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India's Number 1 Education App

MATHS

BOOKS - SAI MATHS (TELUGU ENGLISH)

EAMCET QUESTION PAPER 2017

Mathematics

1. Let A = {-4, -2, -1, 0, 3, 5} and f: $A \to R$ be defined by f(x) = $\begin{cases} 3x-1f \text{ or } x>3 \\ x^2+1f \text{ or } -3 \le x \le 3 \\ 2x-3f \text{ or } x<-3 \end{cases}$ then the range of f is

A. {-11 , -7, 2, 1, 8, 14}

B. {-11, 5, 2, 1, 8,14}

C. {-11, 5,2, 1, 10, 14}

D. {-11, -7, -5, 1, 10, 14}

Answer: C

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2. Let N be the set of all natural numbers, Z be the set of all integers and

$\sigma : N \to Z$ is defined by

sigma(n) = $\begin{cases} \frac{n}{2} & \text{if } niseven \\ \frac{n-1}{2} & \in nisodd \end{cases}$

A. σ is one-one but not onto

B. σ is onto but not one -one

C. $\sigma$is one -one and onto

D. σ is neither one -one nor onto

Answer: C

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3. The sum of first n terms of $\frac{1}{2 \cdot 5} + \frac{1}{5 \cdot 8} + \frac{1}{8 \cdot 11} + \ldots$ is

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

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

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

D. $\frac{n}{2(3n+2)}$

Answer: D

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4. If a, b, c are non-zero real numbers and if the equations (a-1) x = y +z, (b-1) y = z + x , (c - 1) z = x + y have a non-trival solution, then ab+bc+ca=

A. a+b+c

B. a b c

C. 0

D. $a^2b^2c^2$

Answer: B

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5. If a system of three linear equations is three unknowns, which is in the matrix equations from of AX = D is inconsistent then

$\frac{\text{rank of A}}{\text{rank of} AD}$ is

A. Greater than or equal to one

B. One

C. Greater than one

D. Less than one

Answer: D

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6. $If \Delta = \begin{vmatrix} 1 & \cos\theta & 1 \\ -\cos\theta & 1 & \cos\theta \\ -1 & -\cos\theta & 1 \end{vmatrix}, then \Delta$ lies in the intervail

A. (2,4)

B. [2,4]

C. [-1,1]

D. [1,4]

Answer: B

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7. If z is a complex number with $|z| \geq 5$. Then the least value of $\left|z + \frac{2}{z}\right|$ is

A. 23/5

B. 24/5

C. 26/5

D. 29/5

Answer: A

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8. If $\frac{\log 1}{\sqrt{3}}\left\{\frac{|z|^2-|z|+1}{2|z|}\right\} > -2$, then z lies inside

A. a square

B. a triangle

C. a circle

D. an ellipse

Answer: C

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9. If ω is a complex cube root of unity , then for any $n > 1 \sum_{r=1}^{n-1} r(r+1-\omega)\left(r+1-\omega^2\right] =$

A. $\frac{n^2(n+1)^2}{4}$

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

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

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

Answer: B

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10. If α is a non-real root of $x^7=1$ then $\alpha(1+\alpha)\left(1+\alpha^2+\alpha^4\right)=$

A. 2

B. -1

C. 1

D. -2

Answer: B

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11. $\frac{x-1}{3x+4} < \frac{x-3}{3x-2}$ holds. for all x in the interval

A. $\left(-\infty, -\frac{5}{4}\right)$

B. (-4/3, 2/3)

C. $\left(\frac{3}{4}, \infty\right)$

D. $\left(-\infty, -\frac{5}{4}\right) \cup \left(\frac{3}{4}, -\infty\right)$

Answer: B

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12. The harmonic mean of two numbers is $-\frac{8}{5}$ and their geometric mean is 2 . The quadratic equation whose roots are twice those numbers is

A. $x^2 + 10x + 16 = 0$

B. $x^2 - 10x + 16 = 0$

C. $x^2 + 5x + 4 = 0$

D. $x^2 - 5x + 4 = 0$

Answer: A

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13. If the roots of the equations $x^3 - 7x^2 + 14x - 8 = 0$ are in geometric progression then the difference between the largest and the smallest roots is

A. 1/2

B. 2

C. 3

D. 4

Answer: C

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14. If α, β, γ are the roots of $x^3 + px^2 + qx + r = 0,$ then the value of $(1+\alpha^2)(1+\beta^2)(1+\gamma^2)$ is

A. $(r+p)^2 + (q+1)^2$

B. $(r-p)^2 + (q-1)^2$

C. $(1+p)^2 + (1+q)^2$

D. $(r-p)^2 + (r-q)^2$

Answer: B

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15. The number of different ways of preparing a garland using 6 distinct white roses and 5 distinct red roses such that no two red roses come together, is

A. 151200

B. 21600

C. 43200

D. 86400

Answer: C

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16. There are 10 intermediate stations on a railway line between two particular stations. The number of ways that a train can be made to stop at 3 of these intermediate stations so that no two of these halting stations are consecutive, is

A. 56

B. 126

C. 20

D. 120

Answer: A

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17. $37C_4 + \sum_{r=1}^{5}(42-r)Cr$ =

A. $38C_4$

B. $39C_4$

C. $41C_4$

D. $42C_4$

Answer: D

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18. The coefficient of x^5 in the expansion of $(1+x)^{21} + (1+x)^{22} + \ldots. + (1+x)^{30}$ is

A. $51C_5$

B. $9C_5$

C. $31C_6 - 21C_6$

D. $30C_5 + 20C_5$

Answer: C

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19. if x = 1.3/3.6 + 1.3.5/3.6.9 + (1.3.5.7)/(3.6.9.12) + ... To infinite terms, then $9x^2 + 24x =$

A. 11

B. 21

C. 31

D. 41

Answer: A

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20. If $\frac{5x^2+2}{x^3+x} = \frac{A_1}{x} + \frac{A_2x+A_3}{x^2+1}$, then (A_1, A_2, A_3)=

A. (0,2,3)

B. (2,0,3)

C. (3,0,2)

D. (2,3,0)

Answer: D

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21. If $\tan\alpha$ and $\tan\beta$ are the roots of the equation $x^2+px+q=0$, then the value of $\sin^2(\alpha+\beta)+p\cos(\alpha+\beta)\sin(\alpha+\beta)+q\cos^2(\alpha+\beta)$ is

A. p+q

B. p

C. q

D. $\frac{p}{p+q}$

Answer: C

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22. $1+\cos 10^\circ+\cos 20^\circ+\cos 30^\circ$ =

A. $4\cos 5^\circ \cos 10^\circ \cos 15^\circ$

B. $4\cos 10^\circ \cos 20^\circ \cos 30^\circ$

C. $4\sin 5^\circ \sin 10^\circ \sin 15^\circ$

D. $4\sin 10^\circ \sin 20^\circ \sin 30^\circ$

Answer: A

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23. The number of solutions of the trignometric equation $1 + \cos x . \cos 5x = \sin^2 x \in [0, 2\pi]$ is

A. 6

B. 8

C. 10

D. 12

Answer: C

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24. If $\cot\left(\cos^{-1} x\right) = \sec\left\{\tan^{-1}\left(\frac{a}{\sqrt{b^2 - a^2}}\right\}, b > a$, then x =

A. $\frac{b}{\sqrt{2b^2 - a^2}}$

B. $\frac{a}{\sqrt{2b^2 - a^2}}$

C. $\frac{\sqrt{2b^2 - a^2}}{a}$

D. $\frac{\sqrt{2b^2 - a^2}}{a}b$

Answer: A

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25. $\text{sech}^{-1}\left(\frac{1}{\sqrt{2}}\right) + \cos ech^{-1}(-1) =$

A. $\sqrt{2} - 1$

B. $\sqrt{2} + 1$

C. $\sqrt{2}$

D. 0

Answer: D

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26. In ΔABC if θ is any angle, then b cos (C+θ) $+ c\cos(B -$ theta`) =

A. $a \cos \theta$

B. $a \sin \theta$

C. $a \tan \theta$

D. $a \cot \theta$

Answer: A

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27. In ΔABC, if b $\cos \theta = c - a$, (where θ is an acute angle), then (c-a) $\tan \theta$ =

A. $2\sqrt{ca}\frac{\cos B}{2}$

B. $2\sqrt{ca}\frac{\sin B}{2}$

C. $2ca\frac{\sin B}{2}$

D. $2ca\frac{\cos B}{2}$

Answer: B

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28. If `alpha, beta, gamma are the lengths of the tangent from the vertices of a triangle to its in- circle, then

A. $\alpha+\beta+\gamma=\frac{1}{r^2}(\alpha\beta\gamma)$

B. $\alpha+\beta+\gamma=\frac{1}{r}(\alpha\beta\gamma)$

C. $\alpha^2+\beta^2+\gamma^2=\frac{2}{r}(\alpha\beta\gamma)$

D. $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=r(\alpha\beta\gamma)$

Answer: A

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29. The triad (x,y,x) of real numbers such that $\left(3\hat{i}-\hat{j}+2\hat{k}\right)=\left(2\hat{i}+3\hat{j}-\hat{k}\right)x+\left(\hat{i}-2\hat{j}+2\hat{k}\right)y+\left(-2\hat{i}+\hat{j}-2\hat{k}\right)$ z, is

A. (2,-5,3)

B. (2,5,-3)

C. (-2,5,3)

D. (2,5,3)

Answer: D

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30. In ΔABC, L, M, N are points on BC, CA, AB respectively, dividing them in the ratio 1:2, 2:3, 3:5. If the point K divides AB in the ratio 5:3, then $\frac{\left|\overline{AL}+\overline{BM}+\overline{CN}\right|}{\left|\overline{CK}\right|}$ =

A. 1/15

B. 2/5

C. 5/8

D. 3/5

Answer: A

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31. If a non zero vector $\bar{a}$ is a parallel to the line of intersection of the plane determined by the vectors $\hat{j}-\hat{k}, 3\hat{j}-2\hat{k}$ and the plane determined by the vecrtors $2\hat{i}+3\hat{j}, \hat{i}-3\hat{j},$ then the angle between the vectors and $\bar{a}$ and $\bar{i}+\bar{j}+\bar{k}$ is

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

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

C. $\tan^{-1}(\sqrt{3})$

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

Answer: A

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32. If $\bar{a}, \bar{b}$ and $\bar{c}$ are non- zero vectors such that $\bar{a}$ and $\bar{b}$ are not perpendicular to each other, then the vector $\bar{r}$ which is perpendicular to $\bar{a}$ and satisfying $\bar{r} \times \bar{b} = \bar{c} \times \bar{b}$ is

A. $\frac{\left(\bar{b} \times \bar{c}\right) \times \bar{a}}{\bar{a}} . \bar{b}$

B. $\frac{(\bar{a} \times \bar{c}) \times \bar{b}}{\bar{b}} . \bar{c}$

C. $\frac{\left(\bar{b} \times \bar{c}\right) \times \bar{a}}{\bar{a}} . \bar{c}$

D. $\frac{\left(\bar{b} \times \bar{a}\right) \times \bar{c}}{\bar{a}} . \bar{c}$

Answer: A

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33. If the volume of the tetrahedron formed by the coterminous edges $\bar{a}, \bar{b}$ and $\bar{c}$ is 4, then the volume of the parallelopiped formed by the coterminous edges $\bar{a} \times \bar{b}, \bar{b} \times \bar{c}$ and $\bar{c} \times \bar{a}$ is

A. 144

B. 16

C. 48

D. 576

Answer: D

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34. If the points having the position vectors $3\bar{i}-2\bar{j}-\bar{j}, 2\bar{i}+3\bar{j}-4\bar{k}, \bar{i}+\bar{j}+2\bar{k}$ and $4\bar{i}+5\bar{j}+\lambda\bar{k}$ are coplanar, then λ =

A. -8

B. 8

C. 146/17

D. -146/17

Answer: D

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35. If $\alpha \neq 0$ and the mean deviation of the observation $\{k\alpha\}$, for k = 1,2, ...50 about its median is 50, then $|\alpha|$ =

A. 2

B. 3

C. 4

D. 5

Answer: C

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36. If three numbers are drawn at random, successively without replacement from as set S ={1,2,...., 10}, then the probability that the minimum of the chosen numbers is 3 or their maximum is 7, is

A. 1/40

B. 3/40

C. 5/40

D. 11/40

Answer: D

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37. A bag P contains 5 white marbles and 3 black marbles. Four marbles are drawn at random from P and are put in an empty bag Q. If a marble drawn at random from Q is found to be black, Then the probability that all the three black marbles in P are transfered to the bag Q, is

A. 1/8

B. 7/8

C. 6/7

D. 1/7

Answer: D

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38. If the mean and variance of a binomial variate X are 4/3, 8/9 respectively, then P(X =2) =

A. 4/27

B. 8/81

C. 16/81

D. 8/27

Answer: D

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39. $p, x_1, x_2, \ldots . x_n$ and $q, y_1, y_2, \ldots . y_n$ are two arithmetic progressions with common difference a and b respectively. If α and β are

the arithmetic means of $x_1, x_2, \ldots . x_n$ and $y_1, y_2, \ldots . y_n$ respectively, then the locus of P(α, β) is

A. $\alpha(x-p)=\beta(y-q)$

B. $p(x-\alpha)=q(y-\beta)$

C. $a(x-p)=b(y-q)$

D. $b(x-p)=a(y-q)$

Answer: D

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40. The point to which the origin is to be shifted to remove the first degree terms from the equation $2x^2+4xy-6y^2+2x+8y+1=0$ is

A. $\left(\frac{7}{8}, \frac{3}{8}\right)$

B. $\left(\frac{7}{8}, -\frac{3}{8}\right)$

C. $\left(-\frac{7}{8}, \frac{3}{8}\right)$

D. $\left(-\frac{7}{8}, -\frac{3}{8}\right)$

Answer: C

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41. The incentre of the triangle formed by the straight lines y = $\sqrt{3}x, y = -\sqrt{3}x$ and $y = 3$ is

A. (1,2)

B. (0,2)

C. (2,1)

D. (2,0)

Answer: B

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42. The set of all values of 'a' such that both points(1,2) and (3,4) lie on the same side of the line 3x - 5y +a =0

A. $\{x \in R : x > 11\}$

B. $\{x \in R : x < 7\}$

C. $\{x \in Rx > 11\} \cup \{x \in R : x < 7\}$

D. ϕ

Answer: C

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43. The points on the straight line 3x -4y +1 =0 which are at a distance of 5 units from the point(3,2) are

A. $\left(1, \frac{1}{2}\right)\left(2, \frac{5}{4}\right)$

B. $\left(-2, -\frac{7}{4}\right), \left(-3, -\frac{5}{2}\right)$

C. $\left(4, \frac{11}{4}\right), (-1, -1)$

D. (7,5),(-1,-1)

Answer: D

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44. The equation of the pair of lines through the point (2,1) and perpendicular to the pair of lines $4xy + 2x + 6y + 3 = 0$ is

A. $xy + x + 2y - 6 = 0$

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

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

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

Answer: D

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45. If the pair of lines $x^2 - 16pxy - y^2 = 0$ and $x^2 - 16qxy - y^2 = 0$ are such that each pair bisects the angle between the other pair, then pq is =

A. 1/8

B. -1/8

C. 1/64

D. -1/64

Answer: D

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46. The figure formed by the pairs of lines $6x^2 + 13xy + 6y^2 = 0$ and $6x^2 + 13xy + 6y^2 + 10x + 10y + 4 = 0,$ is a

A. square

B. Rhombus

C. Rectangle

D. Parallelogram

Answer: B

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47. A circle having centre at the origin passes through the three vertices of an equilateral triangle the length of its median being 9 units. Then the equation of that circle is

A. $x^2 + y^2 = 18$

B. $x^2 + y^2 = 81$

C. $x^2 + y^2 = 36$

D. $x^2 + y^2 = 9$

Answer: C

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48. If a circle with radius 2.5 units, passes through the points (2,3) and (5,7) then its centre is

A. (7,10)

B. (1.5,2)

C. (3.5,5)

D. (3,4)

Answer: C

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49. If 2kx +3y -1 =0, 2x + y +5 =0 are conjugated lines with respect to the circle $x^2 + y^2 - 2x - 4y - 4 = 0$, then k =

A. 1

B. 2

C. 3

D. 4

Answer: A

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50. If the points of intersection of tangents drawn at the points where the line 5x + y + 1 =0 cits the circle $x^2 + y^2 - 2x - 6y - 8 = 0$ is (a,b) then 5a + b =

A. 3

B. 4

C. -1

D. -44

Answer: D

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51. The angle between the two circles, each passing through the centre of the other is,

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

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

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

D. π

Answer: C

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52. The equation of the circle whose diameter is the common chord of the circles $x^2 + y^2 + 2x + 2y + 1 = 0$ and $x^2 + y^2 + 4x + 6y + 4 = 0$ is

A. $2x^2 + 2y^2 - 2x + 4y + 1 = 0$

B. $x^2 + y62 - x + 2y + 4 = 0$

C. $3x^2 + 3y^2 - 3x + 6y - 8 = 0$

D. $10x^2 + 10y^2 + 14x + 8y + 1 = 0$

Answer: D

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53. The equation of the parabola whose axis is parallel to the x-axis and which passes through the points(-2,1)(1,2)(-1,3) is

A. $25y^2 - 2x - 65y + 36 = 0$

B. $15y^2 + 12x - 11y + 20 = 0$

C. $5y^2 + 2x - 21y + 20 = 0$

D. $18y^2 - 12x - 21y + 21 = 0$

Answer: C

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54. The tangents to the parabola $y^2 = 4ax$ from an external point P make angle θ_1 and θ_2 with the axis of the parabola, such that $\tan\theta_1 + \tan\theta_2 = b$ where b is constant. Then p lies on

A. y=bx

B. y = x+b

C. y = x/b

D. y + x =b

Answer: A

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55. The lines y=2x +$\sqrt{76}$ and 2y +x =8 touch the ellipse $\frac{x^2}{16} + \frac{y^2}{12} = 1$. If the point of intersection of these two lines lie on a circle, whose centre coincides with the centre of that ellipse, then the equation of that circle is

A. $x^2 + y^2 = 16$

B. $x^2 + y^2 = 12$

C. $x^2 + y^2 = 28$

D. $x^2 + y^2 = \left(4 + \sqrt{8}\right)^2$

Answer: C

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56. The angle between the tangents drawn from the point (1,2) to the ellipse $3x^2 + 2y^2 = 5$ is

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

B. $\frac{\tan^{-1}\left(12\sqrt{5}\right)}{5}$

C. $\frac{\tan^{-1}\left(12\sqrt{5}\right)}{13}$

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

Answer: B

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57. If lx + my =1 is a normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ then $a^2m^2 - b^2l^2$ =

A. $l^2m^2\left(a^2+b^2\right)^2$

B. $\left(l^2+m^2\right)\left(a^2+b^2\right)^2$

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

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

Answer: A

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58. The circumcentre of the triangle formed by the points (1,2,3), (3,-1,5), (4,0,-3) is

A. (2,2,2)

B. (1,1,1)

C. (3,3,3)

D. (7/2, -1/2 ,1)

Answer: D

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59. ΔABC is formed by A(1,8,4), B(0,-11,4) and C(2,-3,1). If D is the foot of the perpendicular from A to BC, then the coordiantes of D are

A. (4,5,-2)

B. (4,-5,2)

C. (-4,5,2)

D. (4,-5,-2)

Answer: A

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60. The equation of the plane through (4,4,0) and perpendicular to the planes 2x + y +2z +3 =0 and 3x +3y + 2z -8 =0 is

A. 4x+ 3y +3z =28

B. 4x -2y -3z =8

C. 4x +2y +3z =24

D. 4x +2y -3z =2 4

Answer: B

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61. $\lim_{x \to 0} \frac{(1 - \cos 2x)(3 + \cos x)}{x} \tan 4x =$

A. 1

B. 2

C. -1/4

D. 1/2

Answer: B

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62. If F:R $\rightarrow$ R is defined by $f(x) =$ {:(x-1 , for x le 1), (2-x^2, for 1 lt x le3), (x-10, for 3ltxlt5),(2x, for x ge 5):}` then the set of points of discontinuity of f is

A. R - {1,3,5}

B. {1,3,5}

C. R - {1,5}

D. {1,5}

Answer: D

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63. If $y = \tan^{-1}\left\{\frac{x}{1+\sqrt{1-x^2}}\right\} + \sin\left\{2\tan^{-1}\sqrt{1-\frac{x}{1}}\right\} + x$, then dy/dx =

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

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

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

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

Answer: D

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64. For $x^2 - 4 \neq 0$, thenvalue of d/dx $\left[\log\left\{e^x\left(\frac{x-2}{x+2}\right)^{\frac{3}{4}}\right\}\right]$ at x = 3 is

A. 1

B. 8/5

C. 2

D. $\frac{8e^3}{5}$

Answer: B

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65. If $y = \frac{\sinh^{-1} x}{\sqrt{1+x^2}}$ then $\left(1+x^2\right)y^2 + 3xy_1 + y =$

A. 0

B. -1

C. 1

D. 2

Answer: A

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66. An angle between the curves $x^2 = 3y$ and $x^2 + y^2 = 4$ is

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

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

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

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

Answer: C

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67. A container is in the shape of an inverted cone. Its height is 6m and radius is 4m at the top. If it is filled with water at the rate of $3\frac{m^3}{\min}$, then the rate of change of height of water (in mt/min) when the water level is 3m, is

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

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

C. 16π

D. 2π

Answer: A

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68. If a cyclindrical vessel of given volume V with no lid on the top is to be made from a sheet of metal, then the radius (r) and height (h) of the vessel so that the metal sheet used is minimum, is

A. $r = \sqrt[3]{\frac{V}{\pi}}, h = \sqrt[3]{\frac{V}{\pi}}$

B. $r = \sqrt{\frac{V}{\pi}}, h = \sqrt{\frac{V}{\pi}}$

C. $r = \sqrt{\pi V}, h = \sqrt{\pi V}$

D. $r = \sqrt[3]{\frac{\pi}{V}}, h = \sqrt[3]{\frac{\pi}{V}}$

Answer: A

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69. For the function f(x) = (x-1) (x-2) defined on [0,1/2], the value of 'c' satisfying Lagrange's mean value theorem, is

A. 1/3

B. 1/5

C. 1/7

D. 1/4

Answer: D

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70. $\int \frac{x^{e-1}+e^{x-1}}{x^e+e^x}dx$ =

A. $\frac{1}{e}\log|x^e+e^x|+c$

B. $e\log|x^e+e^x|+c$

C. $-\frac{1}{e}\log|x^e+e^x|+C$

D. $-e\log|x^e+e^x|+C$

Answer: A

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71. $\int\frac{x+\sin x}{1+\cos x}dx$ =

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

B. $x\frac{\sec x}{2}+\frac{\tan x}{2}+C$

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

D. $x\frac{\tan x}{2}+C$

Answer: D

View Text Solution

72. $\int\frac{5x^2+3}{x^2(x^2-2)}dx$ =

A. $\frac{13}{4}\sqrt{2}\log\left|\frac{x+\sqrt{2}}{x}-\sqrt{2}\right|+\frac{3}{2}x+C$

B. $\frac{13}{2}\sqrt{2}\log\left|\frac{\sqrt{2}-x}{\sqrt{2}}+x\right|+\frac{3}{2}x+C$

C. $\frac{5}{3}\sqrt{2}\log\left|\frac{x+\sqrt{2}}{x}-\sqrt{2}\right|+\frac{3}{5}x+C$

D. $\frac{13}{4}\sqrt{2}\log\left|\frac{x-\sqrt{2}}{x+\sqrt{2}}\right|+\frac{3}{2}x+C$

Answer: D

View Text Solution

73. If $I_n=\int\sin n\frac{x}{\cos x}dx, then I_n=$

A. $-\frac{2}{n}-1\cos(n-1)x-I_{n-2}$

B. $-\frac{2}{n}+1\sin(n+1)x-I_{n-2}$

C. $-\frac{2}{n}+1\cos(n-1)x-I_{n-2}$

D. $\frac{2}{n}-1\cos(n-1)x-I_{n-2}$

Answer: A

View Text Solution

74. $\lim_{n \to \infty} \left[\frac{1^k + 2^k + 3^k + \ldots\ldots + n^k}{n^{k+1}} \right]$

A. 1/k

B. 2/k

C. 1/k+1

D. 2/k+1

Answer: C

View Text Solution

75. If $\int_0^{10} f(x)dx = 5$, then $\sum_{k=1}^{10} \int_0^1 f(k-1+x)dx$ =

A. 50

B. 1

C. 1/6

D. 1/3

Answer: D

View Text Solution

76. The area (in sq units) enclosed between the curves $y = x^2$ and $y = |x|$ is

A. 2/3

B. 1

C. 1/6

D. 1/3

Answer: D

View Text Solution

77. The differential equation corresponding to the family of circles in the plane touching the Y-axis at the origin, is

A. $\frac{dy}{dx} = \frac{x^2 + y^2}{2}xy$

B. $\frac{dy}{dx} = \frac{x^2 - y^2}{2}xy$

C. $\frac{dy}{dx} = \frac{y^2 - x^2}{2}xy$

D. $\frac{dy}{dx} = 2x\frac{y}{x^2 + y^2}$

Answer: C

View Text Solution

78. The solution of the equation $\left(x - 4y^3\right)\frac{dy}{dx} - y = 0, (y > 0)$ is

A. $x + 2y^3 = cy$

B. $y = x^3 + cx$

C. $x = y^3 + cy$

D. $y + 2x^3 = cx$

Answer: A

View Text Solution

Physics

1. In the determination of the internal resistance of a cell with a potentiometer, the error in the measurementof the balancing length is ± 1 mm. When the cell alone is connected in the circuit, the balancing length is obtained at 60cm and when the cell is shunted with a resistance of $10\Omega \pm 2\%$, the balancing length is obtained at 50cm. The error in the determination of the internal resistance of the cell is -

A. 0.018

B. 0.024

C. 0.042

D. 0.056

Answer: C

View Text Solution

2. A bird is tossing (flying to and pro) between two cars moving towards each other on a straight road. One car has speed of $36Kmh^{-1}$. The bird starts moving from first car towards the other and is moving with the speed of $36Kmh^{-1}$. when the two cars were separated by 36 km. The total distance covered by the bird before the cars meet each other is

A. 1440m

B. 24400m

C. 244m

D. 14400m

Answer: D

View Text Solution

3. A body is projected from the top of a tower with a velocity $\bar{u} = 3\hat{i} + 4\hat{j} + 5\hat{k} ms^{-1}, where \hat{i}, \hat{j}$ and $\hat{k}$ are unit vectors along east, north and vertically upwards respectively. If the height of the tower is 30m, horizontal range of the body on the ground is $\left(g = 10 ms^{-2}\right)$

A. 12m

B. 9m

C. 25m

D. 15m

Answer: D

View Text Solution

4. Equation of a projactile is given by $y = Px - Qx^2$ where P, Q are constants. The ratio of maximum height to range of the projectile is

A. $\frac{P^2}{Q}$

B. 4P

C. P/4

D. $\frac{q^2}{2}P$

Answer: C

View Text Solution

5. A person of 60Kg mass is in lift which is coming down such that the man exerts a force of 150N on the floor of the lift. Then the acceleration of the lift is $(g = 10ms^{-2})$

A. $40.0ms^{-2}$

B. $15.0ms^{-2}$

C. $22.5ms^{-1}$

D. $7.5ms^{-2}$

Answer: D

View Text Solution

6. 

The situations are shown in figure (a) & (b) , in each case, m , -3 kg and $m_2 = 4kg,$ Ifa_1, a_2 are the respective acccelerations of the blocks in these situations, then the values of a_1 and a_2 respectively $[g = 10ms^{-2}]$

A. 0

B. $\frac{30}{7}ms^{-2}, \frac{5}{7}ms^{-2}$

C. $\frac{40}{7}ms^{-2}, \frac{10}{7}ms^{-2}$

D. $\frac{20}{7}ms^{-2}, \frac{10}{7}ms^{-2}$

Answer: C

View Text Solution

7. A girl of mass 50 kg is swinging on a cradle. If she moves with a velocity of $2ms^{-1}$ upwards in adirection making an angle 60° with vertical, then the power generated is `[g = 9.8 ms^-2]

A. 980W

B. $490\sqrt{2}W$

C. $490\sqrt{3}W$

D. 245W

Answer: C

View Text Solution

8. Two blocks of masses 'M' and 'm' are placed on one another on a smooth horizontal surface as shown in the figure. The force 'F' is acting on the mass 'M' horizontally during time interval 't'. Assuming no relative sliding between the blocks, the work done by friction on the blocks is-

A. $\left(mF^2\frac{t^2}{2}(M+m)^2\right)$

B. $\left(F^2\frac{t^2}{M+m}\right)$

C. $\left(M+\frac{m}{m}t^2\right)$

D. $\left(F\frac{t}{2}(M+m)\right)$

Answer: A

View Text Solution

9. A uniform thin rod of 120 cm length and 1600 g mass is bent as shown in the figure. The moment of inertia of the bent rod about an axis passing through the point 'O' and perpendicular to the plane of the paper is _ _ kgm^2.

A. 0.12

B. 0.084

C. 0.36

D. 0.018

Answer: B

View Text Solution

10. A solid sphere is projected up along an inclined plane of inclination 30° with the horizontal with a speed of $4ms^{-1}$. If it rolls without slipping, the maximum distance transversed by it is -- $\left(g = 10ms^{-2}\right)$

A. 1.12m

B. 22.4m

C. 112m

D. 2.24m

Answer: A

View Text Solution

11. Time period of a simple pendulum of length 'L' is T_1. Time period of a uniform rod of same length 'L' suspended from one end and oscillating in a vertical palne is T_2. Amplitude of oscillation is small in both cases. Then, $\frac{T_1}{T_2}$ is

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

B. 1

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

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

Answer: C

View Text Solution

12. Two bodies of masses 4m and 9m are seprated by a distance 'r'. The gravitational potential at a point on this line joining them where the gravitational field becomes zero is

A. (-4Gm / r)

B. (-25Gm/r)

C. (-9Gm / r)

D. (- 13Gm/ r)

Answer: B

View Text Solution

13. the ratio of lengths, area of cross section and young's modulii of steel to that of brass wires shown in the figure are a,b,c respectively. The ratio of increase in the lengths of brass to that of steel wires is [Assume that the masses of steel and Brass wires are negligible

A. (4a/7bc)

B. (7bc/4a)

C. (4bc/7a)

D. (7a/4bc)

Answer: C

View Text Solution

14. Fully filled open water tank has two holes on either sides of its walls. One is square hole of side x cm at a depth of 2m from the top, and the other hole is equilateral triangle of side 4cm at a depth of 6m from the top. If the rate of flow of water is same from both the holes, then 'X' is

A. 12 cm

B. 3.46cm

C. 6.92 cm

D. 1.73 cm

Answer: B

View Text Solution

15. Three uniform thin aluminium rod of each length 2m from an equilateral triangle PQR as shown in the figure. The mid point of the rod PQ is at the origin of the coordiante system. If the temperature of the system of rods increases by $50^{\circ}C$, the increases in y- coordiante of the centre of mass of the system of the rods is -mm (Coefficient of volume expansion of aluminium = $12\sqrt{3} \times 10^{-6}k^{-1}$)

A. 0.05

B. 0.1

C. 0.2

D. 0.8

Answer: C

View Text Solution

16. A wall is made of equally thick layers 'P' and 'Q' of different materials. Thermal conductivity of 'Q' is half of that of the 'P'. In the steady state, if the temperature difference across the wall is $24^\circ C$, then the temperature difference across the layer 'P' is-

A. $12^\circ C$

B. $8^\circ C$

C. $16^\circ C$

D. $4^\circ C$

Answer: B

View Text Solution

17. One mole of a gas expands such that its volume 'V' changes with absolute temperature 'T' in accordance with the relation $V = KT^2$ where 'K' is a constant. If the temperature of the gas changes by $60^\circ C$, then work done by the gas (R is universal gas constant)

A. 120R

B. Rln60

C. KRln 60

D. 40 KR

Answer: A

View Text Solution

18. A monoatomic ideal gas goes through a cyclic process as shown in the figure. The effciency of this process is

A. 0.78

B. 0.62

C. 0.42

D. 0.21

Answer: A

View Text Solution

19. If the average translational kinetic energy of a molecule in a gas is equal to the kinetic energy, of an electron accelerating from rest through 10 Volt, then the temperature of the gas molecule is (Boltzmann constant $= 1.38 \times 10^{-23} JK^{-1}$)

A. 73.7K

B. $77.3 \times 10^3 K$

C. $7.73 \times 10^3 K$

D. 730 K

Answer: B

View Text Solution

20. The transverse displacement of a string of a linear density $0.01Kgm^-1$, clamped at its ends is given by $Y(\_x, t) = 0.03\sin\left(2\pi\frac{x}{3}\right)\cos(60\pi t)$ where x and y are in meters and time 't' is in seconds. Tension in the string is

A. 81N

B. 162N

C. 36N

D. 9N

Answer: A

View Text Solution

21. A closed organ pipe of length 'L' and an open organ pipe contain gases of densities of ρ_1 and ρ_2 respectively. The compressibility of gases are equal in both the pipes. If the frequencies of their first overtones are same, then the length of the open organ pipe is

A. L/3

B. 4L/3

C. $4\frac{L}{3}\sqrt{\frac{\rho_1}{\rho_2}}$

D. $4\frac{L}{3}\sqrt{\frac{\rho_2}{\rho_1}}$

Answer: C

View Text Solution

22. Two point sources S_1 and S_2 are 24cm apart. Where should a convex lens of focal length 9cm be placed in between them so that the image of both sources are formed at the same place?

A. 8 cm

B. 6 cm

C. 10 cm

D. 12 cm

Answer: B

View Text Solution

23. Two slits seprated by 0.5mm are illuminated by light of wavelength 500 nm. The screen is at a distance of 120 cm from the slits. The phase difference betweeen the interfering waves at a point 3 mm on the screen from the central bright fringe is -

A. π

B. 3π

C. 5π

D. 7π

Answer: C

View Text Solution

24. The uniform electric field intensity between the two plates of a parallel plate capacitor is $1 \times 10^3 Vm^{-3}$ acting vertically upwards as shown in figure. The plates are sufficiently long and have sepration 2 cm. A particle of negative charge $1\mu C$ and mass 2g is projected at an angle 45° with the electric field from the lower plate with a velocity 'u'. The maximum velocity acquired by the particle if it is not hit the upper plate is

A. $0.1ms^{-1}$

B. $0.2ms^{-1}$

C. $2ms^{-1}$

D. $1ms^{-1}$

Answer: B

View Text Solution

25. An infinitely long thin straight wire has uniform linear charge density of $\frac{1}{3}Cm^{-1}$. Then the magnitude of the force acting on a charge $3\mu C$ situated ata point of 18 cm away from the wire is $\left(\frac{1}{4\pi\varepsilon_{\circ}} = 9 \times 10^{9} Nm^{2}C^{-2}\right)$

A. 10^{5}N

B. 2×10^{5}N

C. $\frac{1}{3} \times 10^{6} N$

D. $3 \times 10^{11} N$

Answer: A

View Text Solution

26. In a steady state, a capacitor of capacity $2\mu F$ is charged to $4\mu C$, as shown in figure. If the internal resistance of the cell is 0.5Ω, then the emf of the cell is

A. 4V

B. 2.5V

C. 5V

D. 2V

Answer: B

View Text Solution

27. An electrostatic paint sprayer has a metal sphere of diameter 18 cm and at a potential of 25KV. If it sprays paint droplets, the charge on the metal sphere is

A. $0.5\mu C$

B. $0.25\mu C$

C. $2.5\mu C$

D. $25\mu C$

Answer: B

View Text Solution

28. When the terminals of a cella re connected by a wire of resistance 4Ω, the potential of 25KV. If it sprays paint droplet, the charge on the metal sphere is

A. $0.5\mu C$

B. $0.25\mu C$

C. $2.5\mu C$

D. $25\mu C$

Answer: D

View Text Solution

29. If the charge on the capacitor is 1mC in the given circuit, then $\left(R_1\frac{R_2}{R_3}\right) =$ _ $-\Omega$.

A. 0.4

B. 10

C. 6

D. 0.6

Answer: A

View Text Solution

30. Two concentric coils of 20cm turns each are placed in same plane. Their radii are 30cm and 60 cm and carry 0.4A and 0.6A currents respectively in opposite directions. The magnetic induction at the centre in tesla is --

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

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

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

D. $\frac{10}{3}\mu_{\circ}$

Answer: D

View Text Solution

31. Two long parallel conducting wires carrying currents are seprated by a distance 'X'. Work done per unit length in changing the distance between the wires is proportional to

A. X

B. 1/X

C. $\log_e X$

D. $\left(\frac{1}{\log_e X}\right)$

Answer: C

View Text Solution

32.

$(''L \in e, \text{Slope}), (a\text{High retentivity}, (I)\text{Telephone diaphgram}), (''bHigh$
$\in creaseeddycurrentlosses), (''\text{d Negative susceptibility}'', (\text{IV})Perma$

A. a-I, b-ii, c-iii, d-iv

B. a-Iv, b-iii, c-i, d-ii

C. a-I, b-iv, c-iii, d-ii

D. a-iv, b-ii, c-i, d-iii

Answer: B

View Text Solution

33. Assertion (A) : It is more difficult to push a magnet into a coil with more number of turns. Reason (R) : The emf induced in a coil opposes the

motion of a magnet when it is moved towards the coil.

A. Both A and R are true. R is correct explanation of A.

B. Both A and R are true. R is not correct explanation of A

C. A is true, R is false

D. A is false, R is true

Answer: A

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34. When a coil is connected to AC supply of frequency 50Hz, a current of 4A flows in it and it consumes 240W power. If the potential difference across the coil is 100V, then the inductance value of the coil is

A. $L = \frac{1}{5}\pi H$

B. $L = \frac{\pi}{5}H$

C. $L = (5\pi)H$

D. $L = \frac{1}{25}\pi H$

Answer: A

View Text Solution

35. The amplitude of electric field in an electromagnetic wave is $60Vm^{-1}$. Then the amplitude of magnetic field is

A. $2 \times 10^{7}T$

B. $6 \times 10^{7}T$

C. $6 \times 10^{-7}T$

D. $2 \times 10^{-7}T$

Answer: D

View Text Solution

36. Both an electron and a photon have same de - Broglie wave length of $1.2A^{\circ}$ the ratio of their energies is nearly

A. 1:1

B. 1:10

C. 1:100

D. 1:1000

Answer: C

View Text Solution

37. The radius of orbit of an electron and the speed of electron inn the ground state of hydrogen atom are 5.5×10^{-11} m and $4 \times 10^{6} ms^{-1}$ respectively. Then the orbital period of this electron in the first excited state will be ___

A. $9.608 \times 10^{-16} s$

B. $8.9068 \times 10^{-16} s$

C. $7.806 \times 10^{-16} s$

D. $6.908 \times 10^{-16} s$

Answer: D

View Text Solution

38. The half life of a stream of radioactive particles moving along a straight path with a constant kinetic energy of 4eV is 1 minute. The percentage of particles which decay before travelling a distance of 3.6 Km is ____.

(Mass of the radioactive particles = 3.2×10^{21}kg and charge of the elecrtron = $1.6 \times 10^{-19} C$)

A. 37.5

B. 87.5

C. 75

D. 175

Answer: B

View Text Solution

39. A zener diode voltage regulator operated in the range 120 - 180 V produces a constant supply of 110 V and 250 mA to the load. If the maximum current is equally share between the load and the zener diode, Then the values of load resistance (R_L) and series resistance (R_S) are respectively.

A. $R_L = 70\Omega, R_S = 280\Omega$

B. $R_L = 440\Omega, R_S = 140\Omega$

C. $R_L = 440\Omega, R_S = 1400\Omega$

D. $R_L = 280\Omega, R_S = 70\Omega$

Answer: B

View Text Solution

40. The process of recovering the modulating signal from the modulated carrier wave is called

A. Amplification

B. Recitification

C. Noise

D. Detection

Answer: D

View Text Solution

Chemistry

1. The Lewis structure for O_3 molecule is given below. The correct formal charges on oxygen atoms labelled 1,2,3 are respectively

A. +1 , 0, -1

B. -1, 0, +1

C. 0, +1, -1

D. +1, -1, 0

Answer: B

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2. 20% of a first order reaction was found to be completed at 10 A.M. At 11.30 A.M. on the same day, 20% of the reaction was found to be remaining. The half life period in minutes of the reaction is

A. 90

B. 60

C. 45

D. 30

Answer: C

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3. Which of the following structures represents the compound, generally added to soaps to impart antiseptic properties?

A. 

B. 

C. 

D. 

Answer: B

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4. What is the following sequence of reactions?

A. $-CH_3$

B. CH_2-CH_3

C. $-\underset{\underset{O}{||}}{C}-Cl$

D. $-\underset{\underset{O}{||}}{C}-CH_3$

Answer: A

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5. What are the X and Y in the following reactions?

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6. What are X and Y in the following reactions?

A. 

B. 

C. 

D. 

Answer: A

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