If $f(x) = \dfrac{x^2}{1 + x^2}$ then the range of f is

A. 2

B. $\dfrac{1}{2}$

C. 4

D. 1

Answer: A

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78. If $2f(x) + 3f(-x) = 15 - 4x$, then $f(x)$ is equal to-

A. $3 - 4x$

B. $4x - 3$

C. $3x + 4$

D. $4x + 3$

Answer: D

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79. Let $f(x) = \begin{cases} \dfrac{\sin \pi x}{5x}, & \text{when } x \neq 0 \\ K, & \text{when} x = 0 \end{cases}$ If $\lim_{x \to 0} \lim f(x) = f(0)$, then the value of K is-

A. 1

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

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

D. 0

Answer: B

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80. Let P be the point $(1, 0)$ and Q a point on the parabola $y^2 = 8x$, then

the locus of mid-point of $\overline{PQ}$ is-

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

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

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

D. $y^2 + 4x + 2 = 0$

Answer: C

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81. The domain of defination of the function $f(x) = \dfrac{\sin^{-1}(3 - x)}{\log(|x| - 2)}$ is-

A. $(2, 3) \cup (3, 4)$

B. $(2, 4]$

C. $(3, 4]$

D. $(2, \infty)$

Answer: A

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82. $\lim_{x \to 3}[x]$ is equal to-

A. 4

B. 3

C. 2

D. does not exist

Answer: D

Watch Video Solution

83. If the function $f(x) = \begin{cases} e^{2x} - 1, & \text{when } x \le 0 \\ ax + \dfrac{bx^2}{2}, & \text{when } x > 0 \end{cases}$ is differentiable at $x = 0$

then-

A. $a = 1, b = 2$

B. $a = 2, b =$ any value

C. $a = 2, b = 4$

D. $a =$ any value, $b = 4$

Answer: B

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84. The range of the function $f(x) = \frac{x+2}{|x+2|}$ is-

A. $\{0, 1\}$

B. $\mathbb{R}$

C. $\{1, -1\}$

D. $\mathbb{R} - \{-2\}$

Answer: C

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85. Let $f(x) = a^x (a > 0)$ be writtne as $f(x0 = g(x) + h(x),$ where $g(x0$ is an even function and $h(x)$ is an odd function. Then the value of $g(x+y) + g(x-y)$ is-

A. $g(x)h(x)$

B. $2g(x)$

C. $2g(x)g(y)$

D. $2g(x+y)g(x-y)$

Answer: C

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86. The value of $\lim_{x \to 0} \frac{(\cos x - 1)\left(\cos x - e^{x}\right)}{x^{3}}$ is-

A. 1

B. 2

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

D. 4

Answer: C

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87. If $f:\mathbb{R}\to\mathbb{R}$ satisfies $f(x+y)=f(x)+f(y)$ for all x,y $\in\mathbb{R}$ and $f(1)=7$, then the value of $\sum_{r=1}^{n} f(r)$ is-

A. $\frac{7n}{2}$

B. $\frac{7n(n+1)}{2}$

C. $\frac{7(n+1)}{2}$

D. $7n(n+1)$

Answer: B

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88. Let $f(x)$ be a polynomial function of second degree. If $f(1)=f(-1)$ and a, b, c are in A.P. then $f(a), f'(b), f'(c)$ are in-

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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89. Range of $f(x) = \dfrac{x^2x + 2}{x^2 + x + 1}(- \infty < x < \infty)$ is-

A. $1 \leq f(x) < \infty$

B. $1 \leq f(x) \leq \dfrac{7}{3}$

C. $1 < f(x) < \infty$

D. $1 < f(x) \leq \dfrac{7}{3}$

Answer: D

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90. If $f(x) = |x - 3| + |x - 4|$, then in the interval $0 \leq x \leq 5$, the function f(x) is -

A. differentiable at $x = 3$

B. differentiable at $x = 4$

C. differentiable at $0 \leq x \leq 6$

D. not differentiable at $x = 3$ and $atx = 4$

Answer: D

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QUESTION PAPER 4

1. If the sides of the triangle ABC are p,q and $\sqrt{p^2 + pq + q^2}$, then the greatest angle of the triangle is-

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

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

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

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

Answer: B

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2. If in a triangle ABC, $a = 5, b = 4$ and $A = \frac{\pi}{2} + B,$ then the value of $\tan\frac{C}{2}$ is-

A. $\frac{1}{9}$

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

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

D. $\frac{1}{40}$

Answer: A

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3. The value of $\frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ}$ is equal to-

A. $\tan 51^\circ$

B. $\tan 81^\circ$

C. $\tan 54^\circ$

D. $\tan 26^\circ$

Answer: C

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4. In a triangle $\frac{1}{a+c} + \frac{1}{b+c} = \frac{3}{a+b+c}$, then the value of the angle C is-

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

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

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

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

Answer: D

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5. The circumradius of the triangle whose side are 13, 12 and 5 is -

A. 6

B. $\frac{15}{2}$

C. 15

D. $\frac{13}{2}$

Answer: D

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6. If $0 < x < \frac{\pi}{2}$ and $1 + \sin x + \sin^2 + \sin^3 x + \ldots \infty = 4 + 2\sqrt{3}$, then the value of x is-

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

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

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

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

Answer: B

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7. Consider the following:

(1) If $\cot\theta = x$, then $x + 1 + x = \sec\theta \operatorname{cosec}\theta$

(2) If $x + \frac{1}{x} = \sin\theta$, then $x^2 + \frac{1}{x^2} = \sin^2\theta - 2$

(3) If $x = p\sec\theta$ and $y = q\tan\theta$, then $x^2q^2 - y^2p^2 = p^2q^2$

(4) The maximum valur of $\left(\cos\theta - \sqrt{3}\sin\theta\right)$ is 3 which of these are correct ?

A. (1), (2) and (3)

B. (1), (2)

C. (2), (3)

D. (3), (4)

Answer: A

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8. In any triangle ABC, the valur of $a\left(\cos^2 B + \cos^2 C\right) + \cos A(b\cos B + c\cos C)$ is-

A. $a + b + c$

B. c

C. a

D. b

Answer: C

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9. If $A+C=2b$, then the value of $\frac{\cos C - \cos A}{\sin A - \sin C}$ is-

A. $\cot B$

B. $\tan B$

C. $\tan 2B$

D. $\cot 2B$

Answer: B

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10. If $\sin 44\theta = \cos\theta$, then the value of $\tan 15\theta$ is-

A. $\sqrt{2}$

B. 1

C. $\sqrt{3}$

D. $\dfrac{1}{\sqrt{3}}$

Answer: D

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11. If $\cos\theta \neq \frac{1}{2}$, then the solution of the equation $\cos 2\theta = \left(\sqrt{2}+1\right)\left(\cos\theta - \frac{1}{\sqrt{2}}\right)$ are-

A. $2n\pi \pm \dfrac{\pi}{3}$

B. $2n\pi \pm \dfrac{\pi}{6}$

C. $2n\pi \pm \dfrac{\pi}{2}$

D. $2n\pi \pm \dfrac{\pi}{4}$

Answer: D

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12. The value of $\sin 6^\circ \sin 66^\circ$ is equal to-

A. $\frac{\sqrt{5}-1}{4}$

B. $\frac{3-\sqrt{5}}{4}$

C. $\frac{3-\sqrt{5}}{8}$

D. $\frac{\sqrt{5}-1}{8}$

Answer: C

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13. If $y = (1 + \tan A)(1 - \tan B)$ where $A - B = \frac{\pi}{4}$, then the value of $(y+1)^{y+1}$ is-

A. 27

B. 64

C. 4

D. 125

Answer: A

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14. ABC is a right angle isosceles triangle with $\angle B = 90^\circ$. If D is a point on AB so that $\angle CDB = 15^\circ$ and if $AD = 35$ cm then the value of CD is-

A. $70\sqrt{2}cm$

B. $35\sqrt{3}cm$

C. $\frac{35\sqrt{3}}{2}cm$

D. $\frac{35\sqrt{2}}{2}cm$

Answer: B

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15. If $\tan x = \frac{a}{b}$, then the value of $\left(a^2 + b^2\right)\sin 2x$ is-

A. $\frac{a}{b}$

B. ab

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

D. $2ab$

Answer: D

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16. If $\sin A + \sin B = 2$, then the value of $\cos(A + B)$ is-

A. 0

B. 1

C. -1

D. 2

Answer: C

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17. If $\sin\theta\frac{25}{25}$ and $0^\circ < \theta 90^\circ$, then the value of $\sin\frac{\theta}{2}$ is -

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

B. $\frac{12}{25}$

C. $\frac{7}{25}$

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

Answer: A

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18. If $x\sin^3\theta + y\cos^3\theta = \sin\theta\cos\theta$ and $x\sin\theta = y\cos\theta$, then which one of the following is correct ?

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

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

C. $x^2 - y^2 = 1$

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

Answer: B

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19. The equation $\sin x + \sin y + \sin z = -3$ for $0 \le x \le 2\pi, 0 < y \le 2\pi, 0 \le z \le 2\pi$ has-

A. no solution

B. one set of solution

C. two sets of solution

D. four sets of solution

Answer: B

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20. In a ΔABC, if $b = 20, c = 21$ and $\sin A = \frac{3}{5}$, then the value of a is

A. 13

B. 12

C. 15

D. 14

Answer: A

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21. The equation $3\cos\theta + 4\sin\theta = 6$ has -

A. finite solution

B. infinite solution

C. one solution

D. no solution

Answer: D

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22. Draw the graph of the function, f(x) = 2x - 5.

A. 2π

B. π

C. 4π

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

Answer: B

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23. In triangle ABC, the value of $\left[a^3\cos(B - C) + b^3\cos(C - A) + c^3\cos(A - B)\right]$ is-

A. abc

B. $a + b + c$

C. $3abc$

D. 0

Answer: C

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24. In a triangle ABC, $a = 2cm, b = 3cm$ and $c = 4cm,$ then the value of $\cos A$ is-

A. $\frac{11}{16}$

B. $\frac{1}{24}$

C. $\frac{7}{8}$

D. $\frac{5}{8}$

Answer: C

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25. If $\sin\theta = \sin\left(-600°\right)$, then one of the possible values of θ is-

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

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

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

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

Answer: D

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26. Two roots of the quadratic equation $x^2 + 3ix + 10 = 0$ are-

A. $-5i, 2i$

B. $2i, 5i$

C. $-2i, -5i$

D. none of these

Answer: A

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27. Numbers greater than 1000 but less than 4000 are formed using the digits $0, 1, 2, 3, 4$ (repetition allowed). Total number of such numbers is-

A. 125

B. 105

C. 375

D. 625

Answer: C

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28. If z and w are two non-zero complex numbers such that $|z| = |w|$ and $\arg z + \arg w = \pi$, then the value of z is equal to-

A. w

B. - w

C. w

D. - w

Answer: B

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29. The sum of integers from 1 to 100 that are divisible by 2 or 5 is-

A. 3000

B. 3600

C. 3250

D. 3050

Answer: D

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30. If a,b,c are distinct positive real numbers and $a^2 + b^2 + c^2 = 1$ then the value of $ab + bc + ca$ is-

A. equal to 1

B. less than 1

C. greater than 1

D. any real number

Answer: B

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31. If $|\alpha|, |\beta| < 1, s_1 = 1 - \alpha + \alpha^2 - \alpha^3 + \dots\infty$ and $s_2 = 1 - \beta + \beta^2 - \beta^3 + \dots\infty$ then

$\left(1 - \alpha\beta + \alpha^2\beta^2 - \alpha^3\beta^3 + \dots\infty\right)$ is equal to

A. $s_1 s_2$

B. $\dfrac{s_1 s_2}{1 + s_1 s_2}$

C. $\dfrac{1}{1 + s_1 s_2}$

D. $\dfrac{s_1 s_2}{2s_1 s_2 - s_1 - s_2 + 1}$

Answer: D

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32. If z is a complex number such that $\dfrac{z - 1}{z + 1}$ is purely imaginary, then the value of $|z|$ is-

A. 0

B. 2

C. $\sqrt{2}$

D. none of these

Answer: D

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33. The number of ways in which the letters of the word ARRANGE can be arranged such that both R do not come together, is-

A. 900

B. 360

C. 1260

D. 630

Answer: A

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34. The coefficient of x^{-4} in the expansion of $\left(\frac{3}{2} - \frac{3}{x^2}\right)^{10}$ is-

A. $\frac{504}{289}$

B. $\frac{405}{226}$

C. $\frac{450}{263}$

D. none of these

Answer: D

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35. The value of $\left[1^3 - 2^3 + 3^3 - 4^3 + \ldots + 9^3\right]$ is-

A. -425

B. 475

C. 425

D. -475

Answer: C

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36. A point z moves in the Argand plane such that $|z - 3i| = 2,$ then its locus is-

A. y-axis

B. a straight line

C. a circel

D. none of these

Answer: C

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37. The number of terms of the A.P. $3, 7, 11, 15\ldots$ to be teken so that the sum is 406 is-

A. 14

B. 16

C. 20

D. 24

Answer: A

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38. The two geometric means between 1 and 64 are-

A. 2, 8

B. 8, 16

C. 2, 16

D. 4, 16

Answer: D

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39. If ${}^{43}C_{r-6} = {}^{43}C_{3r+1}$, then the value of r is-

A. 10

B. 12

C. 8

D. 6

Answer: B

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40. The number of ways in which 5 boys and 3 girls can be seated in a row so that each girl is beween two boys, is-

A. 2800

B. 1880

C. 2880

D. 1440

Answer: C

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41. The polar from of the complex number $\left(i^{25}\right)^3$ is-

A. $\cos\pi + I\sin\pi$

B. $\cos\pi - I\sin\pi$

C. $\cos\frac{\pi}{2} + I\sin\frac{\pi}{2}$

D. $\cos\frac{\pi}{2} - i\sin\frac{\pi}{2}$

Answer: D

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42. If in a distribution, $n = 10, \sum x = 20, \sum x^2 = 200,$ then the value of standard deviation of the distribition is-

A. 2

B. 16

C. 6

D. 4

Answer: D

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43. The solutio set of the inequation $x + 19 < 4(1 - x)$ is-

A. $(3, \infty)$

B. $[3, \infty)$

C. $(- \infty, - 3)$

D. $(- \infty, - 3]$

Answer: C

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44. If $(n)C_r$ denotes the number of combinations of n different things taken r at a time, then the vlaue of ${}^nC_{r+1} + {}^nC_{r-1} + 2.\,{}^nC_r$ is-

A. ${}^{n+2}C_{r+1}$

B. ${}^{n+1}C_{r+1}$

C. ${}^{n+2}C_r$

D. ${}^{n+1}C_r$

Answer: A

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45. If n is a natural number then $\left(12^n + 25^{n-1}\right)$ is divisible by-

A. 9

B. 13

C. 12

D. 21

Answer: B

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46. If $|z - 4| < |z - 2|$, where z is a complex number, then its solution is-

A. $Re, z > 0$

B. $Re. z < 0$

C. $Re. z > 3$

D. $Re. z < 3$

Answer: C

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47. The sum to n terms of the series $[1.(1!) + 2.(2!) + 3.(3!) + \ldots]$ is-

A. $(n - 1)! - 1$

B. $(n - 1)! + 1$

C. $(n + 1)! - 1$

D. $(n + 1)! - 1$

Answer: D

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48. If the progressions $3, 10, 17, 24\ldots$ and $63, 65, 67, 69\ldots$ are such that their nth terms are equal, then the value of n is-

A. 12

B. 13

C. 14

D. 16

Answer: B

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49. The porbability that in a family of 5 members, exactly 2 members have birthday on Sunday is-

A. $\frac{12 \times 5^3}{7^5}$

B. $\frac{10 \times 6^2}{7^5}$

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

D. $\frac{10 \times 6^3}{7^5}$

Answer: D

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50. If the coefficients of the middle terms in the binomial expresion in powers of x of $(1 + kx)^4$ and of $(1 - kx)^6$ are equal then the value of $k(\neq 0)$ is-

A. $-\frac{3}{10}$

B. $\frac{10}{3}$

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

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

Answer: A

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51. If x is real and $\frac{x+5}{x-2} \leq 0$, state which of the following is true-

A. $x \in (-5, 2)$

B. $x \in (-5, 2)$

C. $x \in [-5, 2)$

D. $x \in (-5, 2]$

Answer: C

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52. In three dimensional space, $x = 0$ represents the equation of-

A. x-axis

B. xy-plane

C. yz-plane

D. zx-plane

Answer: C

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53. The area of the triangle formed by the striaght lines $y = 0, x + y = 0$ and $x - 4 = 0$ is-

A. 4

B. 8

C. 12

D. 16

Answer: B

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54. The equation of the directirix of the parabola $x^2 - 4x - 8y + 12 = 0$ is-

A. $y = 0$

B. $x = 1$

C. $x = -1$

D. $y = -1$

Answer: D

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55. If PM is the peraendicular from $P(2, 3)$ upon the line $x + y = 3$ then the coordinates of M are-

A. $(1, 2)$

B. $(2, 1)$

C. $(- 1, 4)$

D. $(4, \ - 1)$

Answer: A

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56. The equation of the circel whose diameter is the common chord of the circles $x^2 + y^2 + 2x + 3y + 2 = 0$ and $x^2 + y^2 + 2x - 3y - 4 = 0$ is-

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

B. $x^2 + y^2 + 2x + 2y - 1 = 0$

C. $x^2 + y^2 + 2x + 2y + 1 = 0$

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

Answer: C

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57. If the origin is transferred to the point $(-3, 2)$ keeping the axes parallel, then the equation $2x - 3y + 6 = 0$ becomes-

A. $2x' + 3y' = 6$

B. $2x' + 3y' + 6 = 0$

C. $3x' - 2y' = 6$

D. $2x' - 3y' = 6$

Answer: D

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58. The curve $a^2y^2 = b^2\left(a^2 - x^2\right)$ is symmetrical about-

A. both axis

B. x-axis

C. y-axis

D. none of these

Answer: A

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59. The number of interger values of m, for which the x coordinate of the point of intersection of the lines $y = mx + 1$ and $3x + 4y = 9$ is also in integer, is-

A. 0

B. 2

C. 1

D. 4

Answer: B

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60. The coordinates of the points of trisection of the line-segment joining the points $(2, 1, -3)$ and $(5, -8, 3)$ that is nearer to $(5, -8, 3)$ are-

A. $(4, 5, -1)$

B. $(3, -2, -1)$

C. $(2, -1, 3)$

D. $(4, -5, 1)$

Answer: D

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61. What is the equation to the locus of the centre of a circel of radius 1 unit which rolls inside the circle $x^2 + y^2 - 2x + 2y - 7 = 0$?

A. $x^2 + y^2 - 2x + 2y - 1 = 0$

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

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

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

Answer: B

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62. The figure formed by joining the points $(-4, 5), (3, 7)$ and $\left(\frac{3}{5}, \frac{221}{35}\right)$ in pairs is-

A. a right angled triangle

B. an acute angled triangle

C. an obtuse angled triangle

D. none of these

Answer: C

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63. The equation of the circel with centre $(2, 1)$ and touchig the line $3x + 4y = 5$ is-

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

B. $x^2 + y^2 - 4x - 2y + 5 = 0$

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

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

Answer: A

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64. If $(0, -1)$ and $(0, 3)$ are two opposite vertices of a square, then the other two vertices are-

A. $(2, 2), (1, 1)$

B. $(0, 1), (0, -3)$

C. $(3, -1), (0, 0)$

D. $(2, 1), (-2, 1)$

Answer: D

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65. The centre of the circel $x = 2 + 3\cos\theta, y = 3\sin\theta - 1$ is-

A. $(3, 3)$

B. $(2, -1)$

C. $(-2, 1)$

D. $(1, -2)$

Answer: B

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66. The locus of middle points of a family of focal chord of the parabola $y^2 = 4ax$ is-

A. $x^2 - 2ay + a^2 = 0$

B. $y^2 - 2ax + 2a^2 = 0$

C. $y^2 - 2ax + a^2 = 0$

D. $x^2 - 2ay + 2a^2 = 0$

Answer: B

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67. In a city 20% of the population travels by car, 50% by bus and 10% travels by both car and bus. Then persons travelling by car or bus is-

A. 80 %

B. 40 %

C. 60 %

D. 70 %

Answer: C

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68. If θ is a variable parameter, then the locus represented by $x = 3(\cot\theta - \tan\theta)$ is-

A. an ellipse

B. a circle

C. a parabola

D. a hyperbola

Answer: D

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69. A circle is drawn to cut a chord of length 2a unit along x-axis and to touch the y-axis. Then the locus of the centre of the circle is-

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

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

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

D. $x^2 + y^2 = 4a^2$

Answer: C

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70. The equation of the ellipse with foci at the point $(0, \pm 4)$ and directrices along $y = \pm 9$ is-

A. $5y^2 + 9x^2 = 180$

B. $5y^2 + 9x^2 = 45$

C. $5x^2 + 9y^2 = 45$

D. $5x^2 + 9y^2 = 180$

Answer: A

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71. $f: \mathbb{R} \rightarrow \mathbb{R}$ given by, $f(x) = x^2 + 5$, for all$x \in \mathbb{R}$: then the image set is [$\mathbb{R}$ is a set of real number]-

A. $\{f(x) \in \mathbb{R} : f(x) > 5\}$

B. $\{f(x) \in \mathbb{R} : f(x) \geq 5\}$

C. $\{f(x) \in \mathbb{R} : f(x) > -5\}$

D. $\{f(x) \in \mathbb{R} f(x) \geq -5\}$

Answer: B

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72. Let $Y = (1, 2, 3, 4, 5\}, A = \{1, 2\}, B = \{3, 4, 5\}$ and ϕ be the null st. If $A \times B$ denotes cortesian product of the sets A and B, then $(Y \times A) \cap (Y \times B)$ is equal to-

A. Y

B. ϕ

C. A

D. B

Answer: B

Watch Video Solution

73. Two finite sets have m and n elements. The number of elements in the power set of first set is 48 more than the total number of elements in the power set of the second set. Then the value of m and n are-

A. $m = 6, n = 3$

B. $m = 7, n = 5$

C. $m = 5, n = 3$

D. $m = 6, n = 4$

Answer: D

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74. The coodinates of the centre of the hyperbola $4x^2 - 9y^2 + 8x + 36y = 68$ are-

A. $(1, -2)$

B. $(-1, .2)$

C. $(1, 2)$

D. $(-1, -2)$

Answer: B

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75. Let $A = \{1, 2, 3, 4, 5, 6\}$, then total number of elements of the set $A \times A$ is-

A. 6

B. 12

C. 36

D. none of these

Answer: C

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76. If $f(x) = \frac{1}{\sqrt{x + 2\sqrt{(2x - 4)}}} + \frac{1}{\sqrt{x - 2\sqrt{2x - 4}}}$ for $x > 2$, then the value of $f(11)$ is-

A. $\frac{6}{7}$

B. $\frac{5}{7}$

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

D. $\frac{7}{6}$

Answer: A

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77. If $e^{f(x)} = \frac{10+x}{10-x}, x \in (-10, 10)$ and $f(x) = kf\left(\frac{200x}{100+x^2}\right)$, then the value of k is-

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

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

C. $\frac{7}{10}$

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

Answer: D

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78. The value of $\lim_{x \to \frac{\pi}{6}} \frac{3\sin x - \sqrt{3}\cos x}{6x - \pi}$ is equal to-

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

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

C. $\sqrt{3}$

D. $-\sqrt{3}$

Answer: B

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79. If $f(x) = \frac{x}{1 + |x|}$ for all $x \in \mathbb{R}$, then $f'(0)$ is equal to-

A. 0

B. 1

C. 2

D. - 1

Answer: B

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80. Let $\mathbb{Z}$ be the set of integers and $f: Zz \rightarrow \mathbb{Z}$ be defined by, $f(x) = 2x^2 - 3x + 6$. Then which of the following set is equal to the set $\{x : f(x) = 8\}$?

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

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

C. $\left\{-\frac{1}{2}, -2\right\}$

D. $\left\{-\frac{1}{2}, 2\right\}$

Answer: D

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81. The inverse of the function $f(x) = \frac{10^x - 10^{-x}}{10^x + 10^{-x}}$ is -

A. $f^{-1}(x) = \log_{10}(2 - x)$

B. $f^{-1}(x)\frac{1}{2}\log_{10}(2x - 1)$

C. $f^{-1}(x) = \frac{1}{2}\log_{10}\frac{1 + x}{1 - x}$

D. $f^{-1}(x) = \frac{1}{4}\log_{10}\frac{2x}{2 - x}$

Answer: C

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82. Domain of definition of the function $f(x) = \frac{3}{4 - x^2}\log_{10}\left(x^3 - x\right)$ is-

A. $(-1, 0) \cup (1.2) \cup (2, \infty)$

B. $(1, 2)$

C. $(-1, 0) \cup (1, 2)$

D. $(1, 2) \cup (2, \infty)$

Answer: A

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83. Let $f(x)$ be a differentiable function and $f'(1) = 4, f'(2) = 6$ where $f'(c)$ means the derivative of function $f(x) at x = c.$ Then

$\lim_{h \to 0} \frac{f\left(2 + 2h + h^2\right) - f(2)}{f\left(1 + h - h^2\right) - f(1)}$ is equal to-

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

B. 3

C. -3

D. does not exist

Answer: B

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84. If $\lim_{x \to 0} \frac{1}{x}[\log(3 + x) - \log(3 - x)] = k$, then the value of k is-

A. 0

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

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

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

Answer: C

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85. The function $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$ is-

A. a periodic function

B. neither an even nor an odd function

C. an even function

D. an odd function

Answer: D

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86. Which one of the following statement is true "

A. $|x - y| = |x| - |y|$

B. $|x - y| \geq |x| - |y|$

C. $|x + y| \leq |x| - |y|$

D. none of these

Answer: B

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87. Let $f(x) = \begin{cases} \frac{1 - \sin x}{\pi - 2x}, & \text{when} x \neq \frac{\pi}{2} \\ \lambda, & \text{when} x - \frac{\pi}{2} \end{cases}$ If $\lim_{x \to \frac{\pi}{2}} f(x) = f\left(\frac{\pi}{2}\right)$, then the value of λ is-

A. 0

B. 1

C. 2

D. -2

Answer: A

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88. The domain of defination of the function ${}^{16-x}C_{2x-1} + {}^{20-3x}P_{4x-5}$ is-

A. $\{2, 3, 4\}$

B. $\{1, 2, 3, 4, 5\}$

C. $\{1, 2, 3, 4\}$

D. $\{2, 3\}$

Answer: D

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89. If $f(x) = \begin{cases} \dfrac{x-1}{2x^2-7x+5} & \text{when} x \neq 1 \\ -\dfrac{1}{3} & \text{when} x = 1 \end{cases}$ then the value of $f'(1)$ is-

A. $\frac{1}{9}$

B. $-\frac{1}{9}$

C. $-\frac{2}{9}$

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

Answer: C

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90. If $f(a) = 2, f'(a) = 1, g(a) = -3. g'(a) = -1,$ then the value of $\lim_{x \to a} \frac{f(a)g(x) - g(a)f(x)}{a - x}$ is equal to-

A. 1

B. -1

C. 6

D. -5

Answer: A

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91. If a,b, be two fixed positive intergers such that , $f(a + x) = b + \left[b^3 + 1 - 3b^2 f(x) + 3b\{f(x)\}^2 - \{f(x)\}^3\right]^{1/3}$ for all real x, then $f(x)$ is a periodic function with period-

A. a

B. 2a

C. b

D. 2b

Answer: B

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QUESTION PAPER 5

1. The value of $\left(\cos 15^\circ - \sin 15^\circ\right)$ is-

A. 1

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

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

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

Answer: D

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2. In a triangle ABC, if $a = 2x, b = 2y$ and $C = 120^\circ$, then the area of the triangle is-

A. 2xy

B. xy

C. $\sqrt{3}xy$

D. 4xy

Answer: C

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3. if $\tan(A - B) = 1$ and $\sec(A + B) = \frac{2}{\sqrt{3}}$, then the smallest positive value of B is-

A. $\frac{19\pi}{24}$

B. $\frac{13\pi}{24}$

C. $\frac{7\pi}{34}$

D. $\frac{11\pi}{24}$

Answer: A

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4. The minimum value of $(\sin x + \cos x)$ is-

A. $\sqrt{2}$

B. $-\sqrt{2}$

C. 0

D. 1

Answer: B

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5. If $\cot\theta = x(>0)$, then the value of $\sin\theta$ is-

A. $\left(1 - x^2\right)^{1/2}$

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

C. $\left(1 - x^2\right)^{-1/2}$

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

Answer: B

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6. If in a triangle ABC, $a\cos^2\frac{C}{2} + c\cos^2\frac{A}{2} = \frac{3b}{2}$, then the sides a, b and c-

A. satisfy the relation $a + b = c$

B. are in G.P.

C. are in H.P.

D. are in H.P.

Answer: D

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7. The numbers $\tan\left(-\frac{11\pi}{6}\right)$, $\tan\left(\frac{21\pi}{4}\right)$ and $\cot\left(\frac{283\pi}{6}\right)$ are in-

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: B

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8. If $\cos A\frac{1}{7}$ and $\cos B = \frac{13}{14}$, where A and B both are acute angles, then the value of $(A - B)$ is-

A. 75°

B. 30°

C. 45°

D. 60°

Answer: D

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9. Let α, β be such that $\pi < \alpha < \beta < 3\pi$, if $\sin\alpha + \sin\beta = -\frac{21}{65}$ and $\cos\alpha + \cos\beta = \frac{27}{65}$, then the value of $\cos\frac{\alpha - \beta}{2}$ is-

A. $-\frac{3}{\sqrt{130}}$

B. $-\frac{6}{65}$

C. $\frac{6}{65}$

D. $\frac{3}{\sqrt{130}}$

Answer: A

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10. If $12\cot^2\theta$ - $31\mathrm{cos}ec\theta + 32 = 0,$ then the value of $\sin\theta$ is-

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

B. $\frac{4}{5}$ or $\frac{3}{4}$

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

D. 1 or $\frac{3}{5}$

Answer: B

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11. If θ and ϕ are positive acute angles satisfying $\sin\theta = \frac{1}{2}$ and $\cos\phi = \frac{1}{3},$ then the value of $(\theta + \phi)$ lies in the interval-

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

B. $\left(\frac{2\pi}{3}, \frac{5\pi}{6}\right)$

C. $\left(\frac{\pi}{2}, \frac{2\pi}{3}\right)$

D. $\left(\frac{5\pi}{6}, \pi\right)$

Answer: C

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12. The maximum value of $\left(4\sin^2 x + 3\cos^2 x\right)$ is-

A. 0

B. 1

C. 4

D. 3

Answer: D

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13. If α, β, γ are angles of a triangle then the value of $\left(\sin^2\alpha + \sin^2\beta + \sin^2\gamma - 2\cos\alpha\cos\beta\cos\gamma\right)$ is-

A. 2

B. 1

C. - 1

D. - 2

Answer: A

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14. Let n be a natural number such that $n > 4$ and $U_n = \sin^n x + \cos^n x$. Then which of the following is correct ?

A. $U_n = U_{n-1} - U_{n-4}\sin^2 x\cos^2 x$

B. $U_n = U_{n-2} - U_{n-4}\sin^2 x\cos^2 x$

C. $U_n = U_{n-1} + U_{n-3}\sin x \cos x$

D. $U_n = U_{n-4} - U_{n-2}\sin^2 x \cos^2 x$

Answer: B

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15. If $x = \sin^2\theta + \operatorname{cosec}^2\theta$, then which one of the following is correct ?

A. $x < 2$

B. $x > 2$

C. $x \geq 2$

D. $x = 2$

Answer: C

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16. The value of $\sin 47^{\circ} - \sin 25^{\circ} + \sin 61^{\circ} - \sin 11^{\circ}$ is-

A. $2\sin 7^{\circ}$

B. $2\cos 7^{\circ}$

C. $\sin 7^{\circ}$

D. $\cos 7^{\circ}$

Answer: D

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17. If $0 < \theta < \frac{\pi}{2}$ and $\sin 2\theta = \cos 3\theta$, then the value of $\sin\theta$ is-

A. $\frac{\sqrt{5} - 1}{4}$

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

C. $\frac{\sqrt{5} + 1}{4}$

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

Answer: A

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18. If in a ΔABC, the altituds drawn from the vertices A,B, C on opposite sides are in H.P., then $\sin A$, $\sin B$, $\sin C$ are in-

A. H.P.

B. G.P.

C. A.P.

D. none of these

Answer: C

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19. If $\cos A = \frac{3}{4}$ then, the value of $\sin\frac{A}{2}\sin\frac{5A}{2}$ is-

A. $\frac{1}{32}$

B. $\frac{11}{32}$

C. $\frac{11}{16}$

D. $\frac{9}{32}$

Answer: B

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20. If $\tan\frac{\alpha\pi}{4} = \cot\frac{\beta\pi}{4}$, then which one of the following is correct ?

A. $\alpha + \beta = 0$ when $n \in \mathbb{Z}$

B. $\alpha + \beta = 2n$

C. $\alpha + \beta = 2n + 1$

D. $\alpha + \beta = 2(2n + 1)$

Answer: D

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21. In a triangle ABC, if the sides are $a = 3, b = 5, c = 4,$ thenb the value of $\left(\sin\frac{B}{2} + \cos\frac{B}{2}\right)$ is equal to-

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

B. $\sqrt{2}$

C. 1

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

Answer: B

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22. The value of $\tan\left(7\frac{1}{2}\right)^{\circ}$ is-

A. $\sqrt{6} + \sqrt{3} + \sqrt{2} - 2$

B. $\sqrt{6} - \sqrt{3} + \sqrt{2} + 2$

C. $\sqrt{6} - \sqrt{3} + \sqrt{2} - 2$

D. $\sqrt{6} - \sqrt{3} - \sqrt{2} - 2$

Answer: C

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23. If $\cos(x - y) = -1$, then the values of $(\cos x + \cos y)$ and $(\sin x + \sin y)$ are respectively-

A. 1, 0

B. 0, 1

C. 1, 1

D. 0, 0

Answer: D

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24. If in a triangle ABC, $b\sin B = c\sin C$, then the triangle is-

A. right angle

B. isosceles

C. scalene

D. equilateral

Answer: B

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25. If $\frac{\tan 3A}{\tan A} = x$, then the value of $\frac{\sin 3A}{\sin A}$ is-

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

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

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

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

Answer: C

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26. The locus of the centre of a circle which touches the circles $\left|z - z_1\right| = a$ and $\left|z - z_2\right| = b$ externally $\left(z, z_1, z_2\right.$ are complex numbers) will be-

A. an ellipse

B. a hyperbola

C. a circle

D. none of these

Answer: B

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27. If n is a natural number, then $\left(4^n - 3n - 1\right)$ is always divisible by-

A. 9

B. 18

C. 27

D. 21

Answer: A

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28. If $(1+i)(1+2i)(1+3i), \ldots (1+ni) = a+ib$ then the value of $2 \times 5 \times 10 \times \ldots \times \left(1+n^2\right)$ is-

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

B. $\sqrt{a^2-b^2}$

C. a^2-b^2

D. a^2+b^2

Answer: D

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29. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order ?

A. 360

B. 240

C. 120

D. 480

Answer: A

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30. There are n points in a plane of which m points are collinear. How many lines can be formed from these points ?

A. ${}^{n}C_{2}$ - ${}^{m}C_{2}$

B. ${}^{n-m}C_2$

C. ${}^{n}C_2 - {}^{m}C_2 - 1$

D. ${}^{n}C_2 - {}^{m}C_2 + 1$

Answer: D

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31. The value of $\left({}^{n}C_1 + 2.\,{}^{n}C_2 + 3.\,{}^{n}C_3 + \ldots + n\,{}^{n}C_n\right)$ is-

A. 2^n

B. $n.2^n$

C. $n.\,2^{n-1}$

D. $n.\,2^{n+1}$

Answer: C

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32. If $ab = 2a + 3b, a > 0, b > 0,$ then the minimum value of ab is-

A. 36

B. 24

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

D. 18

Answer: B

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33. If $a_1, a_2, a_3, \ldots, a_{n+1}$ are in A. P. then the value of $\frac{1}{a_1a_2} + \frac{1}{a_2a_3} + \frac{1}{a_3a_4} + \ldots + \frac{1}{a_na_{n+1}}$ is-

A. $\frac{n-1}{a_1a_{n+1}}$

B. $\frac{1}{a_aa_{n+1}}$

C. $\frac{n}{a_1a_{n+1}}$

D. $\frac{n+1}{a_1 a_{n+1}}$

Answer: C

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34. IF first term of an infinite G.P. is x and its sum is 5, then-

A. $0 < x < 10$

B. $0 < x \leq 10$

C. $-10 < x < 0$

D. $0 \leq x \leq 10$

Answer: A

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35. If the sum of first n terms of an A.P. series is $n^2 + 2n$, then the term of the series having value 201 is-

A. 99 th term

B. 100 th term

C. 101 th term

D. 102 th term

Answer: B

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36. Everybody in a room shake hands with everybody else. If the total number of handshakes is 66, then the number of persons in the room is-

A. 11

B. 12

C. 12

D. 14

Answer: B

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37. If a,b,c,d ar all real numbers and $\left(a^2+b^2\right)d^2 - 2(a+c)bd + \left(b^2+c^2\right) = 0,$ then a,b,c are in -

A. G.P.

B. A.P.

C. H.P.

D. none of these

Answer: A

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38. The coefficient of x^6 in the explanation of $\left(x^2 + x - 1\right)^4$ is-

A. 2

B. -4

C. 2

D. 4

Answer: C

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39. How many nine digit numbers can be formed using the digits $2, 2, 3, 3, 5, 5, 8, 8, 8$ so that odd digits occupy even positions ?

A. 240

B. 180

C. 120

D. 60

Answer: D

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40. If ω is a non-ral cube root of unity then the value of $(a+b)(a+b\omega)\left(a+b\omega^2\right)$ is-

A. $a^3 - b^3$

B. 0

C. a^2+b^2

D. a^3+b^3

Answer: D

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41. The chanve of throwing a total of 8 with two dice is-

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

B. $\frac{5}{36}$

C. $\frac{7}{36}$

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

Answer: B

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42. If $(1 + i)$ is a root of the equation $x^3 - 5x^2 + 9x - 6 = 0,$ then its other two roots are-

A. $-1, (2 - i)$

B. $1, (-2 + i)$

C. $1, (2 - i)$

D. $1, -2 - i$

Answer: C

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43. Three numbers a,b,c are such that $\frac{a^2+ab+b^2}{ab+bc+ca}=\frac{a+b}{a+c}$, then the numbers b, a, c are in-

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: B

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44. The complex numbers $1,\ -1$ and $i\sqrt{3}$ from a triangle which is-

A. equilateral triangle

B. isosceles triangle

C. right angled triangle

D. isosceles right angled triangle

Answer: A

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45. Two roots of the quadratic equation $x^2 + (i - 5)x + 18 + i = 0$ are -

A. $-2 + 3i, 3 + 4i$

B. $2 - 3i, 3 + 4i$

C. $-3 - 4i, 2 - 3i$

D. $3i4i, 2 + 3i$

Answer: D

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46. The digit in the unit's place of the number $\left[(183)! + 3^{183}\right]$ is-

A. 4

B. 2

C. 3

D. 7

Answer: D

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47. If in the expansion of $(1 + x)^n$ the coefficient of 2nd, 3rd and 4th terms are in A.P., then the value of n is-

A. 5

B. 7

C. 6

D. 8

Answer: B

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48. If $2(1 - x) \geq 3x + 17$, state which of the following true-

A. $x \in (3, \infty)$

B. $x \in [-3, \infty)$

C. $x \in (-\infty, -3]$

D. $x \in (-\infty, 3]$

Answer: C

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49. In a distribution, coefficient of variation $= 5\%$ and variance =4, then the mean of the distribution is -

A. 40

B. 32

C. 25

D. 45

Answer: A

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50. If a straight line passing through the focus of the parabola $x^2 = 4ay$ intersects the parabola at the points (x_1, y_1) and (x_2, y_2) then the value of x_1x_2 is-

A. a^2

B. $-a^2$

C. $4a^2$

D. $-4a^2$

Answer: D

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51. If thte equation $3y^2 + 6y - 5x - 7 = 0$ reduces to the form $y^2 = ax$ when the origin is shifted to the point (h, k) without ration, then the value of (h, k) is-

A. $(-2, -1)$

B. $(-1, -2)$

C. $(1, 2)$

D. $(2, -1)$

Answer: A

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52. The line-segment the points $(3, 4)$ and $(2, -3)$ is divided by x-axis in the ratio-

A. $3:4$

B. $4:3$

C. $-4:3$

D. $-5:2$

Answer: B

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53. Find the area of the triangle formed by the lines $y - x = 0, x + y = 0$ and $x - k = 0$.

A. $\dfrac{|m + n|}{(m - n)^2}$

B. $\dfrac{2}{|m - n|}$

C. $\dfrac{1}{|m - n|}$

D. $\dfrac{1}{|m + n|}$

Answer: C

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54. C is a point on the line-segment joining the points $A(2, -3, 4)$ and $B(8, 0, 10)$ if the y-coordinate of C is $(-2,)$ then its z-coordinate will be-

A. 4

B. 6

C. -4

D. 5

Answer: B

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55. If $lx + my + n = 0$ is the perpendicular bisector of the segment of line joining (α, β) and (γ, β) then which one of the following is correct ?

A. $\dfrac{\gamma - \alpha}{l} = \dfrac{\delta - \beta}{m} = \dfrac{-2(l\alpha + m\beta + n)}{l^2 + m^2}$

B. $\dfrac{\gamma - \alpha}{l} = \dfrac{\delta - \beta}{m} = \dfrac{2(l\alpha + m\beta + n)}{l^2 + m^2}$

C. $\dfrac{\gamma - \alpha}{l} = \dfrac{\delta - \beta}{m} = \dfrac{l\alpha + m\beta + n}{l^2 + m^2}$

D. $\dfrac{\gamma - \alpha}{m} = \dfrac{\delta - \beta}{l} = \dfrac{l\alpha + m\beta + n}{l^2 + m^2}$

Answer: A

View Text Solution

56. The radius of the circle $x^2 + y^2 + 4x + 6y + 13 = 0$ is-

A. $\sqrt{26}$

B. $\sqrt{13}$

C. $\sqrt{23}$

D. 0

Answer: D

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57. The two circles $x^2 + y^2 - 2x + 22y + 5 = 0$ and $x^2 + y^2 + 14x + 6y + k = 0$ intersect orthogonally provided k is equal to-

A. 47

B. -47

C. 43

D. -43

Answer: A

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58. The image of the origin with reference to the line $4x + 3y = 25$ is -

A. $(8, -6)$

B. $(-8, 6)$

C. $(8, 6)$

D. $(-8, -6)$

Answer: C

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59. Lex x is even natural number less than 12, then domain of the relation $R = \{(2x - 5), (x - 3)\}$ is-

A. $\{2, 5, 7, 11, 16\}$

B. $\{-1, 3, 7, 11, 15\}$

C. $\{1, 4, 7, 10, 13\}$

D. $\{-3, 1, 5, 9, 13\}$

Answer: B

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60. If the circles $x^2 + y^2 + 2ax + cy + a = 0$ and $x^2 + y^2 - 3ax + dy - 1 = 0$ intersect in two distinic points P and Q, then the line $5x + by - a = 0$ passes through P and Q for-

A. infinitely many vlaues of a

B. exactly two valus of a

C. exactly one value of a

D. no ral values of a

Answer: D

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61. The lines parallel ot the x-axis and passing through the intersection of the lines $ax + 2by + 3b = 0$ and $bx - 2ay - 3a = 0$ [where$(a, b) \neq (0, 0)$] is-

A. above the x-axis at a distnace of $\frac{3}{2}$ from it

B. above the x-axis at a distance of $\frac{2}{3}$ from it

C. below the x-axis at a distance of $\frac{3}{2}$ from it

D. below the x-axis at a distance of $\frac{2}{3}$ from it

Answer: C

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62. The ratio in which the straight line joining points $(3, 5, -7)$ and $(-2, 1, 8)$ is divided by the yz-plance is-

A. $3:2$

B. $2:3$

C. $-3:4$

D. $1:2$

Answer: A

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63. Which one of the following points is the nearest poit on the line $3x - 4y = 25$ from the origin ?

A. $(-1, -7)$

B. $(3, -4)$

C. $(-3, 4)$

D. $(4, -3)$

Answer: B

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64. $x+y=6$ and $x+2y=4$ are two diameters of a circle. If the circel passes through the point $(6, 2)$, then its radius is-

A. 4

B. 6

C. $2\sqrt{5}$

D. 20

Answer: C

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65. If the distance between the directrices of a rectangular hyperbola is 10 unit, then the distance between its foci is-

A. $10\sqrt{2}$ unit

B. $20\sqrt{2}$ unit

C. $8\sqrt{2}$ unit

D. 20 unit

Answer: D

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66. The coorinates of the foci of the ellipse $9x^2 + 5y^2 + 30y = 0$ are-

A. $(0, \ -1), (0, \ -5)$

B. $(0, 1), (0, 5)$

C. $(1, 0), (5, 0)$

D. $(-1, 0), (-5, 0)$

Answer: A

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67. Let $f\left(x + \frac{1}{x}\right) = x^2 + \frac{1}{x^2}, x \neq 0,$ then the value of $f(x)$ is-

A. x^2

B. $x^2 - 2$

C. $x^2 + 2$

D. $x^2 - 1$

Answer: B

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68. The range of the function ${}^{7-x}P_{x-3}$ is-

A. $\{1, 2, 3, 4, 5\}$

B. $\{1, 2, 3, 4\}$

C. $\{1, 2, 3\}$

D. $\{1, 2\}$

Answer: C

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69. If the coordinates of one end of a focal chord of the parabola $y^2 = -8$ be $(-8, -8)$, then the coordinates of other end are-

A. $(-2, 4)$

B. $(-2, -4)$

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

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

Answer: D

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70. If a focal chord of $y^2 = 16x$ is a tangent to $(x-6)^2 + y^2 = 2,$. then the possible values of the slopes of the chord are-

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

B. $-2, \frac{1}{2}$

C. $1, -1$

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

Answer: C

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71. If $A = \{1, 2, 3, 4, 5\}, B = \{2, 4, 6\}, C = \{3, 4, 6\}$ then $(A \cup B) \cap C$ is-

A. $\{3, 4, 6\}$

B. $\{1, 2, 3\}$

C. $\{3, 4, 5\}$

D. $\{1, 2, 6\}$

Answer: A

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72. The orbit of the earth around the sun is an ellipes with the sun at one of its foci. If the semi-major axis is 150 million kilometers and the eccentricity is $\frac{1}{60}$, then the difference between the maximum and the minimum distance between the earth and teh sun is-

A. 20

B. 5

C. 50

D. 10

Answer: B

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73. In which of the following intervals two function $f(x) = x$ and $g(x) = +\sqrt{x^2}$ are same ?

A. $0 < x < \infty$

B. $0 \leq x < \infty$

C. $-\infty < x < \infty$

D. $-\infty < x \leq 0$

Answer: B

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74. If $A_n = \left\{x : 22 + \frac{1}{n} \leq x \leq 10 - \frac{1}{n}, n = 1, 2, 3\ldots\right\}$. then the valus of set $A_1 \cup A_2 \cup A_3 \cup \ldots \cup A_n \cup \ldots$ is-

A. $\{x : 2 \leq x \leq 10\}$

B. $\{x : 2 \leq x < 10\}$

C. $\{x : 22 < x \leq 10\}$

D. $\{x : 22 < x < 10\}$

Answer: D

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75. If two sets A and B have 99 elements in common , then the number of elements common to each of the sets $A \times B$ and $B \times A$ are-

A. 99

B. 100

C. $(99)^2$

D. 2^{99}

Answer: C

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76. The range of the function $f(x) = \sin\left(\sin^{-1}x + \cos^{-1}x\right)(|x| \leq 1)$ is-

A. $\{1\}$

B. $\{0\}$

C. $\{x: -1 \leq x \leq 1\}$

D. $\{-1\}$

Answer: A

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77. The value of $\lim_{x \to 0} \dfrac{10^x - 2^x - 5^x + 1}{x \log(1+x)}$ is -

A. $\log_2 5 \log_e 2$

B. 0

C. 1

D. $\log_e 5 \log_e 10$

Answer: A

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78. If $f(x) = \dfrac{3x+2}{5x-3}\left(x \neq \dfrac{3}{5}\right)$, then which one of the following is correct ?

A. $f^{-1}(x) = -f(x)$

B. $f^{-1}(x) = f(x)$

C. $f^{-1}(x) = \dfrac{1}{19}f(x)$

D. $f^{-1}(x) = -\dfrac{1}{19}f(x)$

Answer: B

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79. If $f(x)\begin{cases} x^2 - 3, & \text{when } 2 < x < 3 \\ 2x + 5, & \text{when} 3 < x < 4 \end{cases}$ then the equation whose roots are

$\lim_{x \to 3-} f(x)$ and $\lim_{x \to 3+} f(x)$ is-

A. $x^2 - 7x + 3 = 0$

B. $x^2 - 20x + 66 = 0$

C. $x^2 - 17x + 66 = 0$

D. $x^2 - 18x + 60 = 0$

Answer: C

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80. Let $f(x) = \begin{cases} \dfrac{\left(4^x - 1\right)^3}{\sin\frac{x}{a}\log\left(1 + \frac{x^2}{3}\right)}, & \text{when} x \neq 0 \\ 9\left(\log_e 4\right)^3, & \text{when} x = 0 \end{cases}$ if $\lim_{x \to 0} f(x) = f(0)$, then the value of a is-

A. 1

B. 2

C. 4

D. 3

Answer: D

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81. Let $\begin{cases} px^2 + 1, & \text{when } x \le 1 \\ x + p, & \text{when} x > 1 \end{cases}$ The value of p for which $f(x)$ is derivable at $x = 1$ is-

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

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

C. 2

D. -2

Answer: A

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82. The function f satisfies the relation $f(x + y) = f(x)f(y)$ for all ral x, y and $f(x) \ne 0. Iff(x)$ is differentiable at $x = 0$ and $f'(0) = 2,$ then $f'(x)$ is equal to-

A. $f(x)$

B. $2f(x)$

C. $-f(x)$

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

Answer: B

Watch Video Solution

83. The dervative of $f(x) = |x - 1| + |x - 4| at x = 3$ is equal to-

A. 3

B. -3

C. 0

D. 1

Answer: C

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84. If $f(x) = \sin(\log x)$ then the value of $f(xy) + f\left(\frac{x}{y}\right) - 2f(x)\cos(\log y)$ is-

A. $2f(x)f(y)$

B. -1

C. 1

D. 0

Answer: D

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85. The value of $\lim_{x \to 4} \dfrac{3 - \sqrt{5 + x}}{1 - \sqrt{5 - x}}$ is-

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

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

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

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

Answer: D

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86. The domain of definition of the function $f(x) = \dfrac{\sin^{-1}(x-3)}{\sqrt{9-x^2}}$ is-

A. $2 \leq x < 3$

B. $1 \leq x \leq 2$

C. $1 \leq x < 2$

D. $2 \leq x \leq 3$

Answer: A

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87. It the graph of the function $y = f(x)$ is symmetrical about the line $x = 2$, then which of the following is correct ?

A. $f(x+2) = f(x-2)$

B. $f(2+x) = f(2-x)$

C. $f(x) = f(-x)$

D. $f(x) = -f(-x)$

Answer: B

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88. $\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^{x/2}$ is equal to-

A. 1

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

C. $\sqrt{e}$

D. e^2

Answer: C

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89. If the function $f(x)$ is defined by $f(x) = a + bx$ and $f^R = fff\ldots$ (repeated r times), then $f^R(x)$ is equal to-

A. $a\left(b^r - 1\right) + b^r x$

B. $ar + bx^r$

C. $\dfrac{a.\left(b^r - 1\right)}{b - 1} + b^r x$

D. $(a + x)b^r$

Answer: C

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QUESTION PAPER 6

1. Which of the following is correct ?

A. $\sin 1^{\circ} > \sin 1$

B. $\sin 1^{\circ} < \sin 1$

C. $\sin 1^{\circ} = \sin 1$

D. $\sin 1^{\circ} = \frac{\pi}{180} \sin 1$

Answer: B

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2. If $\cos\theta - 4\sin\theta = 1$, then the value of $(\sin\theta + 4\cos\theta)$ is-

A. ± 4

B. ± 3

C. ± 2

D. ± 1

Answer: A

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3. If $a = b\cos\frac{2\pi}{3} = c\cos\frac{4\pi}{3}$, then the value of $(ab + bc + ca)$ is-

A. 1

B. 2

C. 0

D. - 1

Answer: C

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4. The sides of a tringle are $3x + 4y, 3y$ and $5x + 5y$ where $x, y > 0$, then the triangle is-

A. right angle

B. equilateral

C. isosceles

D. obtuse angled

Answer: D

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5. The value of $16\sin 144^\circ \sin 108^\circ \sin 72^\circ \sin 36^\circ$ is-

A. 2

B. 3

C. 4

D. 5

Answer: D

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6. If $\sin x + \sin^2 x = 1$ then the value of $\left(\cos^8 x + 2\cos^6 x + \cos^4 x\right)$ is-

A. 2

B. 1

C. 0

D. 4

Answer: B

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7. If $A+B+C=\pi, 0<A, B<\frac{\pi}{2}$ and the angle C is obtuse then-

A. $\tan A \tan B>1$

B. $\tan A=\tan B$

C. $\tan A \tan B<1$

D. none of these

Answer: C

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8. If $\sin\alpha = \sin\beta$ and $\cos\alpha = \cos\beta$ then-

A. $\sin\dfrac{\alpha + \beta}{2} = 0$

B. $\cos\dfrac{\alpha - \beta}{2} = 0$

C. $\cos\dfrac{\alpha + \beta}{2} = 0$

D. $\sin\dfrac{\alpha - \beta}{2} = 0$

Answer: D

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9. The value of $\cot 36^\circ \cot 72^\circ$ is-

A. $\dfrac{1}{\sqrt{5}}$

B. $\dfrac{2}{\sqrt{5}}$

C. $\dfrac{1}{5}$

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

Answer: A

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10. In a triangle ABC, if $\frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and the side $a = 2$, then the area of the triangle is-

A. $2\sqrt{3}$

B. $\sqrt{3}$

C. 1

D. 2

Answer: B

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11. If $\sin\alpha + \sin\beta + \sin\gamma = 3$, then the value of $(\cos\alpha + \cos\beta + \cos\gamma)$ is-

A. 1

B. 2

C. 0

D. 3

Answer: C

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12. The value of $\left(1 + \cos\frac{\pi}{8}\right)\left(1 + \cos\frac{3\pi}{8}\right)\left(1 + \cos\frac{5\pi}{8}\right)\left(1 + \cos'\frac{7\pi}{8}\right)$ is-

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

B. $\frac{1}{16}$

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

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

Answer: A

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13. If A lies in the 3rd quadrant and $\tan A = \frac{4}{3}$, then the value of $(\sin 2A + 3\sin A\cos A)$ is-

A. - $\frac{12}{5}$

B. $\frac{12}{5}$

C. - $\frac{24}{5}$

D. 0

Answer: D

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14. The maximum value of $5\cos\theta + 3\cos\left(\frac{\pi}{3} + \theta\right) + 3$ is-

A. 12

B. 10

C. 11

D. 8

Answer: B

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15. If $m = \sin^2\theta + \cos^4\theta$, then-

A. $\frac{3}{4} \leq m \leq 1$

B. $\frac{1}{2} \leq m \leq \frac{3}{4}$

C. $\frac{1}{4} \leq m \leq \frac{5}{4}$

D. none of these

Answer: A

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16. If $A + C + B = 180,$ then the value of $\left(\cos^2 A + \cos^2 B + \cos^2 C - 2\cos A \cos B \cos C\right)$ is-

A. 3

B. 2

C. 1

D. 0

Answer: C

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17. In any triangle ABC, the value of $(b + c)\tan\frac{A}{2}\tan\frac{B - C}{2} + (c + a)\tan\frac{B}{2}\tan\frac{C - A}{2} + (a + b)\tan\frac{C}{2}\tan\frac{A - B}{2}$ is-

A. a

B. b

C. c

D. 0

Answer: D

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18. When n is an odd integer, then the total number of terms in the expresion of $\sin n\theta$ in powers of $\sin\theta$ is-

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

B. $n-1$

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

D. $n+1$

Answer: C

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19. The value of $(\operatorname{cos}ec2A - \cot 2A)$ is-

A. $\tan A$

B. $\sin A$

C. $\cos A$

D. $\cot A$

Answer: A

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20. The general solution of $\sin x - \cos x = \sqrt{2}$ is-

A. $2n\pi$

B. $2n\pi + \frac{3\pi}{4}$

C. $(2n + 1)\pi$

D. $2n\pi - \frac{\pi}{4}$

Answer: B

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21. The solution of the eqution $\tan^2\theta + \cot^2\theta = 2\left(0^\circ \leq \theta \leq 180^\circ\right)$ are-

A. $30^\circ, 120^\circ$

B. $60^\circ, 150^\circ$

C. $45^\circ, 150^\circ$

D. $45^\circ, 135^\circ$

Answer: D

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22. In triangle ABC if a,b,c are sides opposite of angles A, B, C respectivgely, then which of the following is correct ?

A. $(b+c)\cos\frac{A}{2} = a\sin\frac{B+C}{2}$

B. $(b+c)\cos\frac{B+C}{2} = a\sin\frac{A}{2}$

C. $(b-c)\cos\frac{B-C}{2} = a\cos\frac{A}{2}$

D. $(b-c)\cos\frac{A}{2} = a\sin\frac{B-C}{2}$

Answer: D

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23. If $\sin\left(\frac{\pi}{4}\cot\theta\right) = \cos\left(\frac{\pi}{4}\tan\theta\right)$, then the general value of θ is-

A. $2pn\pi + \frac{\pi}{4}$

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

C. $2n\pi \pm \frac{\pi}{4}$

D. $2n\pi - \frac{\pi}{4}$

Answer: B

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24. The perimeter of a triangle ABC iws equal to $2(\sin A + \sin B + \sin C)$. If $a = 1$, then the value of angle A is-

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

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

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

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

Answer: C

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25. The value of $\left[\cos 2(\theta + \phi) + 4\cos(\theta + \phi)\sin\theta\sin\phi + 2\sin^2\phi\right]$ is-

A. $\cos 2\theta$

B. $\sin 3\theta$

C. $\sin 2\theta$

D. $\cos 3\theta$

Answer: A

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26. If z_1 and z_2 are two complex numbers, then which of the following is true ?

A. $|z_1 + z_2| = |z_1| - |z_2|$

B. $|Z_1 - Z_2| = |Z_1| - |Z_2|$

C. $|z_1 - z_2| \le |z_1| - |z_2|$

D. $|z_1 + z_2| \le |z_1| + |z_2|$

Answer: D

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27. If $\mathbb{Z}$ is the set of intergers and $n \in \mathbb{Z}$, then the value of $n(n+1)(2n+1)$-

A. $\in (18k, k \in \mathbb{Z})$

B. $\in (6k, k \in \mathbb{Z})$

C. $\in (12k, k \in \mathbb{Z})$

D. $\in (24k, k \in \mathbb{Z})$

Answer: B

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28. If $i^2 = -1$, then the sum of $i + i^2 + i^3 + \ldots$ to 1000 terms is equal to

A. 1

B. 0

C. -1

D. i

Answer: B

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29. If in an infinite G.P., first term is equal to twice the sum of the remaining terms then its common ratio is-

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

B. - $\frac{1}{4}$

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

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

Answer: C

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30. If the sum of p terms of an A.P. series is the same as that for q termsthen the sum of $(p+q)$ terms of the seires is-

A. $-(p+q)$

B. 1

C. 0

D. -1

Answer: C

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31. If the sum of the coefficients in the expansion of $(a+b)^n$ is 4096, then the greatest coefficient in the expansion is-

A. 792

B. 924

C. 2924

D. 1594

Answer: B

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32. The number of five digit numbers divisible by 3 thet can be formed using the digits $01, 2, 3, 4, 5$ (when no digity is repated) is-

A. 216

B. 312

C. 400

D. 384

Answer: A

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33. If $\dfrac{a - bx}{a + bx} = \dfrac{b - cx}{b + cx}$, then a,b,c are in

A. A.P.

B. H.P.

C. G.P.

D. none of these

Answer: C

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34. There are 15 points in a plane of which 4 points lie in one line and another 5 points lie in another straight line. Two lines are parallel and no three of the remaining 6 points are collinear. Then the number of straight lines that can be formed by joining these 15 points is-

A. 89

B. 90

C. 96

D. 91

Answer: D

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35. The middle terms in the expansion of $\left(x+\frac{1}{x}\right)^{10}$ is-

A. ${}^{10}C_4.\,X^2$

B. ${}^{10}C_5$

C. ${}^{10}C_6.\,\frac{1}{x^2}$

D. none of these

Answer: B

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36. The argument of the complex number $z=1+i\tan\frac{3\pi}{5}$ is-

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

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

C. $\frac{2\pi}{5}$

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

Answer: A

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37. If a_r is the coefficient of x^r in the expansion of $\left(1 + x + x^2\right)^n$, then the value of $a_1 - 2a_2 + 3a_3 - 4a_4 + \dots - 2na_{2n}$ is -

A. 0

B. n

C. $-n$

D. 2n

Answer: C

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38. A man has 10 friends. In how many ways he can invite one of more of them to a party ?

A. $(10)!$

B. 2^{10}

C. $(10)! - 1$

D. $2^{10} - 1$

Answer: D

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39. There are 10 points in space of which 5 points are in the same plane, but no four of the remaining 5 points are in the same plane. The number of planes each containing three points is-

A. 111

B. 120

C. 110

D. 121

Answer: A

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40. The statement $a + ib < c + id$ is true for-

A. $a^2 + b^2 = 0$

B. $b^2 + c^2 = 0$

C. $c^2 + a^2 = 0$

D. none of these

Answer: D

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41. If a,b,c,d,e are in A.P., then the value of $(a + b + 5c - 5d + e)$ in terms of a is-

A. 5a

B. 4a

C. 3a

D. 2a

Answer: C

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42. If $x + \frac{1}{x} = \sqrt{3}$, then one value of x is-

A. $\cos\frac{\pi}{3} + I\sin\frac{\pi}{3}$

B. $\cos\frac{\pi}{6} + I\sin\frac{\pi}{6}$

C. $\sin\frac{\pi}{6} + I\cos\frac{\pi}{6}$

D. $\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}$

Answer: B

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43. Two variables x and y are related by $y = 8 + 2x$, if the S.D. of x is 3, then the S.D. of y will be-

A. 10

B. 14

C. 11

D. 6

Answer: D

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44. From a set of 100 cards numbered 1 to 100, one card is drawn at random. The probability that the number obtained on the card is dividible by 6 is-

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

B. $\frac{8}{25}$

C. $\frac{3}{20}$

D. $\frac{9}{50}$

Answer: A

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45. Let S(k): $1 + 3 + 5 + \ldots + (2k - 1) = 3 + k^2$, state which of the following is true-

A. $S(k) \Rightarrow S(k+1)$

B. $S(k) \Rightarrow S(K+1)$

C. $S(1)$ is ture

D. can be proved by mathematicval induction

Answer: B

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46. If the term independent of x in the expansion of $\left(\sqrt{x}+\frac{k}{x^2}\right)^{10}$ is 405, then the values of k are-

A. ± 6

B. ± 5

C. ± 3

D. ± 4

Answer: C

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47. If $\frac{5}{3}(2 - x) \geq \frac{3}{5}(x - 2)$, state which of the following is true-

A. $(2, \infty)$

B. $(- \infty, 2]$

C. $(- \infty, 2)$

D. $[- 2, \infty)$

Answer: D

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48. If $(\cos\theta + i\sin\theta)(\cos2\theta + i\sin2\theta)\dots(\cos n\theta + i\sin n\theta) = 1$ then the value of θ is (m are integers)-

A. $\dfrac{m\pi}{n(n + 1)}$

B. $4m\pi$

C. $\dfrac{2m\pi}{n(n - 1)}$

D. $\frac{4m\pi}{n(n+1)}$

Answer: D

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49. Let z_1 and z_2 be the roots of $z^2 + az + b = 0$. If the origin, z_1 and z_2 form an equilateral triangle. Then-

A. $a^2 = 3b$

B. $a^2 = 4b$

C. $a^2 = b$

D. $a^2 = 2b$

Answer: A

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50. The number of terms in the expansion of $(a + b + c)^{10}$ is-

A. 55

B. 66

C. 33

D. 44

Answer: B

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51. A straight line passes through $P(1, 2)$ and is such that its intercept between the axes is bisected at P. Then the equation of the line is-

A. $x + y = 3$

B. $2x + y = 4$

C. $x + 2y = 5$

D. $3x + y = 5$

Answer: B

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52. The coordinates of the centroid of the triangle where the mid-points of the sides are $(0, 1), (1, 1)$ and $(1, 0)$, are-

A. $\left(\frac{2}{3}, \frac{2}{3}\right)$

B. $\left(\frac{1}{2}, \frac{1}{3}\right)$

C. $\left(\frac{3}{3}, \frac{4}{3}\right)$

D. $(2, 2)$

Answer: A

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53. A ray of light passing through the point $(1, 2)$ is reflected on the x-axis at a point P and passes through the point $(5, 3)$, then the abscissa of the point P is-

A. 3

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

C. $\frac{13}{5}$

D. $\frac{13}{4}$

Answer: C

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54. The equation $ax + by + c = 0$ reduces to the form $ax + by = 0$ referred to new origin on the x-axis, the new origin on the x-axis is at

A. $(- c, 0)$

B. $\left(\frac{c}{a}, 0\right)$

C. $\left(-\frac{c}{b}, 0\right)$

D. $\left(-\frac{c}{a}, 0\right)$

Answer: D

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55. In three dimensional space, if the coordinates of tow ends o fa diangonal of square be $(2, -3, 5)$ and $(1, -2, 3)$, then the length of a side of the square is-

A. $\sqrt{10}$ unit

B. $2\sqrt{2}$ unit

C. $\sqrt{3}$ unit

D. 2 unit

Answer: C

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56. Let $X = \left\{-1, -2, 0, 1, \frac{5}{2}, 3\right\}, Y = \{-6, -5, 0, 1, 4, 9\}$ and $fX \rightarrow Y$ defined by $f(x) = 2x^2 - 3x - 5$. Then the value of $f(x)$ is-

A. $\{-6, -5, 0, 4, 9\}$

B. $\{-6, 0, 1, 4, 9\}$

C. $\{-6, -5, 0, 4, 9\}$

D. $\{-6, -5, 0, 1, 4, 9\}$

Answer: C

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57. The coordinates of the vertex A of the triangle ABC are $(2, 5)$, if the centroid of the triangle is at $(-2, 1)$, then the coordinates of the mid-point of the side BC are-

A. $(4, 1)$

B. $(-4, -1)$

C. $(-1, -4)$

D. $(-4, 1)$

Answer: B

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58. If x-y+1=0 meets thwe cicle $x^2 + y^2 + y - 1 = 0$at a and b, then the equation of the circle with ab as diameter, is

A. $x^2 + y^2 + 3x - y + 1 = 0$

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

C. $2\left(x^2 + y^2\right) + 3x - y + 2 = 0$

D. $2\left(x^2 + y^2\right) + 3x - y + 1 = 0$

Answer: D

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59. The equation of the circle drawn on the line segment joining the foci of the two parabolas $x^2 = 4ay$ and $y^2 = 4a(x - a)$ as a diameter is-

A. $x^2 + y^2 - 2ay - ax = 0$

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

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

D. $x^2 + y^2 - 2ax + ay = 0$

Answer: C

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60. The equation to the line bisecting the joining of $(3, 4)$ and $(5, 2)$ and having it intercepts on the x-axis and the y-axis in the ratio $2 : 1$ is-

A. $x + 2y = 10$

B. $x + y = 3$

C. $2x - y = 9$

D. $2x + y = 7$

Answer: A

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61. The coordinates of the point which divides the join of the points $(3, 5, -7)$ and $(-2, 1, 8)$ in the ratio $3:2$ are-

A. $0, \frac{13}{5}, 2$

B. $\left(2, 0, -\frac{15}{2}\right)$

C. $\left(-2, \frac{14}{5}, 0\right)$

D. $\left(0, 2, \frac{13}{5}\right)$

Answer: A

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62. At which point the origin should be shifted (retaining the directio of axes) if the coordinates of a point $(3, 4)$ become $(8, -5)$?

A. $(5, 9)$

B. $(5, -9)$

C. $(-5, 9)$

D. $(-5, -9)$

Answer: C

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63. If non-zone numbers a, b, c are in H.P. then the straight line $\frac{x}{a} + \frac{y}{b} + \frac{1}{c} = 0$ always passes through a fixed point. That point is-

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

B. $(1, -2)$

C. $(-1, 2)$

D. $(-1, -2)$

Answer: B

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64. The equations of the circel which touch the x axis at a distance of 3 unit from the origin and intercepts a chord of length 6 unit on the y-axis, aer-

A. $x^2 + y^2 \pm 6\sqrt{2} - 6y + 9 = 0$

B. $x^2 + y^2 + 6x \pm 6\sqrt{2}y + 9 = 0$

C. $x^2 + y^2 \pm 6x + 6\sqrt{2}y + 9 = 0$

D. $x^2 + y^2 - 6x \pm 6\sqrt{2}y + 9 = 0$

Answer: D

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65. The circel $(x - 2)(x - 2 + a) + (y + 3)(y + 3 + b) = 36$ will bisect the circumference of the circel $x - 20^2 + (y + 3)^2 = 36$ for-

A. fixed value of a

B. fixed value of b

C. fixed value of both a and b

D. any values of a and b

Answer: D

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66. What is the eccentricity of the ellipse whose length of minor axis is equal to the distance between the two foci?

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

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

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

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

Answer: A

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67. The equation of the hyperbola in the standard form (with transverse axis along x-axis) having the length of latus rectum =9 unit and eccentricity $\frac{5}{4}$ is-

A. $\frac{X^2}{16} - \frac{Y^2}{18} = 1$

B. $\frac{X^2}{36} - \frac{Y^2}{27} = 1$

C. $\frac{X^2}{64} - \frac{Y^2}{36} = 1$

D. $\frac{X^2}{36} - \frac{Y^2}{64} = 1$

Answer: C

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68. If $f(x) = \frac{1}{2}(\sin x + \cos x) + ce^{-x}$, then the vlaue of $[f'(x) + f(x)]$ is=

A. $\sin x$

B. $\cos x$

C. $2\sin x$

D. $2\cos x$

Answer: B

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69. If A and B are two finite sets, then which of the following is correct ?

A. $n(A - B) = n(A) - n(A \cap B)$

B. $n(A - B) = n(A) - n(B)$

C. $n(A - B) = n(B - A)$

D. $n(A - B) = n(B) - n(A \cap B)$

Answer: A

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70. Let $A = \{1, 2, 3, 4\}$ and relation R on A be defined as follows:

$R = (1, 2), (2, 1), (2, 2), (2, 3), (3, 3), (4, 1), (2, 4), (4, 2)\}$ then which one of the following is correct ?

A. $3R2$

B. $4R1$

C. 1R 3

D. 2R4

Answer: D

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71. If ϕ is the empty set then which one of the following is correct ?

A. $\phi = 0$

B. $\phi = \{0\}$

C. $\phi = \{\phi\}$

D. $\phi = \{\}$

Answer: D

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72. Let $f(x) = [x]$ where $[x]$ denotes the greatest integer contained in x. Which one of the following is correct ?

A. both domain and range of $f(x)$ are sets of real numbers

B. both domain and ranges of $f(x)$ are sets of integers

C. domain of $f(x)$ is set of real numbers and its range is set of integers

D. none of these

Answer: C

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73. Let A, B, C be any three non-empty sets. If $A \cup B = A \cup C$, then which one of the following is denfinitely true ?

A. $B = C$

B. $B \subset C$

C. $C \subset B$

D. none of these

Answer: D

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74. Suppose S and S' are foci of the dllipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$. If P is a variable point on the ellipse and if Δ is the area of the triangle PSS', then maxzimum value of Δ is

A. 12

B. 8

C. 16

D. 20

Answer: A

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75. In a class containing 120 students, 65 students dring tea and 84 students drink coffee. If x students drink both tea and coffee, then the value of x is-

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76. The number of elements in the set $\left\{(a, b), 2a^2 + 3b^2 = 35, a, b, \in \mathbb{Z}\right\}$ where $\mathbb{Z}$ is the set of integers, is-

A. 16

B. 8

C. 4

D. 2

Answer: B

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77. Which one of the following is correct for the graph of $y = |x|$?

A. it lies only in the first quadrant of the xy-plane

B. it lies only in the first and third quadrants of the xy-plane

C. it lies only in the third and fourth quadrants of the xy-plane

D. it lies only in the first and second quadrants of the xy-plane

Answer: D

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78. The value of $\lim_{h \to 0} \frac{1}{h}\left[\frac{1}{\sqrt[3]{8+h}} - \frac{1}{2}\right]$ is-

A. $-\frac{1}{48}$

B. $\frac{1}{48}$

C. $\frac{1}{12}$

D. $-\frac{1}{12}$

Answer: A

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79. If $f, \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \begin{cases} \frac{x-2}{x^2-3x+2}, & \text{when } x \in \mathbb{R} - \{1,2\} \\ 2, & \text{when} x = 1 \\ 1, & \text{when} x = 2 \end{cases}$ then

$\lim_{x \to 2} \frac{f(x) - f(2)}{x - 2}$ is equal to-

A. 0

B. -1

C. 1

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

Answer: B

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80. If $f(x) = lx^2 + mx + n,$ then the value of $\frac{f(x+3) - f(x)}{f(x+2) - f(x+1)}$ is-

A. 0

B. $\dfrac{2lx+3l+m}{lx+2l+m}$

C. 3

D. none of these

Answer: C

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81. If n is any integer, then all the points at which the function $f(x)=\sec 3x+\operatorname{cosec} 3x$ is underfined, are given completely by-

A. $x=n\pi$

B. $x=(2n+1)\frac{\pi}{3}$

C. $\frac{n\pi}{3}$

D. $\frac{n\pi}{6}$

Answer: D

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82. If $f(x) = \begin{cases} x, & \text{when } 0 < x < 1 \\ 2 - x, & \text{when} 1 < x \leq 2 \end{cases}$ then $f'(1)$ is equal to-

A. 0

B. 1

C. -1

D. none of these

Answer: D

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83. If the function $f(x)$ is differentiable at $x = h$, then the value of $\lim_{x \to h} \frac{(x + h)f(x) - 2hf(h)}{x - h}$ is-

A. $f(h) + hf'(h)$

B. $2hf'(h)$

C. $f(h) + 2hf'(h)$

D. $2f(h) + f'(h)$

Answer: C

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84. If $y = \cot^{-1}\frac{b - ax}{a + bx}$, then the value of $\frac{dy}{dx}$ is-

A. 1

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

C. -1

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

Answer: B

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85. If $l(x)$ is the least interger not less than x and $g(x)$ is the greatest integer not greater than x, then $\lim_{x \to \pi + e}[l(x) + g(x)]$ is equal to-

A. 11

B. 10

C. 9

D. 12

Answer: A

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86. If $f(2x + 3) = \sin x + 2^x$, then the value of $f(4m - 2n + 3)$ is-

A. $\sin(m - 2n) + 2^{2m - n}$

B. $\sin(2m - n) + 2^{2m - n}$

C. $\sin(2m - n) + 2^{\frac{m - n}{2}}$

D. $\sin(m - 2n) + 2^{\frac{m - n}{2}}$

Answer: B

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87. Let $f(x)\begin{cases}\frac{\sin 5x}{x^2+2x}, & \text{when} x \neq 0 \\ k+\frac{1}{2}, & \text{when} x = 0\end{cases}$ if $\lim_{x \to 0} f(x) = f(0)$, then the value of k is-

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

B. -2

C. 1

D. 2

Answer: D

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88. If $f(x) = \frac{\alpha x}{x + 1}(x \neq -1)$, then the value of α for which $f\{f(x)\} = x$ is-

A. $\sqrt{2}$

B. $-\sqrt{2}$

C. -1

D. 1

Answer: C

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89. The deerivative of $y = (1 - x)(2 - x)..(n - x)$ at $x = 1$ is equal to-

A. 0

B. $-(n - 1)!$

C. $(-1)^n(n - 1)!$

D. $(-1)^{n-1}(n - 1)!$

Answer: B

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90. If $y = f\{f(x)\}, f(0) = 0$ and $f'(0) = 5,$ then the value of $\left[\frac{dy}{dx}\right]_{x=0}$ is-

A. 0

B. 5

C. 10

D. 25

Answer: D

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QUESTION PAPER 7

1. The value of $\left(\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta\right)$ is-

A. 0

B. 1

C. -1

D. 2

Answer: B

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2. If $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$, then the general value of θ is-

A. $n\pi + (-1)^n\frac{\pi}{4}$

B. $n\pi + (-1)^n\frac{\pi}{4} + \frac{\pi}{3}$

C. $n\pi + \frac{\pi}{4} - \frac{\pi}{3}$

D. $n\pi + (-1)^n\frac{\pi}{4} - \frac{\pi}{3}$

Answer: D

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3. One angle of a triangle is 120° and length of three sides. Are in A.P. If largest side of the triangle is 7 unit, length of one of the other two sides is-

A. 4

B. 2

C. 1

D. 5

Answer: D

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4. The value of $\left(\cos 15^\circ - \sin 15^\circ\right)$ is-

A. 1

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

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

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

Answer: C

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5. If $\sin\alpha = \sin\beta$ and $\cos\alpha = \cos\beta$, then which obne of the following is correct ?

A. $\sin\frac{\alpha - \beta}{2} = 0$

B. $\cos\frac{\alpha - \beta}{2} = 0$

C. $\cos\frac{\alpha + \beta}{2} = 0$

D. $\sin\frac{\alpha + \beta}{2} = 0$

Answer: A

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6. If $\tan\alpha = \left(1 + 2^{-x}\right)^{-1}$ and $\tan\beta = \left(1 + 2^{x+1}\right)^{-1}$ then the value of $(\alpha + \beta)$ is-

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

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

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

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

Answer: C

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7. If $x > 0$ and $\alpha < \frac{\pi}{2}$ then $\left(\sqrt{x^2 + x} + \frac{\tan^2\alpha}{\sqrt{x^2 + x}}\right)$ is never less than-

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

B. $\sec\alpha$

C. 2

D. $2\tan\alpha$

Answer: D

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8. The value of $(\cos ec 2\theta - \cot 2\theta)$ is-

A. $\cot\theta$

B. $\cos\theta$

C. $\tan\theta$

D. $\sin\theta$

Answer: C

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9. If $x+\frac{1}{x}=2\cos\theta$, then $\left(x^3+\frac{1}{x^3}\right)$is equal to-

A. $2\cos 3\theta$

B. $3\cos 3\theta$

C. $2\cos 2\theta$

D. $3\cos 2\theta$

Answer: A

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10. The solution set of $(5+4\cos\theta)(2\cos\theta+1)=0$ in the interval $0 \le \theta \le \pi$ is-

A. $\left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$

B. $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$

C. $\left\{\frac{\pi}{3}, \pi\right\}$

D. $\left\{\frac{2\pi}{3}, \frac{5\pi}{3}\right\}$

Answer: A

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11. If $\sin\theta = \frac{24}{25}$ and $0^\circ < \theta 90^\circ$, then the value of $\sin\frac{\theta}{2}$ is-

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

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

C. $\frac{7}{25}$

D. $\frac{12}{25}$

Answer: B

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12. let A, B, C are angles of a triangle and $\tan\frac{A}{2}=\frac{1}{3}, \tan\frac{B}{2}=\frac{2}{3}$, then the value of $\tan\frac{C}{2}$ is-

A. $\frac{7}{9}$

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

C. $\frac{4}{3}$

D. $\frac{3}{4}$

Answer: A

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13. The period of the function $f(x)=\sin 2x$ is-

A. 2π

B. π

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

D. 4π

Answer: B

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14. If $A+B+C=\pi$, then the value of $\left(\tan\frac{A}{2}\tan\frac{B}{2}+\tan\frac{B}{2}\tan\frac{C}{2}+\tan\frac{C}{2}\tan\frac{A}{2}\right)$ is-

A. 0

B. -1

C. 1

D. 2

Answer: C

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15. If $0 \leq x \leq \frac{\pi}{2}$ and $81^{\sin^2 x} + 81^{\cos^2 x} = 30$, then the value of x is -

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

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

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

D. $\frac{\pi}{6}$ or $\frac{\pi}{3}$

Answer: D

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16. If $\sin\theta = \frac{12}{13}\left(0 < \theta < \frac{\pi}{2}\right)$ and $\cos\phi = -\frac{3}{5}\left(\pi < \phi < \frac{3\pi}{2}\right)$ then the value of $\sin(\theta + \phi)$ will be-

A. $\frac{1}{65}$

B. $\frac{56}{65}$

C. $-\frac{1}{65}$

D. $-\frac{56}{65}$

Answer: D

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17. Minimum value of $\left(16\tan^2\theta + 25\cot^2\theta\right)$ is-

A. 32

B. 40

C. 30

D. 50

Answer: B

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18. The equation $a\cos\theta + b\sin\theta = c$ has a solution when a, b anc c are real numbers such that-

A. $a < b < c$

B. $a = b = c$

C. $c^2 < a^2 - b^2$

D. $c^2 \leq a^2 + b^2$

Answer: D

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19. If $\sin^3 x \sin 3x = \sum_{m=0}^{n} c_m \cos mx$ is an identity in x, where $C_0, C_1, C_2, \ldots, C_n$ are constants and $C_n \neq 0,$ then the value of n is equal to-

A. 6

B. 4

C. 2

D. 8

Answer: A

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20. The value of $\left[\cos\left(270^{\circ}+\theta\right)\cos\left(90^{\circ}-\theta\right)-\sin\left(270^{\circ}-\theta\right)\cos\theta\right)$ is-

A. -1

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

C. 1

D. 0

Answer: C

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21. If a, b, c are the sides of the triangle ABC such that $a^4 + b^4 + c^4 = 2x^2\left(a^2 + b^2\right)$, then the angle opposite to the side c is-

A. 45° or 135°

B. 30° or 120°

C. 60° or 150°

D. none of these

Answer: A

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22. In a triangle ABC, $a = \sqrt{3} + 1, B = 30^\circ$ and $C = 45^\circ$, then the value of c is -

A. $\sqrt{2}$

B. 2

C. 1

D. $\frac{1}{2}\left(\sqrt{3}+1\right)$

Answer: B

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23. If $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, then the value of $\tan(2A + B)$ is-

A. 1

B. 2

C. 3

D. 4

Answer: C

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24. The value of $[\cos(A - B)\cos(A + B) - \sin(A - B)\sin(A + B)]$ is-

A. $2\sin A\cos B$

B. $2\cos A\cos B$

C. $\cos 2B$

D. $\cos 2A$

Answer: D

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25. The maximum and minimum values of $\left[4\cos x^2\cos\left(\frac{\pi}{3}+x^2\right)\cos\left(\frac{\pi}{3}-x^2\right)\right]$ respectively are-

A. 1 and (-1)

B. 2 and (-2)

C. 3 and (-3)

D. 4 and (-4)

Answer: A

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26. If positive integers $a_1, a_2, a_3, \dots$ are ion A.P. such that $a_8 + a_{10} = 24$, then the value of a_9 is-

A. 10

B. 11

C. 12

D. 9

Answer: C

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27. The number of arrangements of the letters of the word BANANA in which otwo N's do not appear adjacently is-

A. 40

B. 60

C. 80

D. 100

Answer: A

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28. For all complex numbers z_1, z_2 satisfying $|z_1| = 12$ and $|z_2 - 3 - 4i| = 5$, then minimum value of $|z_1 - z_2|$ is-

A. 7

B. 0

C. 2

D. 17

Answer: B

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29. Suppose a,b, c are in A.P. and a^2, b^2, c^2 are in G.P. if $a < b < c$ and $a + b + c = \frac{3}{2}$, then the value of a is-

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

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

C. $\frac{1}{2}$ - $\frac{1}{\sqrt{3}}$

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

Answer: D

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30. Find the value of $\left(\sqrt{4}, 4\sqrt{4}. 8\sqrt{4}. 16\sqrt{4}\ldots\infty\right)$is-

A. 2

B. 8

C. 4

D. 1

Answer: C

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31. If a,b,c are three unequal numbers such that a,b,c are in A.P. and $(b - a), . (c - b), a$ are in G.P., then the value of a:b: c is-

A. $2:3:4$

B. $3:5:7$

C. $1:2:3$

D. none of these

Answer: C

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32. Each of 8 questions in a papeer has an alternative. Number of ways in which a candidate can answer one or more questions is -

A. $3^8 - 1$

B. 2^8

C. 3^8

D. $2^8 - 1$

Answer: A

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33. The real numbers that satisfy the equation $x^2 + 6|x| - 9 = 0$ are-

A. $-3(\sqrt{2}+1), 3(\sqrt{2}+1)$

B. $2(\sqrt{2}-1), 3(1-\sqrt{2})$

C. $2(\sqrt{2}+1), 3\sqrt{2}$

D. none of these

Answer: B

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34. The value of $\left[(1+i)^6+(1-i)^6\right]$ is-

A. 2^6

B. 2^7

C. $8\sqrt{2}$

D. none of these

Answer: D

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35. The value of the sum $11^3+12^3+\ldots+20^3$-

A. is not divisible by 5

B. is an odd interger dividible by 5

C. is an odd integer which id not divisible by 5

D. is an even integer which is divisible by 5

Answer: B

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36. The probability of having a king and a queen when two cards are drawn at random for a pack of 52 cards is-

A. $\frac{16}{663}$

B. $\frac{8}{293}$

C. $\frac{16}{283}$

D. $\frac{8}{663}$

Answer: D

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37. If the mean and coefficeint of mean diviation about mean of a distribution be 40 and 30% respectively, then the mean deviation about mean will be-

A. 12

B. 15

C. 20

D. 24

Answer: A

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38. The number of diagonals of a polygon of n sides is-

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

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

C. $\frac{n(n-4)}{2}$

D. $\frac{n(n-3)}{2}$

Answer: D

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39. If a,b,c are in G. P. and x, y are A.M. of a, b and b, c respectively, then the value of $\left(\frac{a}{x}+\frac{c}{y}\right)$ is-

A. 1

B. 2

C. 0

D. 4

Answer: B

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40. A team of 10 plyers is formed out of 22 players , if 6 particular players are always included and 4 particular players are always excluded then the number of ways in which the team can be formed, is-

A. ${}^{12}C_4$

B. ${}^{18}C_4$

C. ${}^{22}C_{10}$

D. ${}^{18}C_{10}$

Answer: A

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41. The set of all real numbers x, for which $x^2 - |x + 2| + x > 0$ is always true, is-

A. $(-\infty, -2) \cup (2, \infty)$

B. $\left(-\infty, -\sqrt{2}\right) \cup \left(\sqrt{2}, \infty\right)$

C. $(-\infty, -1) \cup (1, \infty)$

D. $\left(\sqrt{2}, \infty\right)$

Answer: B

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42. In $n \in \mathbb{N}$, then $\left(3^{2n+2} - 2^{3n} - 9\right)$ is always divisible by -

A. 9

B. 81

C. 64

D. 51

Answer: C

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43. If $\left(\frac{1+i}{1-i}\right)^{x}=1,$ then-

A. $x=2n+1$ where n is any positive integer

B. $x=2n$ where n is any positive integer

C. $x=4n+1$ where n is any positive interger

D. $x=4n$ where n is any positive integer

Answer: D

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44. If in the binomial expansion of $(a+x)^{n}$ where n is a natural number, the coefficients of 5 th, 6 th and 7 th terms are in A.P., then n is equal to-

A. 7 or 13

B. 7 or 15

C. 7 or 14

D. 18 or 14

Answer: C

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45. If z and w are two non-zero complex numbers such that $|zw| = 1$ and $\arg w = \frac{\pi}{2}$, then $\bar{z}w$ is equal to-

A. $-i$

B. 1

C. -1

D. i

Answer: A

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46. The modulus and the amplitude of $\left(1 + i\sqrt{3}\right)^2$ are respectively-

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

B. $4, \left(-\frac{\pi}{3}\right)$

C. $\frac{5}{8}, \tan^{-1}\left(-\frac{4}{3}\right)$

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

Answer: B

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47. The complex number z satisfying the question $\left|\frac{i-z}{i+z}\right| = 1$ lies on-

A. a circle with the centre $(0, 0)$ and radius 1

B. the x-axis

C. the y-axis

D. the line $y = x + 1$

Answer: B

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48. If the mth and nth terms of a H.P. are n and m respectively, then its mnth term will be-

A. 0

B. 2

C. 1

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

Answer: C

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49. Solution of the inequations $-11 \leq 4x - 3 < 13$ is-

A. $-2 \leq x \leq 4$

B. $2 \leq x < 4$

C. $-2 < x < 4$

D. $-2 \leq x < 4$

Answer: D

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50. Two roots of the quadratic equation $ix^2 - 10x - 21i = 0$ is-

A. $7i, 3i$

B. $-3i, 7i$

C. $3i, -7i$

D. $-3i, -7i$

Answer: D

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51. In three dimension space, $(7, 6, 3)$ and $(4, 10, 1), (-2, 6, 2)$ and $(1, 2, 4)$ are the vertices of a-

A. square

B. rhombus

C. rectangle

D. none of these

Answer: C

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52. If θ is a variable paramete, then the equations $x = \frac{1}{4}\left(3 - \operatorname{cosec}^2\theta\right), y = 2 + \cot\theta$ represent the equation of a/an

A. circle

B. parabola

C. ellispse

D. hyperbola

Answer: B

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53. In three dimensional space, if a pints lies on the octant OXY'Z, then the signs of its coordinates are -

A. (+ , - , +)

B. (- , + , -)

C. (+ , + , -)

D. (- , + , +)

Answer: A

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54. If the axes are transferred to parallel axes through the point $(\alpha, -\beta)$, then the equation of the circle $(x-\alpha)^2 + (y-\beta)^2 = a^2$ reduces to the form-

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

B. $x^2 + (y+\beta)^2 = a^2$

C. $x^2 + (y+2\beta)^2 = a^2$

D. $x^2 + (y-2\beta)^2 = a^2$

Answer: D

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55. If the ara of the triangle formed by joining the points $(2, 7), (5, 1)$ and $(x, 3)$ is 18, then one value of x is-

A. -1

B. -2

C. -3

D. -4

Answer: B

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56. If $A(3, 5), B(-5, -4), C(7, 10)$ are the vertices of a parallelogram taken in order, then the coorinates of the fourth vertex are:

A. $(15, 19)$

B. $(10, 19)$

C. $(15, 10)$

D. $(19, 10)$

Answer: A

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57. The circe $x^2 + y^2 + 8y - 4 = 0$ cuts the real circel $x^2 + y^2 + gx + 4 = 0$ orthogonally , then the value of g is-

A. $g = 0$

B. $g > 0$

C. any real number

D. no real value

Answer: C

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58. Distance between the parallel lines $y = 2x + 7$ and $y = 2x + 5$ is-

A. $\frac{12}{\sqrt{5}}$

B. $\frac{12}{5}$

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

D. $\frac{2}{\sqrt{5}}$

Answer: D

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59. For what value of c does the straight line $y = 2x + c$ intersect the circel $x^2 + y^2 = 5$?

A. $-5 \leq c \leq 5$

B. $c \leq -5$

C. $c \geq 5$

D. $x \leq -5$

Answer: A

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60. Orthocentre of the triangle formed by the lines $x + y = 1, x = 0$ and $y = 0$ is-

A. $(0, 1)$

B. $(0, 0)$

C. $(1, 0)$

D. $(1, 1)$

Answer: B

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61. If the circel $x^2 + y^2 - (3p + 4)x - (p - 2)y + 10p = 0$ passes through the point $(3, 1)$, then value of p is-

A. $p = -1$

B. $p = 1$

C. $p = 2$

D. any real value

Answer: D

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62. The intercept on the line $y = x$ by the circel $x^2 + y^2 - 2x = 0$ is AB, then the question of the circel on AB as a diameter is-

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

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

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

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

Answer: C

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63. A variable circle passes through the fixed point $A(p, q)$ and touches the x-axis. The locus of the other end of the diameter through A is-

A. $(y - p)^2 = 4qx$

B. $(x - q)^2 = 4py$

C. $(y - q)^2 = 4px$

D. $(x - p)^2 = 4qy$

Answer: D

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64. Let $A(2, 3)$ and $B(-2, 1)$ be vertices of a triangle ABC. If the centroid of this triangle moves on the line $2x + 3y = 1$, then the locus of the vertex C is the line-

A. $3x + 2y = 5$

B. $2x + 3y = 9$

C. $3x - 2y = 3$

D. $2x - 3y = 7$

Answer: B

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65. The number of common tangent to two circle $x^2 + y^2 = 4$ and $x^2 + y^2 - 8x + 12 = 0$ is-

A. 3

B. 2

C. 1

D. 4

Answer: A

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66. The equation of the directrices of the hyperbola $9x^2 - 16y^2 - 18x - 64y = 199$ arc-

A. $5x = 5 \pm 16$

B. $4x = 4 \pm 25$

C. $4x = 25 \pm 4$

D. $5x = 16 \pm 5$

Answer: A

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67. $(5, -4)$ and $(-3, 2)$ are two foci of an ellipse whose eccentricity is $\frac{2}{3}$.

Then the length of the minor axis of the ellipse is-

A. 10 unit

B. $2\sqrt{5}$ unit

C. $4\sqrt{5}$ unit

D. $5\sqrt{5}$ unit

Answer: D

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68. Which is the simplified representation of $(A' \cap B' \cap C) \cup (B \cap C) \cup (C \cap A)$ where A, B, C are subsets of universal set S?

A. A

B. B

C. C

D. $S \cap (A \cup B \cup C)$

Answer: C

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69. If $\mathbb{N}$ be the set of nature numbers and $N_a = \{an, n \in \mathbb{N}\}$, then $N_5 \cap N_7$ is-

A. N_{12}

B. N_{35}

C. $\mathbb{N}$

D. N_7

Answer: B

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70. Given $n(S) = 20, n(A) = 12, n(B) = 9, n(A \cap B) = 4$ where S is the universal set, A and B are subsets of S, then $n\left[(A \cup B)^C\right]$ is equal to-

A. 3

B. 9

C. 11

D. 17

Answer: A

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71. If mapping $f = \{(1, -6), (2, -1), (3, 4), (4, 9)\}$ is described by the rule $f(x) = px + q$, then the values of p and q are-

A. $p = 2, q = -1$

B. $p = 4, q = -10$

C. $p = 5, q = -11$

D. $p = 6, q = -14$

Answer: C

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72. Let $\mathbb{R}$ be the set of real numbers and $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by $f(x) = \sin x$, then the range of f(x) is-

A. $\{f(x) \in \mathbb{R} : 0 \leq f(x) \leq 1\}$

B. $\{f(x) \in \mathbb{R} : -1 < f(x) < 1\}$

C. $\{f(x) \in \mathbb{R} : -1 < f(x) \leq 1\}$

D. $\{f(x) \in \mathbb{R} : -1 \leq f(x) \leq 1\}$

Answer: D

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73. Which of one of the following is the domain of the relation R defined on the set $\mathbb{N}$ of natural numbers are $R = \{(m, n) : 2m + 3n = 30$ where $m, n \in \mathbb{N}\}$?

A. $\{2, 4, 6, 8\}$

B. $\{3, 6, 9, 12\}$

C. $\{3, 7, 11, 15\}$

D. $\{3, 6, 9, 12, 15\}$

Answer: B

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74. If $f(x+2) = 3x + 4$, then the value of $f\left(x^2 - 1\right)$ is-

A. $3x^2 - 5$

B. $3x^2 - 13$

C. $x^2 - 5$

D. $x^2 + 13$

Answer: A

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75. If $\frac{x^3}{(2x-1)(x+2)(x-3)} = A + \frac{B}{2x-1} + \frac{C}{x+2} + \frac{D}{x-3}$, then the value of A is-

A. 1

B. 2

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

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

Answer: D

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76. The focus of the parabola $y^2 - x - 2y + 2 = 0$ is at-

A. $\left(\frac{1}{4}, 0\right)$

B. $\left(\frac{5}{4}, 1\right)$

C. $(1, 2)$

D. $\left(1, \frac{5}{4}\right)$

Answer: B

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77. The function $f(x) = \dfrac{2x^2 + 7}{x^3 + 3x^2 - x - 3}$ is underfined at-

A. $x = 1$ only

B. $x = 1 \text{ and } x = -1$ only

C. $x = 1, x = -1 \text{ and } x = -3$

D. none of these

Answer: C

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78. The value of $\lim_{x \to 0} \dfrac{27^x - 9^x - 3^x + 1}{\sqrt{5} - \sqrt{4 + \cos x}}$ is equal to-

A. $\sqrt{5}\left(\log_2 3\right)^2$

B. $8\sqrt{5}\left(\log_e 3\right)^2$

C. $8\sqrt{5}\log_e 3$

D. $16\sqrt{5}\left(\log_e 3\right)^2$

Answer: B

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79. The function f satisfies the function equation $3f(x) + 2f\left(\frac{x+59}{x-1}\right) = 10x + 30$ for all $x \neq 1$. Then the value of $f(7)$ is-

A. 4

B. -4

C. 5

D. -5

Answer: A

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80. If $y=\sqrt{x}+\frac{1}{\sqrt{x}}$, then the value of $\left(2x\frac{dy}{dx}+y\right)$ is-

A. $\frac{1}{\sqrt{x}}$

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

C. $\sqrt{x}$

D. $2\sqrt{x}$

Answer: D

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81. The value of $\lim_{x\to 0}\frac{2^{x}-2^{-x}}{x}$ is-

A. 0

B. $\log_e 2$

C. $\log_e 4$

D. 4

Answer: C

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82. A real valued function $f(x)$ satisfied the functional relation $f(x-y)=f(x)f(y)-f(a-x)f(a+y)$ where a is a given constant and $f(0)=1$. Then $f(2a-x)$ is equal to-

A. $f(a)+f(a-x)$

B. $f(-x)$

C. $f(x)$

D. $-f(x)$

Answer: D

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83. If f is a real valued difrerentiable function satisfying $|f(x) - f(y)| \le (x - y)^2$ for all, x,y $\in \mathbb{R}$ and $f(0) = 0$, then $f(1)$ is equal to-

A. 0

B. 1

C. -1

D. 2

Answer: A

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84. Suppose $f(x)$ is differentiable at $x = 1$ and $\lim_{h \to 0} \dfrac{f(1 + h)}{h} = 5$. Then $f'(1)$ is equal to-

A. -1

B. 5

C. 1

D. 6

Answer: B

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85. If $f(x) = \cos\left(\log_e x\right)$, then $f(x)f(y) - \frac{1}{2}\left[f(xy) + f\left(\frac{x}{y}\right)\right]$ has the value-

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

B. 1

C. 0

D. -1

Answer: C

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86. If $\lim_{x \to \infty}\left[\frac{x^3+1}{x^2+1} - (ax+b)\right] = 2$, then the values of a and b are-

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

B. $a = 1, b = 1$

C. $a = 1, b = -1$

D. $a = 1, b = 2$

Answer: A

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87. $y = \sqrt{3x} - \sqrt{\frac{3}{x}} + \frac{x+6}{6-x}$, then the vlaue of $\left[\frac{dy}{dx}\right]_{x=3}$ is-

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

B. 2

C. -2

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

Answer: B

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88. The arange of the function $f(x) = (3 - \cos 2x)^{-1}$ is-

A. $\left[\frac{1}{4}, 1\right]$

B. $\left[-\frac{1}{4}, \frac{1}{2}\right]$

C. $\left[-\frac{1}{2}, -\frac{1}{4}\right]$

D. $\left[\frac{1}{4}, \frac{1}{2}\right]$

Answer: D

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89. The domain of defination of the function $f(x) = \log_{3+x}\left(x^2 - 1\right)$ is-

A. $(-3, -1) \cup (1, \infty)$

B. $[-3, -1) \cup (1, \infty)$

C. $(-3, -2) \cup (-2, -1) \cup (1, \infty)$

D. $[-3, -2) \cup (-2, -1) \cup [1, \infty)$

Answer: C

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90. $\lim x \to 0(1 - ax)^{-1/x}$ is equal to-

A. e

B. e^a

C. e^{-a}

D. 1

Answer: B

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QUESTION PAPER 8

1. Minimum value of $\left(9\cos^2\theta + 16\sin^2\theta\right)$ is-

A. 16

B. 8

C. 9

D. 25

Answer: C

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2. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then the value of $\frac{\tan x}{\tan y}$ is-

A. $\frac{2a}{b}$

B. ab

C. $a^2 + b^2$

D. $\frac{a}{b}$

Answer: D

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3. If $\cos\theta = \tan\theta$, then which one of the following is correct ?

A. $\cos\theta = 2\cos 18^\circ$

B. $\sin\theta = \sin 54^\circ$

C. $\cos\theta = 2\sin 18^\circ$

D. $\sin\theta = 2\cos 18^\circ$

Answer: B

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4. If $\tan(\pi\cos\theta) = \cot(\pi\sin\theta)$, then the valus of $\cos\left(\theta - \frac{\pi}{4}\right)$ are-

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

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

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

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

Answer: A

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5. If $(1 + \tan\theta)(1 + \tan\phi) = 2$, then the value of $(\theta + \phi)$ is

A. 30°

B. 45°

C. 75°

D. 60°

Answer: B

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6. The number of solutions of $2\cos^2\left(\frac{x}{2}\right)\sin^2 x = x^2 + \frac{1}{x^2}$ in $0 \le x \le \frac{\pi}{2}$ is-

A. 0

B. 1

C. 2

D. none of these

Answer: A

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7. The most general values of θ satisfying the two equations $\cos\theta = -\dfrac{1}{\sqrt{2}}$ and $\tan\theta = 1$ are-

A. $2n\pi \pm \dfrac{\pi}{4}$

B. $n\pi + \dfrac{5\pi}{4}$

C. $(2n+1)\pi + \dfrac{\pi}{4}$

D. $n\pi - \dfrac{5\pi}{4}$

Answer: C

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8. In any triangle ABC, if a,b,c are in A.P. then $\tan\dfrac{A}{2}, \tan\dfrac{B}{2}, \tan\dfrac{C}{2}$ are in -

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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9. In any triangle ABC, the value of $\left(b^2 \sin 2C + c^2 \sin 2B\right)$ is-

A. Δ

B. 2Δ

C. 3Δ

D. 4Δ

Answer: D

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10. If $a\sin\theta = b\sin\left(120^\circ + \theta\right) = c\sin\left(240^\circ + \theta\right)$, then the value of $(ab + bc + ca)$ is-

A. 1

B. 2

C. -1

D. 0

Answer: D

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11. The value of $\theta\left(0 < \theta < \frac{\pi}{2}\right)$ for which $\cos\theta\sin\left(\theta - \frac{\pi}{6}\right)$ is maximum is-

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

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

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

D. $\frac{2\pi}{9}$

Answer: A

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12. The maximum value of $\left[\sin\left(x+\frac{\pi}{6}\right)+\cos\left(x+\frac{\pi}{6}\right)\right]$ in the interval $\left[0, \frac{\pi}{2}\right]$ is attained at x=

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

B. $\frac{\pi}{12}$

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

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

Answer: B

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13. The value of $\cos\frac{\pi}{7}\cos\frac{2\pi}{7}\cos\frac{3\pi}{7}$ is-

A. -1

B. 1

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

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

Answer: D

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14. In a triangle ABC, $a = 4, b = 3, A = 60^{\circ}$, then c is the root of the equation-

A. $c^2 + 3c + 7 = 0$

B. $c^2 - 3c + 7 = 0$

C. $c^2 - 3c - 7 = 0$

D. $c^2 + 3c - 7 = 0$

Answer: C

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15. The valud of $\sin 12^\circ \sin 48^\circ \sin 54^\circ$ is equal to-

A. $\frac{1}{16}$

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

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

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

Answer: D

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16. In a right angled triangle, the hypotense is four times as long as the perpendicular drawn to itfrom the opposite vertex. Then one acute angle of the triangleis-

A. 15°

B. 30°

C. 45°

D. 60°

Answer: A

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17. If n is an integer, which of the following is correct ?

A. $\tan(n\pi + \alpha) = -\tan\alpha$

B. $\tan(n\pi + \alpha) = \left(-1^{n}\right)\tan\alpha$

C. $\tan(n\pi + \alpha) = \cot\alpha$

D. $\tan(n\pi + \alpha) = \tan\alpha$

Answer: D

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18. If $1 + \sin^2 A = 3\sin A\cos A,$ then possible values of tan A are-

A. $3, \frac{1}{6}$

B. $2, \frac{1}{4}$

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

D. $4, \frac{1}{8}$

Answer: C

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19. The soluition of the equation $\sin\theta - 2 = \cos 2\theta$ in the interval $0 \le \theta \le 2\pi$ is-

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

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

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

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

Answer: B

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20. The value od the expression $\sqrt{2+\sqrt{2+\sqrt{2+2\cos 8\theta}}}$is-

A. $\sin 2\theta$

B. $2\cos 2\theta$

C. $2\sin\theta$

D. $2\cos\theta$

Answer: D

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21. If $\tan x = \frac{b}{a}$, then the value of $(a\cos 2x + b\sin 2x)$ is equal to-

A. a

B. b

C. $a^2 + b^2$

D. $a^2 - b^2$

Answer: A

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22. If $x = \sum_{n=0}^{\infty} \cos^{2n}\theta, y = \sum_{n=o}^{\infty} \sin^{2n}\theta, z = \sum_{n=0}^{\infty} \cos^{2n}\theta. \sin^{2n}\theta \text{ and } 0 < \theta < \frac{\pi}{2}$

then-

A. $xyz = xz + y$

B. $xyz = xy + z$

C. $xyz = yz + x$

D. $xyz = x + y + z$

Answer: B

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23. In a triangle $PQR, \angle R = \frac{\pi}{2}$. If $\tan\frac{P}{2}$ and $\tan\frac{Q}{2}$ are the roots of $ax^2 + bx + c = 0 (a \neq 0)$ then-

A. $b = c$

B. $a = b + c$

C. $c = a + b$

D. $b = a + c$

Answer: C

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24. If $A + B + C = \pi$ then the value of $\cos^2 A + \cos^2 B + \cos^2 C$ is-

A. $1 - \cos A \cos B \cos C$

B. $2\cos A \cos B \cos C$

C. $1 - 2\cos A\cos B\cos C$

D. $1 + 2\cos A\cos B\cos C$

Answer: C

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25. Find the value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \ldots\ldots\ldots\ldots + \sin^2 90^\circ$.

A. $8\frac{1}{2}$

B. $9\frac{1}{2}$

C. 9

D. 0

Answer: B

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26. If a,b, c are in G. P. then $\left(\frac{1}{a^2 - b^2} + \frac{1}{b^2}\right)$ is equl to-

A. $\frac{1}{c^2 - b^2}$

B. $\frac{1}{c^2 - a^2}$

C. $\frac{1}{b^2 - c^2}$

D. $\frac{1}{b^2 - a^2}$

Answer: C

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27. If the amplitude of $(z - 2 - 3i)$ is $\frac{\pi}{4}$, then the locus of $z = x + iy$ is -

A. $x + y - 1 = 0$

B. $x - y - 1 = 0$

C. $x + y + 1 = 0$

D. $x - y + 1 = 0$

Answer: D

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28. A fair coin is tossed 10 times. The probability of getting exactly 6 heads is-

A. $\frac{105}{512}$

B. $\frac{15}{64}$

C. $\frac{105}{1024}$

D. $\frac{21}{256}$

Answer: A

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29. The value of $\left[{}^{47}C_4 + \sum_{r=1}^{5} {}^{52-r}C_3\right]$ is equal to-

A. ${}^{52}C_3$

B. ${}^{52}C_4$

C. ${}^{51}C_4$

D. ${}^{53}C_4$

Answer: B

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30. If $1, \omega, \omega^2$ are the cube roots of unity, then the value of $(x+y)^2 + \left(x\omega + y\omega^2\right)^2 + \left(x\omega^2 + y\omega\right)^2$ is equal to-

A. $3xy$

B. $9xy$

C. $6xy$

D. $3\left(x^2 + y^2\right)$

Answer: C

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31. Let l_1 and l_2 be thw two lines intersecting at P. If A_1, B_1, C_1 are points on $l_1, A_2, B_2, C_2, D_2, E_2$ are points on l_2 an dif none of these coincides with P, then the number of triangles formed by joining these eight points is-

A. 45

B. 46

C. 55

D. 56

Answer: A

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32. Three numbers are chosen at random from the first 20 natural numbers. The probability that their product is even is -

A. $\frac{2}{19}$

B. $\frac{15}{19}$

C. $\frac{17}{19}$

D. $\frac{12}{19}$

Answer: C

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33. The first term of an infinite G.P. is a and its sum is 3, then-

A. $a > 6$

B. $-5 < a < 0$

C. $0 \leq a \leq 6$

D. $0 < a < 6$

Answer: D

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34. If $a_1 = 2$ and for all $n \geq 2, a_n - a_{n-1} = 2n,$ then the value of $\left(a_1 + a_2 + \ldots + a_{20}\right)$ is-

A. 3000

B. 3080

C. 3120

D. 3200

Answer: B

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35. If the coefficient of x^3 in the expansion of $\left(x^2 + \frac{k}{x}\right)^6$ be 160, then the value of k is-

A. 2

B. 3

C. 4

D. -2

Answer: A

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36. If $\sqrt{a + ib} = x + iy$ then possible value of $\sqrt{a - ib}$ is-

A. $x^2 + y^2$

B. $\sqrt{x^2 + y^2}$

C. $\sqrt{x^2 + y^2}$

D. $x - iy$

Answer: D

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37. A student is to answer 10 out of 13 questions in an examination such that he must choose at least 4 from the first five questions. The number of choice available to him is-

A. 346

B. 140

C. 196

D. 280

Answer: C

Watch Video Solution

38. The median of a distribution is 60 and mean deviation about median is 24, then the coefficient of mean deviation of the distribution is-

A. $30\ \%$

B. $36\ \%$

C. 32 %

D. 40 %

Answer: D

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39. If ω is a complex cube root of unity then the value of $\left[225 + \left(3\omega + 8\omega^2\right)^2 + \left(3\omega^2 + 8\omega\right)^2\right]$ is-

A. 248

B. 200

C. 192

D. 72

Answer: A

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40. Seventh term of an A.P. ios 40. Then the sum of its first 13 items is-

A. 572

B. 104

C. 520

D. 208

Answer: C

Watch Video Solution

41. If $x = \sum_{n=0}^{\infty} a^n, y = \sum_{n=0}^{\infty} b^n, z = \sum_{n=0}^{\infty} c^n$ where a,b,c are in A.P. and $|a| < 1, |b| < 1, |c| < 1,$ thenx,y,z are in-

A. A.P.

B. H.P.

C. G.P.

D. none of these

Answer: B

Watch Video Solution

42. If n is a natural number, then $\left[7^{2n}+2^{3(n-1)}, 3^{n=-1}\right]$ is always a multiple of-

A. 6

B. 9

C. 17

D. 25

Answer: D

View Text Solution

43. If n is a positive integer then the coefficient of x^{-1} in the expansion of

$(1+x)^n\left(1+\frac{1}{x}\right)^n$ is-

A. $\frac{(2n)!}{(n!)^2}$

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

C. $\frac{(2n-1)!}{n!(n-1)!}$

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

Answer: D

Watch Video Solution

44. The number of numbers that can be formed using the digits 3,4,5,6,7 (repetition of digits is not permissible) such that the thousand's digit is always less that unit's digit is-

A. 30

B. 45

C. 60

D. 75

Answer: C

Watch Video Solution

45. A point P which represents a complex number z, moves such that $|z - z_1| = |z - z_2|$, then the locus of P is-

A. a circle with centre z_2

B. a circle with centre z_2

C. a circle with centre at the origin

D. perpendicular bisector of line joining z_1 and z_2

Answer: D

Watch Video Solution

46. Solution set of the inequation $\left|\frac{2}{x-4}\right| > 1(x \neq 4)$ is-

A. $x \in (2, 6)$

B. $x \in (2, 4) \cup (4, 6)$

C. $x \in (4, 6)$

D. $x \in (2, 4)$

Answer: B

Watch Video Solution

47. If the 5th term of a G.P. is x, then the product of its first nine terms is-

A. x^5

B. x^7

C. x^9

D. x^{10}

Answer: C

Watch Video Solution

48. The sum of first n terms of the series $1^2 + 2.\,2^2 + 3^2 + 2.\,4^2 + 5^2 + \dots$ is $\frac{n}{2}(n+1)^2$ when n is even , When n is odd then the sum will be-

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

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

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

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

Answer: A

Watch Video Solution

49. If $^{-3} \wedge (n)C_{r+1}$ then-

A. $-\sqrt{3} \leq x \leq \sqrt{3}$

B. $-\infty < x < -2$

C. $2 < x < \infty$

D. $\frac{1}{n} + 3 \leq x^2 \leq 4(n \geq 2)$

Answer: D

View Text Solution

50. ω is an imaginary cube root of unity. If $\left(1 + \omega^2\right)^m = \left(1 + \omega^4\right)^m$ then the least positive integral value of m is-

A. 3

B. 4

C. 5

D. 6

Answer: A

Watch Video Solution

51. Locus of mid-point of the portionof the line $x\cos\alpha + y\sin\alpha = p$ between the coordinate axes is-

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

B. $x^2 + y^2 = 4p^2$

C. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$

D. $\frac{1}{x^2} + \frac{1}{y^2} = \frac{2}{p^2}$

Answer: C

Watch Video Solution

52. A ray of light is sent along the lie $x - 2y + 5 = 0$, upon reaching the line $3x - 2y + 7 = 0$, the ray is reflected from it. Then the equation of the line containing the reflected ray is-

A. $29x - 2y = 33$

B. $29x - 2y + 33 = 0$

C. $29x - 2y = 31$

D. $29x + 2y + 33 = 0$

Answer: B

Watch Video Solution

53. The coordinates of O , A and B are $(0, 0), (x, y)$ and (y, x) respectively. If $\angle AOB = \theta$, then the value of $\cos\theta$ is-

A. $\dfrac{xy}{x^2 + y^2}$

B. $\dfrac{x^2 - y^2}{x^2 + y^2}$

C. $\dfrac{4xy}{x^2 + y^2}$

D. $\dfrac{2xy}{x^2 + y^2}$

Answer: D

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54. If t is a variable parameter, then the equation to the locus defined by the equations $x = 2(\sec t + \tan t) - 1$ and $y = 2(\sec t - \tan t) - 2$ is-

A. $xy + 2x + y = 2$

B. $xy + x + 2y = 2$

C. $xy + x + 2y + 2 = 0$

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

Answer: A

Watch Video Solution

55. A circel cuts intercepts of lenghts 2a and 2b from the x-axis and the y-axis respectively. Then the equation to the locus of the centre of the circel is-

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

B. $x^2 - y^2 = a^2 - b^2$

C. $x^2 - y^2 = b^2 - a^2$

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

Answer: B

Watch Video Solution

56. The ordinate of the centre of the circle passing through $(0, 0)$ and $(1, 0)$ and touching the circle $x^2 + y^2 = 9$ is-

A. ± 1

B. ± 2

C. $\pm\sqrt{2}$

D. $\pm\sqrt{3}$

Answer: C

Watch Video Solution

57. The sides of a triangle are $3x + 4y$, $4x + 3y$ and $5x + 5y$ where, $x, y > 0$, then the triangle is-

A. equilateral

B. right angled

C. right angled isosceles

D. obtuse angled

Answer: D

Watch Video Solution

58. The triangle formed by joining the points (x, y, z), (y, z, x) and (z, x, y) in three dimensional space is-

A. equilateral

B. right angled

C. isosceles

D. none of these

Answer: A

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59. The sum of the focal distances of any point on the conic $16x^2 + 25y^2 = 400$ is-

A. 8

B. 4

C. 10

D. 5

Answer: C

Watch Video Solution

60. Without rotation of axes if the origin is shifted to the point $\left(\frac{ab}{a-b}, 0\right)$, then the equation $(a-b)\left(x^2+y^2\right) = 2abx$ reduces to-

A. $(a-b)^2\left(x^2+y^2\right) = a^2b^2$

B. $x^2+y^2 = (a-b)^2$

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

D. $a^2b^2\left(x^2+y^2\right) = (a-b)^2$

Answer: A

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61. The distance between the lines $5x+3y=7$ and $15x+9y+14=0$ is-

A. $\frac{35}{3\sqrt{34}}$

B. $\frac{35}{4\sqrt{34}}$

C. $\frac{21}{\sqrt{34}}$

D. $\frac{7}{\sqrt{34}}$

Answer: A

Watch Video Solution

62. The ratio in which he line-segment joining the points (p, q, r) and $(-p, -r, -q)$ is divided by the zx-plane, is-

A. $-p, q$

B. r, q

C. q, r

D. r, p

Answer: C

Watch Video Solution

63. The centre of a circel is at $(2, -3)$ and its circumference is 10π, then the equation os the circel is-

A. $x^2 + y^2 - 4x + 6y - 12 = 0$

B. $x^2 + y^2 - 4x - 6y + 12 = 0$

C. $x^2 + y^2 - 4x + 6y + 12 = 0$

D. $x^2 + y^2 - 4x - 6y - 12 = 0$

Answer: A

Watch Video Solution

64. If two circles $(x-1)^2 + (y-3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points, then-

A. $r < 2$

B. $8 < r < 10$

C. $r = 2$

D. $2 < r < 8$

Answer: D

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65. The lines $ax + by + c = 0, bx + cy + a = 0, cx + ay + b = 0$ are concurrent when-

A. $ab^2 + bc^2 + ca^2 = abc$

B. $a^3 + b^3 + c^2 = 3abc$

C. $ab + bc + ca = 0$

D. $a^2 + b^2 + c^2 = ab + bc + ca$

Answer: B

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66. If $\left(at^2, 2at\right)$ be the coordinate of an extremity of a focal chord of the parabola $y^2 = 4ax,$ then the length of the chord is-

A. $a\left(t - \frac{1}{t}\right)^2$

B. $a\left(t + \frac{1}{t}\right)$

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

D. $a\left(t - \frac{1}{t}\right)$

Answer: C

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67. Let L be the end of a latus rectum of the ellipse $2x^2 + 4y^2 = 1$ and it is in the third quadrandt, then the eccentric angle of L is-

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

B. $\frac{4\pi}{3}$

C. $\frac{7\pi}{3}$

D. $\frac{11\pi}{3}$

Answer: A

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68. 36 candidates appeared for an examination, 15 candidates passed I mathaematics, 15 candidates passed in physics, 20 candidates passed in chemistry, 3 candidates passed only in matematics, 4 candidates passed only in physics, 7 candidates passed only in chemistry and 2 candidates in all the three subjects. Then the number of cendidates who passed only in two subjects is-

A. 17

B. 20

C. 18

D. 15

Answer: D

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69. If $n(A) = 4, n(B) = 3$ and $n(A \times B \times C) = 24,$ then the value of $n(C)$ is-

A. 17

B. 288

C. 1

D. 2

Answer: D

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70. Two finite sets A and B are having m and n elements.The total number of subsets of the first set is 56 more than the total number of subsets of the second set.The value of m and n ae respectively.

A. $6, 3$

B. $7, 5$

C. $5, 3$

D. $6, 4$

Answer: A

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71. Let $R = \{(3, 3)\}, (6, 6), (9, 9), (12, 12), (6, 12), (3, 9), (3, 12), (3, 6)\},$ be a relation on the set $A = \{3, 6, 9, 12\}:$ then the domain of R is-

A. $\{3, 6, 9\}$

B. set A

C. $\{6, 9, 12\}$

D. none of these

Answer: B

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72. The equation of the hyperbola having its eccentricity 2 and the distance between its foci is 8, is-

A. $\frac{x^2}{12} - \frac{y^2}{4} = 1$

B. $\frac{x^2}{8} - \frac{y^2}{2} = 1$

C. $\frac{x^2}{4} - \frac{y^2}{12} = 1$

D. $\frac{x^2}{16} - \frac{y^2}{9} = 1$

Answer: C

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73. y_1 and y_2 and y_3 are the ordinates of three points on the parabola $y^2 = 4ax$, then the area of the triangle formed by the points is-

A. $\left|\frac{1}{4a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)\right|$

B. $\left|\frac{1}{16a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)\right|$

C. $\left|\frac{1}{2a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)\right|$

D. $\left|\frac{1}{8a}(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)\right|$

Answer: D

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74. Let $A = \{-3, -2, -1, 0, 1, 2\}$ and $\mathbb{Z}$ be the set of integers. If $f: A \rightarrow \mathbb{Z}$ be defined by $f(x) = x^2 - 10$, then the range of f is-

A. $\{1, -1, -4, -6, -10\}$

B. $\{-1, -4, 0, 1, 4\}$

C. $\{-1, -6, -9, -10\}$

D. $\{1, 3, 9, 10\}$

Answer: C

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75. Total number of relation that can be defined on set $A = \{1, 2, 3, 4, 5\}$ is=

A. 2^5

B. 2^{25}

C. 2^{10}

D. 2^{20}

Answer: B

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76. If $f2f(x) + 3f(-x) = x^2 - x + 1,$ then the value of $f'(1)$ is-

A. $\frac{7}{5}$

B. $\frac{5}{7}$

C. $\frac{6}{7}$

D. $\frac{7}{6}$

Answer: A

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77. The value of $\lim x \to \frac{\pi}{2}\left(\frac{2x - \pi}{\cos x}\right)$ is

A. $\log_2 2$

B. 1

C. 0

D. -1

Answer: A

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78. If $f(x)=\frac{e^{x}-e^{-x}}{e^{x}+e^{-x}}+2$, then the value of $f^{-1}(x)$ is-

A. $\log_e\frac{x-1}{3-x}$

B. $\frac{1}{2}\log_e\frac{3-x}{x-1}$

C. $\frac{1}{2}\log_e\frac{x-1}{3-x}$

D. $\log_e\frac{3-x}{x-1}$

Answer: C

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79. Let α and β be the distinct roots of $ax^2+bx+c=0$ then

$Lt_{x\to\alpha}\frac{1-\cos\left(ax^2+bx+c\right)}{(x-\alpha)^2}$ equal to

A. $-\frac{a^2}{2}(\alpha-\beta)^2$

B. $\frac{a^2}{2}(\alpha-\beta)^2$

C. $\frac{1}{2}(\alpha-\beta)^2$

D. 0

Answer: B

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80. If $2f\left(\frac{1}{x}\right) + f(x) = 3x$, then the value of $f(2)$ is-

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

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

C. $-\frac{1}{3}$

D. -1

Answer: D

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81. The domain of defination of the function $f(x) = \sqrt{\frac{\sqrt{x+1}}{\sqrt{x}}}$ is-

A. $(0, \infty)$

B. $(-1, \infty) - \{0\}$

C. $(-2, \infty)$

D. $[0, \infty)$

Answer: A

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82. The range of the function $f(x) = {}^{9-x}P_{x-1}$ is-

A. $\{2, 7, 24, 36, 60\}$

B. $\{1, 7, 24, 30, 60\}$

C. $\{1, 6, 24, 36, 64\}$

D. $\{2, 9, 16, 23, 30\}$

Answer: B

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83. The period of the function $\sin^4 x + \cos^4 x$ is -

A. π

B. 2π

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

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

Answer: C

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84. The value of $\lim_{x \to 0} \frac{xe^x - \log(1 + x)}{x^2}$ is equal to-

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

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

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

D. -1

Answer: A

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85. The value of $\lim_{x \to 1}(1 - x)\tan\frac{\pi x}{2}$ is-

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

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

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

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

Answer: B

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86. If $f(x)$ be a function such that $f(9) = 9$ and $f'(9) = 3$, then the value of

$$\lim_{x \to 9} \frac{\sqrt{f(x)} - 3}{\sqrt{x} - 3}$$ is equal to-

A. 9

B. 1

C. 6

D. 3

Answer: D

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87. Let $f(x) = \frac{1 - \tan x}{4x - \pi}$ when $0 \le x < \frac{\pi}{2}$ and $x \ne \frac{\pi}{4}$, If $f(x)$ is defined at $x = \frac{\pi}{4}$, then the value of $f\left(\frac{\pi}{4}\right)$ is-

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

B. 1

C. -1

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

Answer: D

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88. If $f(x)$ is differentiable and $f'(4)=5$, then the vlaue of $\lim_{x \to 2} \frac{f(4)-f\left(x^2\right)}{x-2}$ is equal to-

A. 20

B. 10

C. -20

D. -10

Answer: C

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89. If $f(x)$ is differentiable at $x = a$, then the value of $\lim_{x \to a} \frac{(x + a)f(x) - 2af(a)}{x - a}$ is equal to-

A. $f(a) + 2af'(a)$

B. $2af(a) + f'(a)$

C. $af'(a) + af(a)$

D. $af(a) + 2af'(a)$

Answer: A

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90. If $f(x + y + z) = f(x)f(y)f(z) \neq 0$, for all real x, y, z and $f(2) = 5, f'(0) = 2$, then the value of $f'(2)$ is-

A. 0

B. ± 2

C. ± 5

D. ± 10

Answer: D

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QUESTION PAPER 9

1. if $\tan x = \frac{b}{a}$, then $\left(\sqrt{\frac{a+b}{a-b}} + \sqrt{\frac{a-b}{a+b}}\right)$ is equal to-

A. $\frac{2\sin x}{\sqrt{\sin 2x}}$

B. $\frac{2\cos x}{\sqrt{\sin 2x}}$

C. $\frac{2\cos x}{\sqrt{\cos 2x}}$

D. $\frac{2\sin x}{\sqrt{\cos 2x}}$

Answer: C

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2. The complex number z is is such that $|z| = 1, z \neq -1$ and $w = \frac{z - 1}{z + 1}$.

Then real part of w is-

A. $\frac{1}{|z + 1|}$

B. 0

C. $\frac{\sqrt{2}}{|z + 1|^2}$

D. $\frac{1}{(|z + 1|)^2}$

Answer: B

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3. The number of words that can be formed out of the letters of the word ARTICLE so thet the vowel occupy even places is-

A. 360

B. 574

C. 300

D. 144

Answer: D

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4. The product $\left[32. (32)^{1/6}. (32)^{1/36}. . . o\right]$ is equal to-

A. 128

B. 256

C. 64

D. 512

Answer: C

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5. If a, b, c are distinct positive rational numbers and they are in A.P., then the roots of the equation $ax^2 + 2bx + x = 0$ are-

A. imaginary

B. rational and equal

C. ral may be rational or irrational

D. rational and unequal

Answer: D

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6. If the pth, qth and rth terms of a G.P. are again in G.P., then p, q, r are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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7. 10 boys and 6 girls are arranged in a row, the number of arrangement is which no two girls are together is-

A. ${}^{10}P_6 \times (10)!$

B. $6! \times {}^{10}P_6$

C. ${}^{11}P_6 \times (10)!$

D. $\dfrac{(18)!}{6!}$

Answer: C

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8. If $i = \sqrt{-1}$ then the value of $\sqrt{i}$ is-

A. $\pm\frac{1}{\sqrt{2}}(1 - i)$

B. $\pm\frac{1}{\sqrt{2}}(1 + i)$

C. $\pm\frac{1}{\sqrt{2}}(2 + i0$

D. $\pm\frac{1}{\sqrt{2}}(2 - i)$

Answer: B

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9. The sm of numjbers lying between 107 and 253 and divisible by 5 is-

A. 5220

B. 5210

C. 5200

D. 5190

Answer: A

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10. The coefficient of x^{24} in $\left(1+x^2\right)^{12}\left(1+x^{12}\right)\left(1+x^{24}\right)$ is-

A. ${}^{12}C_6+1$

B. ${}^{12}C_6$

C. ${}^{12}C_6+3$

D. ${}^{12}C_6+2$

Answer: D

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11. If the sum of squares of the diviations of 10 observations taken from the mean 50 is 250, then the coefficient of variation is-

A. $10\ \%$

B. $20\ \%$

C. 25 %

D. 15 %

Answer: A

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12. If ω is a complex cube root of unity, then the value of $(2 - \omega)\left(2 - \omega^2\right)\left(2 - \omega^{10}\right)\left(2 - \omega^{11}\right)$ will be-

A. 47

B. 48

C. 49

D. 50

Answer: C

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13. If the coefficient of x^7 in $\left(ax^2 + \frac{1}{bx}\right)^{11}$ equals the corfficient of x^{-7} in $\left(ax - \frac{1}{bx^2}\right)^{11}$, then a and b satisfy the equation-

A. $a = b$

B. $ab = 1$

C. $a - b = 1$

D. $a + b = 1$

Answer: B

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14. The probability of getting a total of at least 6 in the simultaneous thrown of 3 dice is-

A. $\frac{103}{108}$

B. $\frac{5}{108}$

C. $\frac{101}{108}$

D. $\frac{14}{27}$

Answer: A

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15. In the Argand diagram, OAP is an isosceles right angled triangle, right angled at O, the origin. If the point A corresponds to the complex number $\sqrt{3} + I,$ then the point P correspods to the complex number-

A. $1 + i\sqrt{3}$ or , $1 - I\sqrt{3}$

B. $\sqrt{30}i$ or , $-\sqrt{3} + i$

C. $\sqrt{3} + I$ or , $\sqrt{3} - i$

D. $1 - I\sqrt{3}$ or , $1 + I\sqrt{3}$

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16. The real part of $\left(1+\cos\frac{\pi}{5}+i\sin\frac{\pi}{5}\right)^{-1}$ is-

A. $\frac{1}{2}\cos\frac{\pi}{10}$

B. $\frac{1}{2\cos\frac{\pi}{10}}$

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

D. 1

Answer: C

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17. The valud of $\left[15^2+16^2+17^2+\ldots+30^2\right]$ is-

A. 8450

B. 8440

C. 8540

D. 8460

Answer: B

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18. 5 boys and 5 girls are sitting in a row randomly. The probability that boys and girls sit alternately is-

A. $\frac{5}{126}$

B. $\frac{2}{63}$

C. $\frac{1}{42}$

D. $\frac{1}{63}$

Answer: C

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19. If $x \in \mathbb{R}$ and $\frac{x}{2x+1} \geq \frac{1}{4}$, state which of the following is true-

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

B. $x \in \left(-\frac{1}{2}, \frac{1}{2}\right]$

C. $x \in \left(-\infty, -\frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$

D. $x \in \left[-\frac{1}{2}, \frac{1}{2}\right)$

Answer: A

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20. The value of $\left({}^{20}C_4 + 2 \cdot {}^{20}C_3 + {}^{20}C_2 - {}^{22}C_{18}\right)$ is-

A. 0

B. 1242

C. 7315

D. 960

Answer: A

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21. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabatical order ?

A. 240

B. 360

C. 480

D. 120

Answer: B

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22. Assuming that no two consecutive digits are same, the number of n-digit numbers is-

A. $n!$

B. $9!$

C. n^9

D. 9^n

Answer: D

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23. Two roots of the quadratic equation $x^2 - \left(3\sqrt{2} - 2i\right)x - 6\sqrt{2}i = 0$ are-

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

B. $3\sqrt{2}, \ -2i$

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

D. $3\sqrt{2}, 2i$

Answer: B

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24. Number of 6-digit numbers that can be formed with the digits of the number 112233 is-

A. 30

B. 60

C. 90

D. 120

Answer: C

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25. The first term and common difference of an A.P. are a and d respectively. If mth and nth terms of this A.P. are $\frac{1}{m}$ and $\frac{1}{n}$ respectively, then the value of $(a - d)$ is-

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

B. 0

C. 1

D. $\frac{m+n}{mn}$

Answer: D

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26. 3rd term from the end in the expension of $\left(\frac{4x}{5} - \frac{5}{2x}\right)^8$ is-

A. $4375x^{-4}$

B. $-4375x^{-4}$

C. $4325x^{-2}$

D. $-4325x^{-2}$

Answer: A

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27. Which of the following is the acute angle between the two linez $7x - 4y = 0$ and $3x0 - 11y = 2$?

A. $\left(\frac{\pi}{6}\right)$

B. $\left(\frac{\pi}{3}\right)$

C. $\left(\frac{\pi}{4}\right)$

D. $\left(\frac{2\pi}{5}\right)$

Answer: C

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28. If the axes are transferred to parallel axes through the point $(1, -2)$, then the equation $y^2 - 4x + 4y + 8 = 0$ becomes -

A. $y^2 = 4x + 1$

B. $y^2 = 4(x - 1)$

C. $y^2 = 4(x + 2)$

D. $y^2 = 4x$

Answer: D

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29. The distance between the circumcentre and orthocentre of the triangle whose vertices are (0,0),(6,8)and (-4,3) is

A. $\left(3, \frac{3}{4}\right)$

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

C. $\left(3, \frac{5}{4}\right)$

D. $(5, -2)$

Answer: A

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30. The coordinate of the vertices B and C of the triangle ABC are $(5, 2, 8)$ and $(2, -3, 4)$ respectively, if the coordinates of the centroid of the triangle are $(3, -1, 3)$, then the coordinates of the vertex A are-

A. $(2, -2, 2)$

B. $(2, -2, -3)$

C. $(2, 2, -3)$

D. $(-2, -2, -3)$

Answer: B

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31. If P is a point such that the ratio of the squares of rthe lengths of the tangents from P to the circels $x^2 + y^{\circ} - 4x + 2y - 44 = 0$ and $x^2 + y^2 + 2x - 4y - 20 = 0$ is $3:2$, then the locus of P is a circle with centre at-

A. $(7, -8)$

B. $(7, 8)$

C. $(-7, -8)$

D. $(-7, 8)$

Answer: D

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32. If the circles $x^2 + y^2 + 2gx + 2fy = 0$ and $x^2 + y^2 + 2g'x + 2f'y = 0$ touch each other then-

A. $ff' = gg'$

B. $fg = f'g'$

C. $f^2g = f'g'$

D. $fg' = gf'$

Answer: D

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33. The equation of the line bisecting perpendicularly the segmwent joining the points $(-4, 6)$ and $(8, 8)$ is-

A. $y = 7$

B. $6x + y = 19$

C. $x + 2y = 16$

D. $6x + 2y = 19$

Answer: B

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34. The ratio in which the line-segment joining the points $(2, -3, -5)$ and $(7, 1, 3)$ is divided by the xy-plane is-

A. $-5 : 3$

B. $4:3$

C. $5:3$

D. $3:5$

Answer: C

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35. A square of side a lies above the x-axis and has one vertex at the origin. The side passing throuhg the origin makes an angle $\alpha\left(0 < \alpha < \frac{\pi}{4}\right)$ with the positive direction of x-axis. Then the equation of its diagonal not passing through the origin is-

A. $y(\cos\alpha + \sin\alpha) + x(\cos\alpha - \sin\alpha) = a$

B. $y(\cos\alpha - \sin\alpha) - x(\sin\alpha - \cos\alpha) = a$

C. $y(\cos\alpha + \sin\alpha) + x(\sin\alpha - \cos\alpha) = a$

D. $y(\cos\alpha + \sin\alpha) + x(\sin\alpha + \cos\alpha) = a$

Answer: A

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36. The triangle formed by the lines $x + y = 0, 3x + y = 4$ and $x + 3y = 4$ is-

A. isosceles

B. equilateral

C. right angled

D. isosceles right angled

Answer: A

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37. The base vertices of an isosceles triangle PQR are $Q(1, 3)$ and $R(-2, 7)$. The vertex P can be-

A. $(1, 6)$

B. $\left(\frac{1}{2}, 5\right)$

C. $\left(\frac{5}{6}, 6\right)$

D. none of these

Answer: C

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38. The distance of the line $2x - 3y = 4$ from the point $(1, 1)$ measured parallel to the line $x + y = 1$is-

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

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $\sqrt{2}$

Answer: D

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39. The equation of the circle with origin as centre and passing through the vertices of an equilateral triangle whose median is of length 3a is-

A. $x^2 + y^2 = 9a^2$

B. $x^2 + y^2 = 4a^2$

C. $x^2 + y^2 = 16a^2$

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

Answer: B

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40. A point moves such that the area of the triangle formed by it with the points $(1, 5)$ and $(3, -7)$ is 21 square unit, then the locus of the moving point is-

A. $6x + y = 32$ or , $6x + y + 10 = 0$

B. $6x - y = 0$ or , $6x - y = 10$

C. $x + 6y = 32$ or , $x + 6y + 10 = 0$

D. $6x + y = 32$ or , $6x, \ - y = 10$

Answer: A

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41. The length of the tangent drawn from any point on the circle $x^2 + y^2 + 2gx + 2fy + c_1 = 0$ to the circel $x^2 + y^2 + 2gx + 2fy + c_2 = 0$ is-

A. $c_1 - c_2$

B. $c_2 - c_1$

C. $\sqrt{c_2 - c_1}$

D. $\sqrt{c_1 - c_2}$

Answer: C

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42. A point moves on a plane such that its distance from the point $(3, 0)$ is $\frac{3}{2}$ times its distance from the line $3x - 4 = 0$, then the locus of the moving point is a/an-

A. ellipse

B. hyperbola

C. parabola

D. circle

Answer: B

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43. If the major and minor axes of the ellipse are the axes of coordinates, then the equation of the ellipse passing through the points $(2, -2)$ and $(-3, 1)$ is-

A. $3x^2 + 4y^2 = 28$

B. $x^2 + 6y^2 = 28$

C. $2x^2 + 5y^2 = 28$

D. $3x^2 + 5y^2 = 32$

Answer: D

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44. Let m be the slope of a system of parallel chords of the parabola $y^2 = 4ax$, then the sum of y co-ordinates of the ends of any chord of the systme will be-

A. $-\frac{2a}{m}$

B. $\frac{2a}{m}$

C. $-\frac{4a}{m}$

D. $\frac{4a}{m}$

Answer: D

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45. The locus of the mid-point of the line segment joining the focus to a moving point onn the parabola $t^2 = 4ax$ is

A. $x + a = 0$

B. $2xa + a = 0$

C. $2x - a = 0$

D. $x = 0$

Answer: D

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46. Let R be the relation on the set A of first eight natural numbers defined by, $\{R = (x, y), x \in Ay \in A$ and $2x + y = 12$ then the domain of

R^{-1} is-

A. $\{2, 4, 6, 8, 10\}$

B. $\{1, 2, 3, 4, 5\}$

C. $\{2, 4, 6, 8\}$

D. $\{1, 2, 3, 4\}$

Answer: C

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47. Out of 40 boys 30 can swim, 27 can play chess and only 5 can fo neither. How many can swim only ?

A. 8

B. 12

C. 22

D. 10

Answer: A

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48. For two sets A and B , the three elements of $A \times B$ are $(a, x), (b, y), (c, x), ,$ then the value of $B \times A$ is-

A. $\{(y, a), (y, b), (c, y), (x, a), (x, b)\}$

B. $\{(a, y), (y, b), (y, c), (x, a), (b, x), (x, c)\}$

C. $\{(x, a), (x, b), (x, c), (y, a), (y, b), (y, c)\}$

D. none of these

Answer: C

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49. The coordinates of the foci of a hyperbola are $(0, 4)$ and $(0, -4)$ and the length of its latus rectum is 12 units , find its equation.

A. $y^2 - 3x^2 = 12$

B. $3y^2 - x^2 = 12$

C. $x^2 - 3y^2 = 12$

D. $3x^2 - y^2 = 12$

Answer: B

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50. Let $\mathbb{R}$ be the set of real numbers and $f, Rr \rightarrow \mathbb{R}$ be defined by $f(x) = \operatorname{cosec} x (x \neq n\pi, n \in z)$: then image set of f is-

A. $\{f(x) \in \mathbb{R} : f(x) \geq 1\}$

B. $\{f(x) \in \mathbb{R} : f(x) \leq 1\}$

C. $\{f(x) \in \mathbb{R} : |f(x)| \geq 1\}$

D. $\{f(x) \in \mathbb{R} : |f(x)| > 1\}$

Answer: C

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51. The inverse of the function $f(x) = \dfrac{x^4 + x^2 + 1}{x^2}$ is-

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

B. $f^{-1}(x) = \sqrt{x - 1} + \sqrt{x - 3}$

C. $f^{-1}(x) = \frac{1}{2}\left(\sqrt{x + 1} - \sqrt{x - 3}\right)$

D. $f^{-1}(x) = \sqrt{x + 1} - \sqrt{x - 3}$

Answer: A

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52. The period of the function $f(x) = \tan 4x$ is-

A. π

B. 2π

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

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

Answer: D

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53. If $f(x) = \cos\left[\pi^2\right]x + \cos\left[-\pi^2\right]x,$ where $[x]$ denots the greatest integer function, then the value of $f\left(\frac{\pi}{2}\right)$ is-

A. 0

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

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

D. -1

Answer: B

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54. Domain of definition of the function $f(x) = \sin^{-1}\left[\log_2\left(\frac{1}{2}x^2\right)\right]$ is-

A. $(-\infty, -2] \cup [1, 2]$

B. $(-2, -2) \cup (1, 2]$

C. $[-2, -1] \cup [1, 2]$

D. $(-2, 1) \cup [1, \infty)$

Answer: C

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55. The value of $\lim_{x \to 0}\frac{2^x - 1}{\sqrt{1 + x} - 1}$ is-

A. $\log_e 4$

B. $\log_e 2$

C. $\frac{1}{2}\log_2 2$

D. $3\log_e 2$

Answer: A

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56. The range of the function $y = \dfrac{1}{4 - \sin 2x}$ is-

A. $\left[\frac{1}{5}, 1\right]$

B. $\left[\frac{1}{5}, \frac{1}{3}\right]$

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

D. $\left[\frac{1}{5}, -\frac{1}{3}\right]$

Answer: B

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57. The value of $\lim_{x \to 0} \dfrac{\tan x - \sin x}{x^3}$ is equal to-

A. 0

B. 1

C. 2

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

Answer: D

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58. The function $f(x) = \frac{1 - \sin x + \cos x}{1 + \sin x + \cos x}$ is defined at $x = \pi$. if $f(\pi) = k + 1$, then the value of k for which, $\lim_{x \to \pi} f(x) = f(\pi)$ is-

A. -2

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

C. -1

D. 1

Answer: A

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59. If $f(x) = \log\left(\tan\frac{x}{2}\right)$, then the value of $f'(x)$ is -

A. 2

B. 4

C. 6

D. 0

Answer: A

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60. If $f(x) = 3x^2 + k|\sin x|$ is differentiable at $x = 0$ then the value of k is-

A. 1

B. -1

C. 0

D. -3

Answer: C

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61. The derivative of $f(x) = |x|^3 at x = 0$ does / is-

A. not exist

B. 0

C. 1

D. -1

Answer: B

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62. Let $f(x)\begin{cases} \frac{1}{x} & \text{when } x \geq 1 \\ a\left(x^2 - 1\right) + 1 & \text{when } x < 1 \end{cases}$ If $f'(1)$ exists, then the value of a is-

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

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

C. -2

D. 2

Answer: A

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63. Let x and y be two irrational numbers , state which of the following is true:

A. both $x + y$ and xy are always irrational

B. $x + y$ is always irrational and xy is always rational

C. $x + y$ may be ratiaonal and xy is always irrational

D. both $x + y$ and xy may be rational

Answer: D

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64. The function $f(x)$ is defined by $f(x) = \begin{cases} \left(x^2 + e^{\frac{1}{2-x}}\right)^{-1}, & \text{when} x \neq 2 \\ k, & \text{when} x = 2 \end{cases}$ If $\lim_{x \to 2^+} f(x) = f(2)$, then k is equal to-

A. $-\frac{1}{4}$

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

C. 0

D. 1

Answer: B

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65. The value of $\lim_{x \to \pi} \frac{\sqrt{1 + \cos x} - 1}{(\pi - x)^2}$ is-

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

B. 0

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

D. 1

Answer: C

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66. The period of $\sin^2\theta$ is-

A. π

B. π^2

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

D. 2π

Answer: A

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QUESTION PAPER 10

1. The value of $\left(\sin 75^\circ - \cos 75^\circ\right)$ is-

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

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

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

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

Answer: A

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QUESTION PAPER 11

1. A circular wire of radius 7 cm is cut and bend again into an arc of a circle of radius 12 cm. The angle substended by the arc at the centre of the circel is-

A. 100°

B. 210°

C. 120°

D. 240°

Answer: B

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QUESTION PAPER 12

1. If $\tan\theta = \frac{4}{5}$ and $\tan\phi = \frac{5}{4}$, then the value of $(\theta + \phi)$ is-

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

B. $\frac{3\pi}{4}$

C. π

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

Answer: D

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QUESTION PAPER 13

1. The value of $\left(\cos^2\frac{\pi}{12}+\cos^2\frac{\pi}{4}+\cos^2\frac{5\pi}{12}\right)$ is-

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

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

C. $\frac{3}{4}$

D. $\frac{4}{3}$

Answer: A

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QUESTION PAPER 14

1. If $x = 2\cos\theta$ then the value of $\left(x^3 - 2x + 6\right)$ is-

A. $\dfrac{\sin 4\theta}{\sin\theta}$

B. $\dfrac{2\sin^2 2\theta}{\sin\theta}$

C. $4\cos^2\theta(2\cos\theta - 1)$

D. none of these

Answer: D

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QUESTION PAPER 15

1. The triangle ABC of which the angles A, B, C satisfy $\cos A = \frac{\sin B}{2 \sin C}$ is-

A. equilateral

B. right angled

C. isosceles

D. none of these

Answer: C

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QUESTION PAPER 16

1. If in two circles, arcs of the same length substend angles of 60° and 75° at their centres, then the ratio of their radii is-

A. $4:5$

B. $5:4$

C. $3:4$

D. $4:3$

Answer: B

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QUESTION PAPER 17

1. The principal value of $\cot^{-1}\left(-\sqrt{3}\right)$ is

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

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

C. $\frac{7\pi}{6}$

D. $\frac{5\pi}{6}$

Answer: D

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QUESTION PAPER 18

1. If $\tan\theta = \sqrt{\frac{3}{2}}$, then the sum of infinity of the series, $1 + 2(1 - \cos\theta) + 3(1 - \cos\theta)^2 + 4(1 - \cos\theta)^3 + \ldots$ is-

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

B. $\frac{\sqrt{3}}{4}$

C. $\frac{5}{2\sqrt{2}}$

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

Answer: D

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QUESTION PAPER 19

1. If $\sin\theta\sin\phi - \cos\theta\cos\phi + 1 = 0$ then the value of $1 + \cot\theta\tan\phi$ is-

A. 1

B. 2

C. 0

D. -1

Answer: C

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QUESTION PAPER 20

1. The correct value of the parameter t of the identity $2\left(\sin^6 x + \cos^6 x\right) + t\left(\sin^4 x + \cos^4 x\right) = -1$ is-

A. -3

B. 3

C. 1

D. -1

Answer: A

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QUESTION PAPER 21

1. If $0 < \alpha < \frac{\pi}{2}$ and $\sin\alpha + \cos\alpha = \sqrt{2}$, then the value of $\cos 3\alpha$ is-

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

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

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

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

Answer: B

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QUESTION PAPER 22

1. If $A + B + C = 270^{\circ}$, then the value of $\cos 2A + \cos 2B + \cos 2C + 4\sin A \sin B \sin C$ is-

A. 4

B. 2

C. 1

D. 0

Answer: C

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QUESTION PAPER 23

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

A. 0

B. 1

C. 3

D. 2

Answer: D

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QUESTION PAPER 24

1. The general solution of the equation $\tan 2\theta \tan\theta = 1$ is-

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

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

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

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

Answer: B

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QUESTION PAPER 25

1. The value of $\left(\cot 70^\circ + 4\cos 70^\circ\right)$ is-

A. $\sqrt{3}$

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

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

D. $2\sqrt{3}$

Answer: A

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QUESTION PAPER 26

1. If b $\cos\left(\theta + 120^\circ\right) = c\cos\left(\theta + 240^\circ\right)$, then the value of $\frac{b + c}{b - c}\tan\theta$ is-

A. $\sqrt{3}$

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

C. $-\frac{1}{\sqrt{3}}$

D. $-\sqrt{3}$

Answer: C

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QUESTION PAPER 27

1. If $\alpha, \beta(\alpha \neq \beta)$ satisfy the equation $a\cos\theta + b\sin\theta = c$ then the value of $\tan\frac{\alpha + \beta}{2}$ is-

A. $\frac{a}{b}$

B. $\frac{b}{a}$

C. $\frac{c}{b}$

D. $\frac{b}{c}$

Answer: B

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QUESTION PAPER 28

1. For any angle θ, the expression $\frac{2\cos 8\theta + 1}{2\cos\theta + 1}$ is equal to-

A. $(2\cos\theta - 1)(2\cos 2\theta - 1)(2\cos 4\theta - 1)$

B. $(2\cos\theta + 1)(\cos 2\theta + 1)(2\cos 4\theta + 1)$

C. $(\cos\theta - 1)(\cos2\theta - 1)(\cos4\theta - 1)$

D. $(2\cos\theta - 1)(2\cos2\theta - 1)(2\cos4\theta + 1)$

Answer: A

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QUESTION PAPER 29

1. The number of values of θ in the interval $-\pi \leq \theta \leq \pi$ satisfying the equation $\cos\theta + \sin2\theta = 0$ is-

A. 1

B. 2

C. 3

D. 4

Answer: D

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QUESTION PAPER 30

1. If $m\tan\left(\theta - 30^{\circ}\right) = n\tan\left(\theta + 120^{\circ}\right)$, then the value of $\cos 2\theta$ is -

A. $\dfrac{m+n}{2(m-n)}$

B. $\dfrac{m+n}{m-n}$

C. $\dfrac{m-n}{m+n}$

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

Answer: A

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QUESTION PAPER 31

1. If n is a positive integer, then the value of $\left(\cos\alpha\cos2\alpha\cos2^2\alpha\ldots.\cos2^{n-1}\alpha\right)$ is-

A. $\dfrac{\sin2n\alpha}{2^n\sin\alpha}$

B. $\dfrac{\sin2^n\alpha}{2^n\sin2^{n-1}\alpha}$

C. $\dfrac{\sin2^n\alpha}{2^n\sin\alpha}$

D. none of these

Answer: C

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QUESTION PAPER 32

1. If $u=\sqrt{a^2\cos^2\theta+b^2\sin^2\theta}+\sqrt{a^2\sin^2\theta+b^2\cos^2\theta}$, then the difference between the maximum and minimum values of u^2 is-

A. $(a+b)^2$

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

C. $2\left(a^2 + b^2\right)$

D. $(a - b)^2$

Answer: D

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QUESTION PAPER 33

1. The ratio of the sides of a triangle ABC is $1:\sqrt{3}:2$. Then the ratio $A:B:C$ is-

A. $3:5:2$

B. $1:2:3$

C. $1:\sqrt{3}:2$

D. $3:2:1$

Answer: B

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