SECTION—I : MATHEMATICS

1. If \( f(x) \) is a polynomial and \( a \) is any real number, then \( x-a \) divides
   \[ f(x) \quad \text{or} \quad a \text{ divides } f(x) \]
   \[ f(x) - f(a) \quad \text{or} \quad x - a \text{ divides } f(x) - f(a) \]
   \[ f(x) - a \quad \text{or} \quad x - a \text{ divides } f(x) - a \]
   \[ \text{None} \quad \text{or} \quad \text{None divides } f(x) \]
   
2. If \( x^2 - \frac{4}{x^2} = 3 \), then \( x = \)
   
   \[ (1) \pm 1 \quad (2) \pm 3 \quad (3) \pm 2 \quad (4) \pm \sqrt{5} \]

3. If one root of the equation \( x^2 - px + 8 = 0 \) is twice the other, then \( p = \)
   \[ x^2 - px + 8 = 0 \quad \text{and} \quad \text{let the roots be } a \quad \text{and} \quad 2a \]
   \[ p = \]
   
   \[ (1) 2 \quad (2) 4 \quad (3) 8 \quad (4) 6 \]

4. If \( x = 2 \) is one solution of \( kx^2 + 2x - 3 = 0 \), then the value of \( k = \)
   \[ x = 2 \quad \text{and} \quad \text{solve } kx^2 + 2x - 3 = 0 \]
   \[ k = \]
   
   \[ (1) -\frac{1}{4} \quad (2) \frac{1}{4} \quad (3) \frac{1}{2} \quad (4) -\frac{1}{2} \]

5. If \( y = 1 \) is a common root of the equations \( ay^2 + ay + 3 = 0 \) and \( y^2 + y + b = 0 \), then \( ab = \)
   \[ ay^2 + ay + 3 = 0 \quad \text{and} \quad y^2 + y + b = 0 \quad \text{when} \quad y = 1 \]
   \[ ab = \]
   
   \[ (1) -\frac{7}{2} \quad (2) 6 \quad (3) 3 \quad (4) -3 \]
6. If two roots of \( x^3 - 3x - 2 \) are equal, the third root is

\[ x^3 - 3x - 2 \]

\[ x = 2 \quad (2) \quad x = 1 \quad (3) \quad x = \frac{1}{2} \quad (4) \quad x = -2 \]

7. If \( 2x + 3y = 1 \) and \( \frac{x + y}{x} = \frac{3}{x} \), then (solution) \( x = \)

\[ (1) \quad -2, \frac{4}{3} \quad (2) \quad 2, \frac{4}{3} \quad (3) \quad 2, -\frac{4}{3} \quad (4) \quad -2, -\frac{4}{3} \]

8. If \( \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \) where \( a_1x + b_1y + c_1 = 0 \) and \( a_2x + b_2y + c_2 = 0 \) are two linear equations, then

the equations are

\[ \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \]

\[ a_1x + b_1y + c_1 = 0 \quad \text{and} \quad a_2x + b_2y + c_2 = 0 \]

\[ \begin{align*}
(1) & \quad \text{consistent and have a unique solution} \\
(2) & \quad \text{consistent and have infinite solutions} \\
(3) & \quad \text{consistent and have finite solutions} \\
(4) & \quad \text{inconsistent}
\end{align*} \]

9. If \( 2^x + 3^y = 17 \) and \( 3(2^x) - 2(3^y) = 6 \), then (solution)

\[ (1) \quad x = 2, y = 3 \quad (2) \quad x = -2, y = 3 \quad (3) \quad x = -2, y = -3 \quad (4) \quad x = 3, y = 2 \]

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10. A fraction in the form \( \frac{a}{b} \) becomes equal to \( \frac{6}{5} \) if 2 is added to both numerator and denominator. If 1 is subtracted from both numerator and denominator, fraction becomes \( \frac{3}{2} \). Then \( \frac{a}{b} = \)

\[
\frac{a}{b} = \frac{4}{3} \hspace{1cm} (1) \quad \frac{7}{5} \hspace{1cm} (2) \quad \frac{10}{8} \hspace{1cm} (3) \quad \text{None (అన్నపూర్వం)} \hspace{1cm} (4)
\]

11. In an arithmetic progression the first term is 3 and the last term is 27. The fifth term from the first and fifth term from the last are the same, then the common difference is

\( a = 3 \), \( b = 27 \). First term, \( b = 3 \), common difference = \( \frac{(27 - 3)}{5 - 1} \) = \( \frac{24}{4} \) = 6

(1) 2 \hspace{1cm} (2) -2 \hspace{1cm} (3) 3 \hspace{1cm} (4) -3

12. Under usual notations in an AP if \( 2a = d \), then the ratio of the sum to first 11 terms and the sum to first 5 terms =

\( a = 2 \), \( d = 2a \) common difference = 11 term = \( \frac{11(2a + (11 - 1)d)}{2} \) term = \( \frac{5(2a + (5 - 1)d)}{2} \) = \( \frac{5(2 \times 2 + 4 \times 6)}{2} \) = \( \frac{5(4 + 24)}{2} \) = \( \frac{5 	imes 28}{2} \) = 70

(1) \( \left( \frac{11}{5} \right)^2 \) \hspace{1cm} (2) \( \left( \frac{10}{4} \right)^2 \) \hspace{1cm} (3) \( \left( \frac{12}{6} \right)^2 \) \hspace{1cm} (4) None (అన్నపూర్వం)

13. If the first term of a GP is 256 and the common ratio is \( \left( -\frac{1}{2} \right) \), the tenth term is

\( a = 256 \), \( r = -\frac{1}{2} \) tenth term = \( a \times r^{(n-1)} \) = \( 256 \times \left(-\frac{1}{2}\right)^{9} \) = 10 term

(1) -1 \hspace{1cm} (2) \(-\frac{1}{2}\) \hspace{1cm} (3) \(-\frac{1}{4}\) \hspace{1cm} (4) \( \frac{1}{8} \)

14. In a GP, the fourth term is 24 and the ninth term is 768, the first term is

\( a = ? \), \( r = 24 \) \( 768 = a \times r^{(9-1)} \) \( a \times 24^{4} = 768 \) \( a = \frac{768}{24^{4}} \) \( a = 1 \)

(1) '2' \hspace{1cm} (2) 3 \hspace{1cm} (3) 4 \hspace{1cm} (4) 6

15. If the centroid of the triangle two of whose vertices are (2, 1) and (1, 2) is (0, 0), then the third vertex is

\( a = \text{centroid} \), \( b = (2, 1) \), \( c = (1, 2) \), \( d = (0, 0) \) \( \text{centroid} = \frac{(2 + 1 + x)}{3} = 0 \)

(1) (1, 1) \hspace{1cm} (2) (-1, -1) \hspace{1cm} (3) (-2, -2) \hspace{1cm} (4) (-3, -3)
16. If the slope of the line joining the points $(3, -6), (-6, 3)$ is equal to the slope of the line joining $(3, x)$ and $(x^2, -3)$, then $x =$

$(3, -6), (-6, 3)$ పోటీ సరైన సరిస్థలం (3, x), $(x^2, -3)$ పోటీ సరైన సరిస్థలం. అంచనాం, $x =$

(1) $-2$ or 3  (2) $-3$ or 2  (3) 2 only  (4) 3 only

-2 అనే 3
-3 అనే 2
2 ఒకేది
3 ఒకేది

17. The area of the quadrilateral formed by $(-a, -b), (a, -b), (a, b)$ and $(-a, b)$ is

$(-a, -b), (a, -b), (a, b)$ వంటి చతురస్రం రెండు మద్య సరైన సరిస్థలం. తెలుగు సరైన సరిస్థలం

(1) $ab$  (2) $2ab$  (3) $3ab$  (4) $4ab$

18. $A(1, 2), B(1, 4), C(3, 2)$ are the vertices of a triangle. The slope of the line joining the mid-points of $BA$ and $BC$ is

$A(1, 2), B(1, 4), C(3, 2)$ రెండు మాణ చతురస్రం. తెలుగు చతురస్రం మాణ తేడా వంటి సరిస్థలం

(1) $30^\circ$  (2) $60^\circ$  (3) $45^\circ$  (4) parallel to $x$-axis

ఒక మానతాకు సరైన సరిస్థలం

19. $ABCD$ is a trapezium with $AB\parallel DC$ and $AD$, $BC$ are non-parallel. $E$ and $F$ are points on $AD$ and $BC$ respectively so that $EF\parallel AB$. If $\frac{AE}{BF} = 2$, then $\frac{ED}{FC} =$

$ABCD$ దత్తం $AB\parallel DC$, $AD$, $BC$ వంటి నష్ట వంటి సరిస్థలం. $AD$, $BC$ పూర్ణమైన $EF\parallel AB$ తేడా మాణ తేడా $E,

F$ మద్య సరైన సరిస్థలం. $\frac{AE}{BF} = 2$ తేడా $\frac{ED}{FC} =$

(1) 1  (2) 2  (3) 3  (4) None

20. In $\triangle ABC$, $AD$ is perpendicular to $BC$. If $BD : DC = 3 : 2$, then area of $\triangle ABC$ : area of $\triangle ADC =$

$\triangle ABC$ అంశం $BD : DC = 3 : 2$ తేడా $\triangle ABC$ ఆపుర్ణమైన $\triangle ADC$ ఆపుర్ణమైన$

(1) 2 : 3  (2) 1 : 2  (3) 5 : 2  (4) 3 : 2$

21. The angles of elevation of two buildings on either side of a point of observation between them are $45^\circ$ and $30^\circ$. If the heights of them are 20 m and $25\sqrt{3}$ m respectively, then the distance between the two buildings is

తోడు తోడు అంశం $45^\circ$ అంశం $30^\circ$ తేడా $20$ మీ. $25\sqrt{3}$ మీ. తేడా అంశం$45^\circ$ నుంచి $30^\circ$ నుంచి నడిపింది. అంశం నడిపింది$20$ మీ. $25\sqrt{3}$ మీ. తేడా అంశం$45^\circ$ నుంచి $30^\circ$ నుంచి నడిపింది.

(1) 45 m  (2) 35 m  (3) 55 m  (4) 95 m
22. \( \triangle ABC \) is isosceles with right angle at vertex \( B \). If \( AC = 10 \text{ cm} \), then \( AB = \)

\[ B \Rightarrow \text{None} \Rightarrow \sqrt{2} \Rightarrow AC = 10 \text{ cm} \Rightarrow AB = \]

(1) 5 cm (2) 10 cm (3) 5 cm (4) None

23. For a man of height 6 ft, the angle of elevation of the top of a tree is 45°. If the distance between the man and the tree is 20 ft, find the height of the tree.

6 ft \( \Rightarrow \text{None} \Rightarrow 45° \Rightarrow \text{Distance} \Rightarrow 20 \text{ ft} \Rightarrow \) height?

(1) 45 ft (2) 32 ft (3) 14 ft (4) 26 ft

24. The areas of two similar triangles are 100 sq cm and 64 sq cm. If the altitude of smaller triangle is 4 cm, then altitude of the bigger one is

100 sq cm \( \Rightarrow \text{None} \Rightarrow 64 \text{ sq cm} \Rightarrow 4 \text{ cm} \Rightarrow \) altitude?

(1) 16 cm (2) 5 cm (3) 10 cm (4) 8 cm

25. In the given figure, \( AB, CD, PQ \) are all perpendicular to \( BQ \) and \( AB = 5, PQ = 4 \), then \( CD = \)

\[ \text{None} \Rightarrow \text{None} \Rightarrow 5 \Rightarrow 4 \Rightarrow \) \( \text{CD} = \)

(1) 1 (2) 9 (3) \( \frac{9}{20} \) (4) \( \frac{20}{9} \)

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26. If $AD = 2$, $AC = x - 1$, $BE = 6$, $BC = x + 2$ and $AB || DE$, then $(\text{option}) x = \ldots$

27. If $O$ is any point inside a rectangle $ABCD$, then

- $OA + OC = OB + OD$
- $OA \cdot OC = OB \cdot OD$
- $OA^2 + OC^2 = OB^2 + OD^2$
- $OA^2 + OD^2 = OB^2 + OC^2$

28. Area of the triangle whose sides are 5 cm, 12 cm, 13 cm is

- $25 \text{ cm}^2$
- $30 \text{ cm}^2$
- $32.5 \text{ cm}^2$
- $78 \text{ cm}^2$

29. A square of side 3 cm is circumscribed by a circle. Then the area of the circle is

- $9\pi \text{ cm}^2$
- $4.5\pi \text{ cm}^2$
- $6\pi \text{ cm}^2$
- $9 \text{ cm}^2$

30. There are two concentric circles of radii 5 cm and 3 cm respectively. If a chord of larger circle is a tangent to the smaller circle, find its length.

- $4 \text{ cm}$
- $6 \text{ cm}$
- $8 \text{ cm}$
- None (None)

31. The area of a sector of angle 60° of a circle of diameter 42 cm is

- $200 \text{ cm}^2$
- $231 \text{ cm}^2$
- $197 \text{ cm}^2$
- $462 \text{ cm}^2$

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32. If a circle touches inside all the four sides of quadrilateral \(ABCD\), then the following is true:

\[ AB + BC = AC + AD \quad \text{(1)} \]
\[ AC = BD \quad \text{(2)} \]
\[ AB + CD = BC + DA \quad \text{(3)} \]
\[ \text{All} \quad \text{(4)} \]

33. If a sphere, a cylinder and a cone are of same radius and height, then their curved surface areas are in the ratio

\[ \frac{4}{1} : \frac{4}{2} : \sqrt{5} \quad \text{(1)} \]
\[ 4 : \sqrt{5} : 4 \quad \text{(2)} \]
\[ \sqrt{5} : 4 : 4 \quad \text{(3)} \]
\[ \text{None} \quad \text{(4)} \]

34. Three metallic spheres of radii 3 cm, 4 cm and 5 cm are melted to form a single sphere. Then the radius of the resulting sphere is

\[ 12 \quad \text{(1)} \]
\[ 6 \quad \text{(2)} \]
\[ 7 \quad \text{(3)} \]
\[ 9 \quad \text{(4)} \]

35. A hemispherical bowl of internal diameter 36 cm contains a liquid. How many cylindrical bottles of radius 3 cm and height 6 cm are required to empty the bowl?

\[ 1000 \quad \text{(1)} \]
\[ 1078 \quad \text{(2)} \]
\[ 1152 \quad \text{(3)} \]
\[ \text{None} \quad \text{(4)} \]

36. The value of \(\tan 24^\circ \tan 42^\circ \tan 43^\circ \tan 66^\circ\) is

\[ \tan 24^\circ \tan 42^\circ \tan 48^\circ \tan 66^\circ \quad \text{is} \]

\[ \sqrt{3} \quad \text{(1)} \]
\[ \frac{1}{\sqrt{3}} \quad \text{(2)} \]
\[ 0 \quad \text{(3)} \]
\[ 1 \quad \text{(4)} \]

37. If \(\sin \theta = \frac{7}{25}\), then \(\cosec \theta - \cot \theta = \cosec \theta + \cot \theta\)

\[ \frac{24}{7} \quad \text{(1)} \]
\[ \frac{7}{24} \quad \text{(2)} \]
\[ 49 \quad \text{(3)} \]
\[ \frac{1}{49} \quad \text{(4)} \]

38. The value of \(\sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ\) is

\[ \sin 25^\circ \cos 65^\circ + \cos 25^\circ \sin 65^\circ \quad \text{is} \]

\[ \sin 40^\circ \quad \text{(1)} \]
\[ \cos 40^\circ \quad \text{(2)} \]
\[ 1 \quad \text{(3)} \]
\[ 0 \quad \text{(4)} \]

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39. If \( \cosec \theta - \cot \theta = p \), then \( (\text{选项}) \) \( \cosec \theta + \cot \theta = \)

(1) \( 1 + p \)  
(2) \( 1 - p \)  
(3) \( \frac{1}{p} \)  
(4) \( p \)

40. If \( \cos(A + B) = \frac{1}{2} \) and \( (\text{选项}) \) \( \sin(A - B) = \frac{1}{\sqrt{2}} \), \( 0 < B < A < 90^\circ \), then \( (\text{选项}) \) \( A = B = \)

(1) \( 60^\circ, 45^\circ \)  
(2) \( 52.5^\circ, 7.5^\circ \)  
(3) \( 30^\circ, 45^\circ \)  
(4) \( 60^\circ, 15^\circ \)

41. A ball is drawn from a bag containing 3 red, 4 blue and 3 green balls. What is the probability that a ball that is drawn at random is not blue?

\( 3 \) red, \( 4 \) blue, \( 3 \) green balls, \( \text{总共有} 10 \) balls. \( \text{非blue的概率} = \frac{7}{10} \)

(1) \( \frac{2}{5} \)  
(2) \( \frac{3}{5} \)  
(3) \( \frac{4}{5} \)  
(4) None (其它选项)

42. If a dice is thrown, what is the probability that the number appeared is a multiple of 3?

\( 1, 2, 3, 4, 5, 6 \)  
(1) \( \frac{1}{6} \)  
(2) \( \frac{2}{5} \)  
(3) \( \frac{1}{2} \)  
(4) \( \frac{1}{3} \)

43. If 20 defective bulbs are mixed with \( X \) number of good bulbs. If the probability of drawing a defective bulb is \( \frac{1}{4} \), then the number of good bulbs in the box, \( X = \)

\( 20 \) bulbs, \( X \) good bulbs. \( \text{总共有} 20 + X \) bulbs. \( \frac{1}{4} \) defective. \( \text{所以} X = 50 \)

(1) \( 60 \)  
(2) \( 80 \)  
(3) \( 100 \)  
(4) \( 20 \)

44. From the following table, determine the median of the data:

<table>
<thead>
<tr>
<th>Weight</th>
<th>30</th>
<th>32</th>
<th>34</th>
<th>35</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td>2</td>
</tr>
</tbody>
</table>

(1) \( 34 \)  
(2) \( 35 \)  
(3) \( 12 \)  
(4) \( 31 \)

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45. The mean of first \( n \) natural numbers is

\[
\frac{1 + n}{2}
\]

(1) \( n \)  \quad (2) \( n + 1 \)  \quad (3) \( \frac{n + 1}{2} \)  \quad (4) \( \frac{n}{2} \)

46. For the data 2, 4, 6, 7, 4, 2, 8, 11, 4, 8, 12, 4: Mean - Mode =

(1) 4  \quad (2) 2  \quad (3) 2.5  \quad (4) 8

47. Find the Mode of the following data:

<table>
<thead>
<tr>
<th>Family Size</th>
<th>2-4</th>
<th>4-6</th>
<th>6-8</th>
<th>8-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Families</td>
<td>5</td>
<td>7</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

(1) 4.66  \quad (2) 7  \quad (3) 5  \quad (4) 4.5

48. The Median of the data 8, 14, 16, 21, \( x \), \( y \), 28, 30, 33, 38 is 25 and if \( y - x = 2 \), then \( x = \) and \( y = \)

8, 14, 16, 21, \( x \), \( y \), 28, 30, 33, 38 are the data points arranged in ascending order. \( y - x = 2 \) and \( x = \) median \( y = \)

(1) 23, 25  \quad (2) 24, 26  \quad (3) 18, 20  \quad (4) 25, 27

49. From which of the following curves we can find the median of a data?

- Bar graphs
- Histogram
- Frequency polygon
- Ogive curves

(1) Bar graphs  \quad (2) Histogram  \quad (3) Frequency polygon  \quad (4) Ogive curves

50. The sum of the observation of a data is 576 and its arithmetic mean is 18. The number of observations of the data is

(1) 24  \quad (2) 32  \quad (3) 48  \quad (4) 36
51. If \( x \) is any rational number in the form \( \frac{p}{q} \), where \( q \) is in the form \( 2^m 5^n \) where \( m, n \) are non-negative integers, then \( x \) will have a decimal expansion which is

(1) terminating
(2) non-terminating
(3) non-terminating, recurring
(4) None

52. \( p \) is any prime number and it divides \( a^2 \). Then \( p \) also divides \( p \) is any prime number and it divides \( a^2 \). Then \( p \) also divides

(1) \( a + 1 \)  
(2) \( a - 1 \)  
(3) \( a \)  
(4) None

53. \( 3^{\log_3 243} = \)

(1) 27  
(2) 81  
(3) 243  
(4) 9

54. If \( 2\log_{10} 4 + 2\log_{10} 3 - 2\log_{10} 12 = \log_{10} x \), then (\( x = \))

(1) 10  
(2) 4  
(3) 2  
(4) 1

55. If cube of 5 can be written in the form \( 9m \) or \( 9m + 1 \) or \( 9m + 8 \), then \( m \) (\( m \) is a positive integer) =

5 can be written in the form \( 9m \) or \( 9m + 1 \) or \( 9m + 8 \), then \( m \) =

(1) 9  
(2) 12  
(3) 13  
(4) 15

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56. From the diagram estimate sum of elements in \((A \cup B) \cap C\). 

\[ \begin{array}{ccc} 
& 6 & 7 \\
A & 5 & \\
& 3 & 4 \\
B & 2 & 10 \\
& 9 & \\
C & & 
\end{array} \]

(1) 18  (2) 12  (3) 9  (4) 3

57. How many subsets the set \(P = \{0, 1, 2, 3\}\) will have?

\(P = \{0, 1, 2, 3\}\) is a finite set with \(n=4\) elements

(1) 4  (2) 16  (3) 8  (4) 32

58. If \(n(A - B) = 5\) and \(n(A \cap B) = 2\), then \(n(A) = \)

(1) 3  (2) 4  (3) 6  (4) 7

59. The degree of the polynomial \((\sqrt{x} + 1)^2 + (\sqrt{x} - 1)^2\) is

\((\sqrt{x} + 1)^2 + (\sqrt{x} - 1)^2\) is a mathematical expression

(1) 0  (2) 1

(3) 2  (4) Not a polynomial

60. The common zero of the polynomials \(f(x) = x^2 - x - 6\) and \(g(x) = x^2 - 5x + 6\) is

\(f(x) = x^2 - x - 6\) and \(g(x) = x^2 - 5x + 6\) have common zeros

(1) -2  (2) 3  (3) 2  (4) None
61. The reverse process of evaporation is
(1) melting  (2) freezing  (3) condensation  (4) oxidation

62. A house has one bulb of 100 W used for 10 hours a day. The cost of electric energy used by the bulb in 30 days @ ₹3 per kWh is

100 W विद्युत बॉलच 10 कालांक के भावे में बिजली का खर्च. यदि रेफ्रिजरेटर में कुल 30 कालांक बिजली का खर्च होगा, तो रेफ्रिजरेटर में कुल खर्च कितना होगा?
(1) ₹90  (2) ₹100  (3) ₹30  (4) ₹10

63. Four wires each of resistance 8 Ω are arranged in the form of a square. The resistance between the ends of any diagonal is

4 विद्युत रेसिस्टेंस के चौड़ी रेसिस्टेंस के तरल के रूप में वास्तव में दिखाई देगी. कोई विकल्प में दिखाई देगा?
(1) 32 Ω  (2) 16 Ω  (3) 8 Ω  (4) 0.125 Ω

64. 2 volt × 3 coulomb =

2 वॉल्ट × 3 कोल्न =
(1) 6 J  (2) 6 Ω  (3) 6 A  (4) 6 W

65. Which among the following materials has resistivity of $10 \times 10^{10}$ Ω-m at 20 ºC?

20 ºC में $10 \times 10^{10}$ Ω-m वाला स्रावतकता का मालकी वस्तु?
(1) Air  (2) Lead  (3) Copper  (4) Glass

66. Read the following two statements and pick the correct answer :

(a) Human skin offers more electric resistance than the organs inside the body. जानी हुईं हाथ के विद्युत सामग्री बाहर से माणे सुसामर के बाहर हैं।
(b) Human body offers a common electric resistance of 10000 Ω always. जानी हुईं विद्युत सामग्री 10000 Ω के सामान्य हैं,

(1) Both (a) and (b) are true  (2) Both (a) and (b) are false
(3) Only (a) is true  (4) Only (b) is true

SPACE FOR ROUGH WORK / रूगा बॉक्स
67. The resistance of a wire of length 100 cm and area of cross-section 1 mm$^2$ is 1 Ω. The specific resistance is

$(1)\ 10^{-3}\ \Omega\cdot m\quad (2)\ 10^{-2}\ \Omega\cdot m\quad (3)\ 1\ \Omega\cdot m\quad (4)\ 10^{-6}\ \Omega\cdot m$

68. Which among the following does not involve the principle of total internal reflection?

(1) Working of an optical fiber
(2) Shining of diamonds
(3) Appearance of mirage on distant road
(4) Working of a solar cooker

69. A rectangular tank of depth 6 m is full of water of refractive index $\frac{4}{3}$. When viewed from the top, the bottom of the tank is seen at a depth of

$(1)\ 4.5\ m\quad (2)\ 2.5\ m\quad (3)\ 1.3\ m\quad (4)\ 3\ m$

70. The speed of light in a medium is same as that in vacuum. The refractive index of the medium is

$(1)\ 0\quad (2)\ 1\quad (3)\ 1.33\quad (4)\ 3$

71. If $u$ and $v$ are the object and image distances respectively due to a convex lens, then which among the following statements is false?

(1) As $u$ increases, $v$ also increases
(2) As $u$ increases, $v$ decreases
(3) As $u$ increases, $v$ remains constant
(4) None of the above
72. Read the following two statements and pick the right answer:

(a) A concavo-convex lens has two curved surfaces.
(b) A bi-concave lens has two curved surfaces.

(1) Only (a) is true
(2) Only (b) is true
(3) Both (a) and (b) are true
(4) Both (a) and (b) are false

73. A convex lens forms an image at infinity when the object is placed

(1) at focal point
(2) at centre of curvature
(3) between focus and centre of curvature
(4) beyond centre of curvature

74. The magnetic field lines near a long straight wire are of

(1) straight lines parallel to the wire
(2) straight lines perpendicular to the wire
(3) concentric circles centred on the wire
(4) radial lines originating from the wire
75. Which one among the following pair of ‘physical quantity – unit’ is wrong?

(1) Induced current – Ampere
   చక్రవ్యత్తి – ఆమెరె

(2) Magnetic flux – Weber
    ధృతిమాపన్న ధృతి – స్యార్బెర

(3) Magnetic flux density – Weber/metre$^2$
    ధృతిమాపన్న ధృతిఖండాన్న ధృతి – స్యార్బెర్/మీటర్$^2$

(4) Induced EMF – Tesla
    ధృతిభాగం ధృతిభాగం ధృతి – టెస్లా

76. Regarding AC generator, which among the following statements is wrong?

AC రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం

(1) It has two slip rings
   రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం

(2) As the coil rotates, the magnetic flux remains constant
   ధృతిభాగం ధృతిభాగం ధృతిభాగం ధృతిభాగం ధృతిభాగం ధృతిభాగం ధృతిభాగం ధృతిభాగం

(3) It can be converted into DC generator
   రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం

(4) None of the above
   రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం రాశిప్రభుత్వం

77. The device used to convert mechanical energy into electrical energy is
    ద్రవికం ద్రవికం ద్రవికం ద్రవికం ద్రవికం ద్రవికం ద్రవికం

(1) ammeter
    ఆమెరె

(2) galvanometer
    గలవాంమటరెం

(3) motor
    మాటర్

(4) generator
    గేనరేటర్

78. The magnetic flux through each turn of the coil increases by 0.01 Wb in 0.1 s. The maximum induced EMF in a coil of 100 turns is
    పరమాణు ఫ్లష్ట్ పరమాణు ఫ్లష్ట్ పరమాణు ఫ్లష్ట్ పరమాణు ఫ్లష్ట్ పరమాణు ఫ్లష్ట్ 

(1) 10 V
(2) 1 V
(3) 0.1 V
(4) 0.01 V
79. The magnetic force acting on a straight wire of length \( L \) carrying a current \( I \) kept perpendicular to the magnetic field of induction \( B \) is

\[ (1) \ 0 \quad (2) \ \frac{B}{IL} \quad (3) \ BIL \quad (4) \ \frac{BI}{L} \]

80. To correct one's myopia, the selected lens should form an image at

(1) near point

(2) far point

(3) both near and far points

(4) None of the above

81. Pick the false statement from the following:

(1) Eye lens forms a real image

(2) Image is formed on retina

(3) Cornea contains rods and cones

(4) Distance between lens and retina is about 2.5 cm

82. Arrange the following colour of light in decreasing order of their wavelength:

Blue (హృదయ), Red (అండి), Violet (వ్యాయామ)

(1) Red > Blue > Violet

(2) Red > Violet > Blue

(3) Violet > Blue > Red

(4) Violet > Red > Blue

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SPACE FOR ROUGH WORK / రోగసమాధానాలు ప్రాంతం
83. The example of dispersion is

1. red colour of sun during sunset
2. rainbow
3. blue colour of the sky
4. droplets on plants

84. When we enter a cinema hall, we cannot see properly for a short time. This is because of

1. eye-lens becomes opaque
2. pupil does not open
3. ciliary muscles do not react
4. adjustment of size of pupil takes sometime

85. The negative sign in magnification indicates that the image is

1. erected
2. inverted
3. real
4. virtual
86. An object 4 cm in size is placed at a distance of 20 cm in front of a concave mirror of radius of curvature 30 cm. The position of the image is at
4 cm 30 cm 20 cm
(1) -25 cm (2) -60 cm (3) -20 cm (4) -37.5 cm

87. The angle of incidence of a light ray on a plane mirror is 45°. The angle between the incident ray and reflected ray is
22.5° 45° 90° 135°
(1) (2) (3) (4)

88. The specific heat of water is 1 cal/gm°C. Its value in J/kg-K is
273 1000 2100 4180
(1) (2) (3) (4)

89. An object P is at 100 K and another object Q is at 25 °C are kept in contact. The flow of heat is from
P to Q Q to P No flow of heat None of the above
(1) (2) (3) (4)

90. Which among the following has lower specific heat?
Mercury Iron Ice Water
(1) (2) (3) (4)
SECTION—III : CHEMISTRY

91. The pH of blood is in between

సరుకుల ప్రాందం యొక్క pH మందయ్య ఎలా దానిని అనుసరించండి?

(1) 7–8 (2) 6–7 (3) 4–5 (4) 13–14

92. Match the following :

పదార్థాలను సంబంధించుకోండి:

a. Caustic soda రోముల అసలు
   (i) NaHCO₃

b. Baking soda తండ్రిల అసలు
   (ii) CaSO₄·2H₂O

c. Gypsum అసలు
   (iii) CaSO₄·½H₂O

d. Plaster of paris అసలు
   (iv) NaOH

(1) a b c d
   (i) (ii) (iii) (iv)

(2) a b c d
   (i) (iv) (iii) (ii)

(3) a b c d
   (iv) (i) (iii) (ii)

(4) a b c d
   (iv) (i) (ii) (iii)

93. NaCl + H₂O + CO₂ + NH₃ → X + NaHCO₃. The X may be

NaCl + H₂O + CO₂ + NH₃ → X + NaHCO₃ నుండి X లేదు మిగతా అనుమానించండి?

(1) NH₄HCO₃ (2) NH₄OH (3) NH₄Cl (4) (NH₄)₂CO₃

SPACE FOR ROUGH WORK / ప్రత్యేకంగా చిత్రాలంపరించాలను ప్రాందానిల్ల
94. The maximum number of orbitals accommodated in a sub-shell with the angular-momentum quantum number \( l \) is

\[
(1) \quad l + 1 \quad (2) \quad 4l + 2 \quad (3) \quad 2l + 1 \quad (4) \quad l(l + 1)
\]

95. As per Moeller chart, the correct ascending order of energy in the following atomic orbitals is

\[
(1) \quad 3p < 3d < 4s < 4p \quad (2) \quad 3p < 4s < 3d < 4p \\
(3) \quad 3d < 3p < 4s < 4p \quad (4) \quad 3p < 3d < 4p < 4s
\]

96. The wavelength of visible light is in between

\[
(1) \quad 100 \text{ nm} - 300 \text{ nm} \quad (2) \quad 400 \text{ nm} - 700 \text{ nm} \\
(3) \quad 700 \text{ nm} - 900 \text{ nm} \quad (4) \quad 800 \text{ nm} - 1000 \text{ nm}
\]

97. Which of the following elements constitute a Dobereiner’s triad?

\[
(1) \quad \text{Li, Na, K} \quad (2) \quad \text{Na, K, Al} \quad (3) \quad \text{C, O, F} \quad (4) \quad \text{He, H, C}
\]

98. The formula of compound formed between the element \( X \) of IIA group and another element \( Y \) of VIIA group is

\[
(1) \quad XY \quad (2) \quad XY_3 \quad (3) \quad X_2Y \quad (4) \quad XY_2
\]

99. Which group elements have the outer electronic configuration as \( ns^2 np^3 \)?

\[
(1) \quad \text{VA} \quad (2) \quad \text{IVA} \quad (3) \quad \text{IIA} \quad (4) \quad \text{IIIA}
\]

**SPACE FOR ROUGH WORK** / ఉండాలు పిల్లిచేపోయిన ప్రత్యేకించాలి
100. Which of the following element has largest atomic size?

(1) Be  (2) Mg  (3) Ca  (4) Ba

101. The correct order of ionization energy in the following element is

(1) F > C > O  (2) F > O > C  (3) O > F > C  (4) C > F > O

102. The ionic bond is formed easily between which ions?

(1) Larger size cation and smaller size anion
(2) Larger size cation and larger size anion
(3) Smaller size cation and smaller size anion
(4) Smaller size cation and larger size anion

103. The number of lone pair of electrons in CH₄ molecule is

CH₄  (1) zero  (2) 1  (3) 2  (4) 4

104. The bond angle in H₂O molecule is

(1) 107°48’  (2) 180°  (3) 109°28’  (4) 104°31’

105. The molecule that contains only sigma bonds in the following is

(1) C₂H₄  (2) O₂  (3) N₂  (4) NH₃
106. The type of hybridization in $C_2H_4$ molecule is

$C_2H_4$ ఎంభ చిహ్నాలు మిగిలిన విధం

(1) $sp$ (2) $sp^2$ (3) $sp^3$ (4) $sp^3d$

107. The low reactivity metal in the following is

అంతర్గత పండిత నాటకం మాత్రమే తగ్గితం వచ్చేవాడు

(1) Au (2) Mg (3) Zn (4) Cu

108. $CaCO_3 \rightarrow CaO + CO_2$. This reaction is an example for $CaCO_3 \rightarrow CaO + CO_2$ యొక్క ఉదాహరణలు ఉందేవారు?

(1) smelting (2) calcination

(3) reduction (4) roasting

109. $Ag_2S$ is dissolved in KCN solution to get $Ag_2S$ కు క నీళ్ళ జరుగుతుంది

(1) AgCN (2) Ag(CN)$_2$ (3) Ag$_3$SCN (4) KNC

110. Which of the following is an unsaturated hydrocarbon?

ఎంపోయే వాస్తవం అసాధారణ హిడ్రోకారోణాలు?

(1) CH$_4$ (2) C$_2$H$_2$ (3) C$_3$H$_8$ (4) C$_2$H$_6$

111. Successive compounds in a homologous series possess a difference of జాతి జాతి చేతులకు విభాగం విభాగం విభాగం విభాగం

(1) (—CH) unit (2) (—CH$_2$) unit

(3) (—CH$_3$) unit (4) (—C$_2$H$_2$) unit

SPACE FOR ROUGH WORK / విశేషాలం ఇమ్ములు చేయడానికి రూపం పొందండి
112. The IUPAC name of the compound \( \text{CH}_2=\text{CH} = \text{C} \equiv \text{CH} \) is
\( \text{CH}_2=\text{CH} = \text{C} \equiv \text{CH} \) см анилин см енин, IUPAC нымнггн.

(1) but-3-ene-1-yne
(2) but-1,2-ene-3,4-yne
(3) but-4-yne-1-ene
(4) but-3,4-ene-1,2-yne

113. Ethanol on heating with acidified \( \text{KMnO}_4 \) to form ethanal and acetic acid. This reaction is an example of

(1) addition reaction
(2) substitution reaction
(3) reduction reaction
(4) oxidation reaction

114. 5–8% solution of acetic acid in water is called as

(1) vinegar
(2) formalin
(3) gasohol
(4) cough syrup

115. The general formula of ketones is

(1) \( R-O-R \)  (2) \( R-CO-R \)  (3) \( R-COOR \)  (4) \( R-CHO \)

116. The chemical formula of bleaching powder is

(1) \( \text{CaOCl}_2 \)  (2) \( \text{Ca(OH)}_2 \)  (3) \( \text{CaO} \)  (4) \( \text{Ca(HCO}_3)_2 \)
117. NaCl + AgNO₃ → AgCl↓ + NaNO₃ is an example for
NaCl + AgNO₃ → AgCl↓ + NaNO₃ 有哪些化学反应？

(1) chemical combination  (2) chemical decomposition
(3) displacement reaction  (4) double displacement reaction

118. The spoilage of food can be prevented by adding preservatives like
食物的腐败可以通过添加以下哪些防腐剂来防止？

(1) vitamin C only  (2) vitamin E only
(3) vitamin C and vitamin E  (4) vitamin D only

119. C₆H₁₂O₆ → xC₂H₅OH + yCO₂. In this balanced equation the x, y values respectively are
C₆H₁₂O₆ → xC₂H₅OH + yCO₂ 在平衡方程式中，x, y 的值是？

(1) 1, 1  (2) 2, 1  (3) 1, 2  (4) 2, 2

120. Which of the following solutions converts blue litmus paper to red?
以下哪种溶液能使蓝色石蕊试纸变红？

(1) HCl  (2) KOH  (3) NaOH  (4) Na₂CO₃

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