FINAL ANSWER KEY

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1. Let $X = \{a_1, a_2, a_3, \ldots, a_n\}$ be a set consisting of n elements. The relation $R = \{(a_1, a_1), (a_2, a_2), (a_3, a_3), \ldots, (a_n, a_n)\}$ on the set X is

A) reflexive, symmetric but not transitive

B) reflexive, transitive but not symmetric

C) transitive, symmetric but not reflexive

D) reflexive, symmetric and transitive

E) reflexive, not symmetric and not transitive

Correct Answer : Option D

2. Let $X = \{a, b, c, d, e, f\}$ and $Y = \{7, 8, 9, 10, 11\}$ be two sets. Which one of the following is true?

A) $\{(a, 8), (b, 7), (c, 9), (d, 10), (e, 11)\}$ is an one-to-one function from X to Y

B) $\{(a, 7), (b, 11), (c, 8), (d, 10), (e, 9), (f, 11)\}$is an one-to-one function from X to Y

C) $\{(a, 7), (b, 8), (c, 9), (d, 10), (e, 11)\}$is an one-to-one function from X to Y

D) $\{(a, 11), (b, 10), (c, 9), (d, 8), (e, 7)(f, 9)\}$ is an one-to-one function from X to Y

E) one-to-one function cannot be defined from X to Y

Correct Answer : Option E

3. Let, $f(x) = \frac{2x+3}{x-2}, x \in \mathbb{R}, x \neq 2$ and $h(x) = f(f(x))$ .Then $h(h(10))$ is equal to

A) 100

B) 20

C) 10

D) 1000

E) 1

Correct Answer : Option C

4. The inverse of the function $f(x) = x^2 + 4x + 4, x \leq -2$ is $f^{-1}(x)$ =

A) $-2 - \sqrt{x}, x \geq 0$

B) $-2 - \sqrt{x-1}, x \geq 1$

C) $-2 - \sqrt{x}, x \geq 2$

D) $-2 - \sqrt{x}, x \geq 4$

E) $-2 - \sqrt{x}, x \geq 5$

Correct Answer : Option A

5. Given that $i^2 = -1$. Then $i^{13} + i^{14} + i^{15} + \ldots + i^{2026}$ is equal to

A) $i - 2$

B) $i + 2$

C) $2i + 1$

D) $i - 1$

E) $-i + 1$

Correct Answer : Option D

6. Let x and y be real numbers. If $(3 + i)x + y + (1 - i)y + 3i - 4 = (2x + 1)i + ($ $x - y + 2)i$, where $i = \sqrt{-1}$, then the pair x, y is equal to

A) (1,2)

B) (0,2)

C) (0,-2)

D) (3,2)

E) (-1,-2)

Correct Answer : Option B

7. Let $z_1 = \frac{5 + 7i}{7 - 5i}, z_2 = \frac{3 + 2i}{3 - 2i}$ and $z_3 = \frac{1 + 11i}{11 - i}$. Then $z_1\overline{z_1} + z_2\overline{z_2} + z_3\overline{z_3}$ is equal to

A) 2

B) 1+2i

C) 1

D) 3

E) 1-2i

Correct Answer : Option D

8. The value of $\frac{(1 + i)^n}{(1 - i)^{n-4}}$, where $i = \sqrt{-1}$ and n is an integer,

A) $\frac{i^n}{4}$

B) $4i^n$

C) $-4i^n$

D) -1

E) 1

Correct Answer : Option C

9. The number of terms in the sequence 2,6,18,...,1458 is

A) 14

B) 12

C) 10

D) 8

E) 7

Correct Answer : Option E

10. Let $t_1, t_2, t_3, \ldots, t_{2n-2}, t_{2n-1}, t_{2n}$ be in G.P. with common ratio r . Then

A) $t_1, t_3, t_5, \ldots, t_{2n-5}, t_{2n-3}, t_{2n-1}$ are in G.P. with common ratio r

B) $t_1, t_4, t_7, \ldots, t_{2n-7}, t_{2n-4}, t_{2n-1}$ are in G.P. with common ratio r^2

C) $t_1, t_3, t_5, \ldots, t_{2n-5}, t_{2n-3}, t_{2n-1}$ are in G.P. with common ratio r^2

D) $t_2, t_4, t_6, \ldots, t_{2n-4}, t_{2n-2}, t_{2n}$ are in G.P. with common ratio r^3

E) $t_2, t_4, t_6, \ldots, t_{2n-4}, t_{2n-2}, t_{2n}$ are in G.P. with common ratio r^5

Correct Answer : Option C

11. If $\frac{4^{n+1} + 16^{n+1}}{4^n + 16^n}$ is the Geometric Mean between 4 and 16, then the value of n is

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

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

C) 10

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

E) 8

Correct Answer : Option D

12. The first and last term of a G.P. are 7 and 448 respectively. If the sum is 889, then the common ratio is

A) 4

B) 2

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

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

E) 3

Correct Answer : Option B

13. There are two main entrances to a building with five floors. Each entrance leads to three lifts and each lift can stop at all the five floors. A person enters the building and reaches a floor. The number of possible ways that the person can reach the floor, is

A) 15

B) 25

C) 10
D) 30
E) 50

Correct Answer : Option D

14. If $9_{p5} = (504)({}^{6}P_{r})$, then the value of r is equal to

A) 3
B) 2
C) 1
D) 4
E) 5

Correct Answer : Option B

15. The sum of all 3-digit numbers that can be formed using 1, 2, 3, 4 without repetitions is

A) 6668
B) 8886
C) 12486
D) 9876
E) 6660

Correct Answer : Option E

16. A box contains 24 identical balls of which one ball is black and the remaining balls are green. Three balls are taken simultaneously and randomly. The number of ways of getting only green balls, is

A) 1765
B) 1764
C) 1763
D) 1771
E) 1864

Correct Answer : Option D

17. The coefficient of $\frac{1}{x^2}$ in the binomial expansion of $\left(3x - \frac{1}{3x}\right)^4$, is

A) $\frac{4}{7}$
B) $\frac{3}{8}$
C) $\frac{2}{9}$
D) $\frac{4}{9}$
E) $\frac{-4}{9}$

Correct Answer : Option E

18. If $\begin{pmatrix} x & 3 & -1 \end{pmatrix}\begin{pmatrix} 1 & 1 & 1 \\ -1 & 0 & 1 \\ 1 & 0 & -1 \end{pmatrix}\begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} = 0$, then the values of x are

A) -2

B) $\frac{-1}{3}$

C) -3

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

E) $\frac{-2}{3}$

Correct Answer : Option D

19. Let $P = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 10 & 100 & -1 \end{pmatrix}$. Then P^{4052} is equal to

A) P

B) P^T

C) I, the unit matrix of order 3

D) $-P^T$

E) $2P^T$

Correct Answer : Option C

20. $\begin{vmatrix} 11 & 1 & 1 \\ 1 & 21 & 1 \\ 1 & 1 & 31 \end{vmatrix}$ is equal to

A) 7100

B) 6800

C) 7300

D) 6900

E) 6700

Correct Answer : Option A

21. If $A = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ and $(\alpha\ I + \beta\ A)^2 = A$ where I is 2×2 unit matrix,then $\alpha^2 - \beta^2 =$

A) 2

B) -2

C) -1

D) 1

E) 0

Correct Answer : Option E

22. Let x be a real number such that $5 < |x-1| < 15$. Then

A) $-18 < x < -3 \; or \; 3 < x < 19$

B) $-14 < x < -3 \; or \; 6 < x < 17$

C) $-16 < x < -2 \; or \; 6 < x < 20$

D) $-14 < x < -4 \; or \; 6 < x < 16$

E) $-10 < x < -1 \; or \; 3 < x < 18$

Correct Answer : Option D

23. Let x be a real number such that $\frac{x-3}{x-2} \geq 1$. Then the solution set of the inequality is

A) $(-\infty, 3)$

B) $(-\infty, 2)$

C) $[0, \infty)$

D) $(-9, \infty)$

E) $(0, 8)$

Correct Answer : Option B

24. If $sin\,\theta \; cos\,\theta > 0$, then θ lies

A) only in the first quadrant

B) only in the second quadrant

C) in the first quadrant or in the fourth quadrant

D) in the second quadrant or in the fourth quadrant

E) in the first quadrant or in the third quadrant

Correct Answer : Option E

25. If $4sin^2x - 2(1+\sqrt{3})sinx + \sqrt{3} = 0$ and $15^o < x < 150^o$, then the values of x are

A) $30^o, 45^o, 90^o$

B) $45^o, 100^o, 120^o$

C) $30^o, 60^o, 120^o$

D) $35^o, 45^o, 90^o$

E) $30^o, 45^o, 130^o$

Correct Answer : Option C

26. If $tan\,\alpha = \frac{5}{6}$ and $tan\,\beta = \frac{1}{11}$, where $0 < \alpha, \beta < \frac{\pi}{2}$ then $\alpha + \beta =$

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

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

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

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

E) $\frac{2\pi}{3}$

Correct Answer : Option D

27. The value of $sin6^o cos36^o sin66^o + cos12^o sin42^o sin18^o$ is equal to

A) $\frac{1}{12}(sin18^o + cos36^o)$

B) $\frac{1}{3}(sin18^o + cos36^o)$

C) $\frac{1}{16}(sin18^o + cos36^o)$

D) $\frac{1}{4}(sin18^o + cos36^o)$

E) $\frac{1}{2}(sin18^o + cos36^o)$

Correct Answer : Option D

28. The domain of the function $f(x) = 2sin^{-1}(2x-1) - \frac{\pi}{4}$ is

A) [-1,1]

B) [0,1]

C) [0,2]

D) [2,5]

E) [-2,2]

Correct Answer : Option B

29. The value of $sin^{-1}\left(sin\frac{5\pi}{9}\,cos\frac{\pi}{9} + sin\frac{\pi}{9}\,cos\frac{5\pi}{9}\right)$ is equal to

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

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

C) $\frac{\pi}{6}$

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

E) $\frac{\pi}{9}$

Correct Answer : Option D

30. The value of $sin\left(2sin^{-1}\frac{3}{5}\right)$ is equal to

A) $\frac{23}{25}$

B) $\frac{21}{25}$

C) $\frac{22}{25}$

D) $\frac{24}{25}$

E) $\frac{18}{25}$

Correct Answer : Option D

31. Let $P = \left(\frac{15}{2}(cosec\,\theta + sin\,\theta), 8(cosec\,\theta - sin\,\theta)\right)$, where θ is a variable parameter. Then the locus of P is

A) $\frac{x^2}{15} - \frac{y^2}{16} = 1$

B) $\frac{x^2}{256} - \frac{y^2}{225} = 1$

C) $\frac{x^2}{225} + \frac{y^2}{256} = 1$

D) $\frac{x^2}{225} - \frac{y^2}{256} = 1$

E) $\frac{x^2}{16} + \frac{y^2}{30} = 1$

Correct Answer : Option D

32. A straight linemakes y -intercept of 5. If the angle made by the line with y-axis is 60^o and the line intersects x-axis in the negative direction,then the equation of the line is

A) $x + \sqrt{3}y + 5\sqrt{3} = 0$

B) $x - \sqrt{3}y + 5\sqrt{3} = 0$

C) $\sqrt{3}x - y + 5 = 0$

D) $\sqrt{3}x + y + 5 = 0$

E) $\sqrt{3}x - y + 5\sqrt{3} = 0$

Correct Answer : Option B

33. The perpendicular drawn from the origin to the straight line $\sqrt{3}x + y - 24 = 0$ makes an angle α with the positive direction of x-axis. Then α is equal to

A) 120^o

B) 45^o

C) 135^o

D) 60^o

E) 30^o

Correct Answer : Option E

34. If the one end of a diameter of the circle $x^2 + y^2 + 3x + y - 6 = 0$ is at (-4,-2) , then the other end of the diameter is at

A) (4,-2)

B) (1,-1)

C) (1,1)

D) (-1,-1)

E) (1,-2)

Correct Answer : Option C

35. The vertex of a parabola is at (2,-5) and the focus is at (5,-5). The equation of the parabola is

A) $y^2 + 10y - 10x + 49 = 0$

B) $y^2 + 10y - 12x + 49 = 0$

C) $y^2 + 10y - 12x + 46 = 0$

D) $y^2 + 8y - 12x + 49 = 0$

E) $y^2 + 10y - 18x + 48 = 0$

Correct Answer : Option B

36. Let $R(-2, -2)$ be a point and let $\frac{(x-3)^2}{25} + \frac{(y+2)^2}{16} = 1$ be an ellipse. If S and T are the foci of the ellipse, then $RS + RT$ is equal to

A) 128

B) 61

C) 12

D) 10

E) 124

Correct Answer : Option D

37. The equation of the latus rectum of the parabola $y^2 + 8x + 4y + 12 = 0$ is

A) $x + 3 = 0$

B) $y + 3 = 0$

C) $x + 1 = 0$

D) $y + 2 = 0$

E) $x + 2 = 0$

Correct Answer : Option A

38. Let O be the origin. Let $\overrightarrow{OA} = \vec{a}$ and $\overrightarrow{OB} = \vec{b}$ be the position vectors of the points A and B respectively. A point P divides the line segment AB internally in the ratio $m:n$. Then $\overrightarrow{AP}$ is equal to

A) $\frac{2n(\vec{b} - \vec{a})}{m + n}$

B) $\frac{n(\vec{b} + \vec{a})}{m + n}$

C) $\frac{n(\vec{b} - \vec{a})}{m - n}$

D) $\frac{m(\vec{b} - \vec{a})}{m + n}$

E) $\frac{n(\vec{b} - \vec{a})}{m + n}$

Correct Answer : Option D

39. If $2\hat{\imath} - \hat{\jmath} + \hat{k} = s(3\hat{\imath} - 4\hat{\jmath} - 4\hat{k}) + t(\hat{\imath} - 3\hat{\jmath} - 5\hat{k})$, where s and t are scalars, then $3s + 5t$ is equal to

A) 2

B) -4

C) -2

D) 6

E) 14

Correct Answer : Option C

40. Let $\vec{a} = 2\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$, $\vec{b} = -5\hat{\imath} - \hat{\jmath} + 8\hat{k}$ and $\vec{c} = 3\hat{\imath} + \hat{\jmath} - \lambda\,\hat{k}$. If $\vec{a} + \vec{b} + \vec{c}$ and $\vec{a} - \vec{b} + \vec{c}$ are perpendicular, then the values of λ are

A) 4 and -12

B) -2 and 12

C) -6 and 14

D) -3 and 12

E) -4 and 12

Correct Answer : Option E

41. If $|\vec{a}| = \sqrt{26}$, $|\vec{b}| = \sqrt{3}$ and $\vec{a} \times \vec{b} = 5\hat{\imath} + \hat{\jmath} - 4\hat{k}$,then $\vec{a} \cdot \vec{b}$ =

A) ± 12

B) ± 4

C) ± 10

D) ± 8

E) ± 6

Correct Answer : Option E

42. Consider the straight line $\vec{r} = (5\hat{\imath} + 2\hat{\jmath} - 3\hat{k}) + t(4\hat{\imath} + 6\hat{\jmath} - 7\hat{k}), t \in \mathbb{R}$. Which one of the following points, is a point on the straight line?

A) (21,24,-31)

B) (17,20,-22)

C) (1,-4,5)

D) (25,32,-38)

E) (45,66,-36)

Correct Answer : Option D

43. The equation of a line passing through (-1,2,-4) and parallel to the straight line $\frac{-x-1}{4} = \frac{2y+1}{-1} = \frac{-z+4}{3}$, is

A) $\vec{r} = (-\hat{\imath} + 2\hat{\jmath} - 4\hat{k}) + t(4\hat{\imath} + 6\hat{\jmath} - 7\hat{k}), t \in \mathbb{R}$

B) $\vec{r} = (-\hat{\imath} + 2\hat{\jmath} - 4\hat{k}) + t(3\hat{\imath} + 5\hat{\jmath} - 2\hat{k}), t \in \mathbb{R}$

C) $\vec{r} = (-\hat{\imath} + 2\hat{\jmath} - 4\hat{k}) + t(8\hat{\imath} + \hat{\jmath} + 6\hat{k}), t \in \mathbb{R}$

D) $\vec{r} = (-\hat{\imath} + 2\hat{\jmath} - 4\hat{k}) + t(7\hat{\imath} + 6\hat{\jmath} + 6\hat{k}), t \in \mathbb{R}$

E) $\vec{r} = (-\hat{\imath} + 2\hat{\jmath} - 6\hat{k}) + t(8\hat{\imath} + \hat{\jmath} + 6\hat{k}), t \in \mathbb{R}$

Correct Answer : Option C

44. A straight line passes through the point whose position vector is $\vec{k}$. The straight line also passes through the point of intersection of the lines $\vec{r} = \hat{\jmath} + \lambda\ \hat{\imath}, \lambda \in \mathbb{R}$ and $\vec{r} = \hat{\imath} + s\hat{\jmath}, s \in \mathbb{R}$. Then the equation of the straight line is

A) $\vec{r} = \hat{k} + t(\hat{\imath} + \hat{\jmath} - \hat{k}), t \in \mathbb{R}$

B) $\vec{r} = \hat{k} + t(\hat{\imath} - \hat{\jmath} - \hat{k}), t \in \mathbb{R}$

C) $\vec{r} = \hat{k} + t(\hat{\imath} - \hat{\jmath} + \hat{k}), t \in \mathbb{R}$

D) $\vec{r} = \hat{k} + t(-\hat{\imath} + \hat{\jmath} + 2\hat{k}), t \in \mathbb{R}$

E) $\vec{r} = \hat{k} + t(-\hat{\imath} + 2\hat{\jmath} - \hat{k}), t \in \mathbb{R}$

Correct Answer : Option A

45. The shortest distance between the lines $\vec{r} = -\hat{\imath} + t\hat{k}, t \in \mathbb{R}$ and $\vec{r} = -\hat{\jmath} + s\hat{\imath}, s \in \mathbb{R}$, is

A) 8
B) 5
C) 3
D) 4
E) 1

Correct Answer : Option E

46. The mean deviation about the mean for the data: 5, 6, 14, 15 is

A) 3.5
B) 4.5
C) 4.2
D) 3.8
E) 4.0

Correct Answer : Option B

47. The variance for the data : 65, 70, 75 is

A) $\frac{50}{3}$
B) $\frac{55}{3}$
C) $\frac{50}{6}$
D) $\frac{50}{2}$
E) 70

Correct Answer : Option A

48. A fair die is rolled once. Which one of the following is not true?

A) $\{1,3\}$ and$\{2,4,6\}$ are mutually exclusive events
B) $\{1,5\}$,$\{2,4\}$ are $\{3,6\}$ mutually exclusive and exhaustive eve nts
C) $\{1,2,4,3,6,5\}$is sure event
D) $\{1\}$,$\{2\}$ and $\{6\}$ are elementary events
E) $\{1,3,2\}$and $\{2,4,6\}$ are mutually exclusive events

Correct Answer : Option E

49. Let A, B, C be all the three possible mutually exclusive events of a random experiment. Which one of the following is not permissible in terms of their probabilities?

A) $P(A) = \frac{7}{19}, P(B) = \frac{4}{19}, P(C) = \frac{8}{19}$
B) $P(A) = \frac{18}{95}, P(B) = \frac{29}{95}, P(C) = \frac{48}{95}$
C) $P(A) = \frac{81}{190}, P(B) = \frac{41}{190}, P(C) = \frac{68}{190}$

D) $P(A) = \frac{21}{95}, P(B) = \frac{42}{95}, P(C) = \frac{32}{95}$

E) $P(A) = \frac{77}{190}, P(B) = \frac{47}{190}, P(C) = \frac{67}{190}$

Correct Answer : Option E

50. The value of $\lim_{x \to 0} \frac{sin^2 x}{1 - cosx}$ is equal to

A) 4

B) 2

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

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

E) 0

Correct Answer : Option B

51. The value of $\lim_{x \to 1} \frac{x - 1}{3\sqrt{x} - 1}$ is equal to

A) 3

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

C) 2

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

E) 0

Correct Answer : Option E

52. If the function $f(x) = \begin{cases} \frac{2x^2 + 3x - 5}{x - 1}, & x \neq 1 \\ k, & x = 1 \end{cases}$ is continuous at $x = 1$, then the value of k is

A) 6

B) 8

C) -6

D) 7

E) -7

Correct Answer : Option D

53. The value of $\lim_{x \to 0} \frac{\sqrt{1 - cos(x^2)}}{1 - cosx}$ is equal to

A) $\frac{1}{\sqrt{2}}$

B) $\sqrt{2}$

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

D) $2\sqrt{2}$

E) 0

Correct Answer : Option B

54. The domain of the function $f(x) = \frac{log_2(x-5)}{x^2+3x-4}$, is

A) $(1, \infty)$

B) $(10, \infty)$

C) $(5, \infty)$

D) $\mathbb{R}\backslash\{-4\}$

E) $\mathbb{R}\backslash\{-4, 1\}$

Correct Answer : Option C

55. Which one of the following is not true?

A) $f(x) = x \mid x|$ is differentiable in (-1,1)

B) $g(x) = \sqrt{|x|}$ is differentiable in (4,5)

C) $h(x) = \mid x-2 \mid + \mid x+3|$ is differentiable in (3,2)

D) $k(x) = \mid x+1 \mid + \mid x-6|$ is differentiable in (-1,6)

E) $t(x) = x + [x]$, $[x]$ is the greatest integer less than or equal to x , is differentiable at $x = 0$

Correct Answer : Option E

56. Let $y = \frac{3x^3 - 2x^2 + x}{|x|}, x \neq 0$. Then $\frac{dy}{dx}$ at $x = -2$ is equal to

A) 14

B) -12

C) -14

D) 12

E) 10

Correct Answer : Option A

57. If $(3+5x)e^{\frac{y}{x}} = x$, then $\frac{dy}{dx}$ is equal to

A) $\log \mid \frac{x}{3+5x} \mid + \frac{3}{3+5x}$

B) $\log \mid \frac{x}{3+5x} \mid + \frac{5x-3}{3+5x}$

C) $\log \mid \frac{x}{3+5x} \mid + \frac{5x-2}{3+5x}$

D) $\log \mid \frac{3x}{3+5x} \mid + \frac{10x+3}{3+5x}$

E) $\log\left|\frac{x}{3+5x}\right| + \frac{3-10x}{3+5x}$

Correct Answer : Option A

58. If $y = e^{-x^2}$, then at $\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} =$

A) $2y$

B) $-2y$

C) $\frac{-y}{2}$

D) $-y$

E) y

Correct Answer : Option B

59. Let $f(x)$ and $g(x)$ be two differentiable functions such that $f'(x) = g(x)$ and $g'(x) = -f(x)$.
Let $h(x) = (f(x))^2 + (g(x))^2$ and $h(3) = 100$ .Then $h(100)$ is equal to

A) 100

B) 10

C) 50

D) 200

E) 300

Correct Answer : Option A

60. Let f and g be differentiable real valued functions on $[0, \infty)$. If f is increasing, g is decreasing and $h(x) = f(g(x))$, then $h(2026) - h(2025)$ is

A) greater than 1000 but less than 2000

B) greater than or equal to 0

C) less than or equal to 0

D) greater than 2025

E) greater than 2026

Correct Answer : Option C

61. Let $f(x) = 10x^2 + ax, x \in \mathbb{R}$ be such that $a^2 - 400 < 0$. Let $g(x) = f(x) + f'(x) + f''(x)$. Then $g(x)$ is

A) greater than 100 but less than 200

B) greater than 10 but less than 100

C) less than 10

D) greater than 0

E) less than 1

Correct Answer : Option D

62. The minimum of $f(x) = \frac{x^{100}-1}{x^{100}+1}, x \in \mathbb{R}$, is

A) -5

B) -1.5

C) -1

D) -2

E) -3

Correct Answer : Option C

63. Let $f(x) = 1 + xlog(x + \sqrt{x^2+1}) - \sqrt{x^2+1}, x \geq 0$. Then

A) $f(x)$ is increasing on $(0, \infty)$

B) $f(x)$ is increasing only on $(10, \infty)$

C) $f(x)$ is increasing only on $(0, e)$

D) $f(x)$ is decreasing on $(0, \infty)$

E) $f(x)$ is decreasing only on $(100, \infty)$

Correct Answer : Option A

64. $\int \frac{sin(cot^{-1}x)}{1+x^2} dx$ is equal to

A) $-cos(cot^{-1}x) + C$

B) $cos(cot^{-1}x) + C$

C) $\frac{cos(cot^{-1}x)}{1+x^2} + C$

D) $\frac{cos(cot^{-1}x)}{2} + C$

E) $\frac{-cos(cot^{-1}x)}{1+x^2} + C$

Correct Answer : Option B

65. $\int \sqrt{1 + sin(\frac{x}{8})} dx =$

A) $16sin(\frac{x}{32}) - 16cos(\frac{x}{32}) + C$

B) $16sin(\frac{x}{16}) - 16cos(\frac{x}{16}) + C$

C) $16sin(\frac{x}{32}) + 16cos(\frac{x}{32}) + C$

D) $16sin(\frac{x}{16}) + 16cos(\frac{x}{16}) + C$

E) $8sin(\frac{x}{16}) - 8cos(\frac{x}{16}) + C$

Correct Answer : Option B

66. $\int \left(\frac{1}{(1+x)^2} - \frac{2}{(1+x)^3}\right)e^x dx$ is equal to

A) $\frac{-2}{(1+x)^2} + C$

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

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

D) $\frac{-2e^x}{(1+x)^2} + C$

E) $\frac{e^x}{(1+x)^2} + C$

Correct Answer : Option E

67. $\int \frac{x^4-1}{x+1} dx$ is equal to

A) $\frac{x^4}{4} + \frac{x^3}{3} + \frac{x^2}{2} + x + C$

B) $\frac{x^4}{4} + \frac{x^3}{3} + \frac{x^2}{2} + 2x + C$

C) $\frac{x^4}{4} - \frac{x^3}{3} + \frac{x^2}{2} - x + C$

D) $\frac{x^4}{4} - \frac{x^3}{3} + \frac{x^2}{2} - 2x + C$

E) $-\frac{x^4}{4} - \frac{x^3}{3} - \frac{x^2}{2} - x + C$

Correct Answer : Option C

68. $\int \left(\frac{sint + cost}{13 + 36sin2t}\right)dt$ is equal to

A) $\frac{1}{84} log \left| \frac{7 + 6(sint - cost)}{7 - 6(sint - cost)} \right| + C$

B) $\frac{1}{81} log \left| \frac{7 + 6(sint - cost)}{7 - 6(sint - cost)} \right| + C$

C) $\frac{1}{84} log \left| \frac{7 - 6(sint - cost)}{7 + 6(sint - cost)} \right| + C$

D) $\frac{1}{48} log \left| \frac{7 + 6(sint - cost)}{7 - 6(sint - cost)} \right| + C$

E) $\frac{1}{64} log \left| \frac{7 + 6(sint - cost)}{7 - 6(sint - cost)} \right| + C$

Correct Answer : Option A

69. $\int_{-6}^{0}\left[t^3+9t^2+27t+29+(t+3)\cos(t+3)\right]dt$ is equal to

A) 6

B) 12

C) 18

D) 4

E) 24

Correct Answer : Option B

70. If $I=\int_{-1}^{1}\left(\frac{x^4}{1-x^4}\right)\cos^{-1}\left(\frac{2x}{1+x^2}\right)dx$, then $2I$ is equal to

A) $\pi\int_{-1}^{1}\frac{x^4}{1-x^4}\,dx$

B) $2\pi\int_{-1}^{1}\frac{x^4}{1-x^4}\,dx$

C) $\int_{-1}^{1}\frac{x^4}{1-x^4}\,dx$

D) $\pi\int_{-1}^{1}\frac{x^4}{1+x^4}\,dx$

E) $-\pi\int_{-1}^{1}\frac{x^4}{1-x^4}\,dx$

Correct Answer : Option A

71. $\int_{0}^{1}\left[\tan^{-1}\left(\frac{1}{1+x+x^2+x^3}\right)+\tan^{-1}\left(1+x+x^2+x^3\right)\right]dx$ is equal to

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

B) 2π

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

D) 1

E) 4π

Correct Answer : Option C

72. The value of $\int_{0}^{1}x(1-x)^4\,dx$ is equal to

A) $\frac{1}{60}$

B) $\frac{1}{15}$

C) $\frac{1}{30}$

D) $\frac{1}{45}$

E) $\frac{1}{20}$

Correct Answer : Option C

73. Elimination of arbitrary constants A and B from $y = Ae^{x} + Be^{-2x}$ gives the differential equation

A) $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$

B) $\frac{d^2y}{dx^2} + \frac{dy}{dx} + 2y = 0$

C) $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$

D) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$

E) $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$

Correct Answer : Option A

74. The solution of the differential equation $(x + 2y)dx + (2x - y)dy = 0$ is

A) $x^2 - y^2 + 6xy = C$

B) $x^2 - y^2 - 4xy = C$

C) $x^2 - y^2 + 4xy = C$

D) $x^2 - y^2 + 3xy = C$

E) $2x^2 - y^2 + 4xy = C$

Correct Answer : Option C

75. Consider the Linear Programming Problem (LPP): Maximize $z = 30x + 60y$ subject to the constraints $x + 2y \leq 12; 2x + y \leq 12; 4x + 5y \geq 20; x \geq 0; y \geq 0.$. Then the number of corner points of the feasible region is

A) 8

B) 6

C) 3

D) 4

E) 5

Correct Answer : Option E

76. The physical quantity that doesn't have appropriate unit is

A) Compressibility - $N^{-1}m^2$

B) Latent heat - Jkg^{-1}

C) Intensity - Wm^{-2}

D) Energy density - Jm^{-2}

E) Impulse - Ns

Correct Answer : Option D

77. In the equation A = B/CD^2 , if B, C and D have the dimensions of inductive reactance, capacitive reactance and angular frequency respectively, then the dimensions of A are

A) M^0LT^2

B) ML^0T^2

C) $M^0L^0T^2$

D) $M^{-1}L^0T^{-2}$

E) $M^0L^0T^{-2}$

Correct Answer : Option C

78. The position of a particle moving along y - axis is given as $y = t^2 + 2t + 3$ metre. The average acceleration of the particle between t = 3 s and t = 6 s (in ms^{-2}) is

A) 2

B) 5

C) 4

D) 3

E) 6

Correct Answer : Option A

79. The ratio of distances traversed by a freely falling body in successive intervals of time is

A) 3 : 4 : 6 : 9

B) 1 : 3 : 6 : 9

C) 1 : 2 : 4 : 6

D) 2 : 5 : 7 : 9

E) 1 : 3 : 5 : 7

Correct Answer : Option E

80. If the scalar product of two vectors $x\hat{i} + 3\hat{j} + 2\hat{k}$ and $2\hat{i} - 3\hat{j} + 4\hat{k}$ is 9, then the value of x is

A) 9

B) 5

C) 6

D) 1

E) 2

Correct Answer : Option B

81. Among the following the INCORRECT statement is

A) Newton's second law relates the net external force to its acceleration.

B) Impulse is equal to the change in momentum.

C) Newton's second law is inconsistent with Newton's first law.

D) Same force acting on different bodies for the same time brings the same change in momentum.

E) Action and reaction act on different bodies.

Correct Answer : Option C

82. A ball of 200 *g* mass moving with a speed of 5 ms^{-1}collides with a wall and bounces back with the same speed. If the force exerted on the wall is 1 *N*, then the ball is in contact with the wall for

A) 2 s

B) 1 s

C) 0.5 s

D) 1.5 s

E) 0.75 s

Correct Answer : Option A

83. A block of 10 *kg* mass moving on a frictionless surface moving with 5 ms^{-1} compresses the spring by 5 *cm* and comes to rest. The force constant of the spring (in Nm^{-1}) is

A) 2×10^5

B) 2.5×10^5

C) 3×10^5

D) 1.5×10^5

E) 1×10^5

Correct Answer : Option E

84. If a gun fires 25 bullets in one second, each of 10 *g* mass with a velocity of 20 ms^{-1}, then the recoil force on the gun in *N* is

A) 50

B) 5

C) 15

D) 10

E) 20

Correct Answer : Option B

85. The angular momentum of a uniform rod of mass *m* and length *l*, rotating in a horizontal circle about one of its ends with an angular velocity ω is

A) $ml^2\,\omega$

B) $\frac{1}{4}ml^2\,\omega$

C) $2ml^2\,\omega$

D) $\frac{1}{3}ml^2\,\omega$

E) $\frac{1}{2}ml^2\,\omega$

Correct Answer : Option D

86. The moment of inertia of a solid sphere of radius 20 *cm* about its diameter is same as that of a solid cylinder of same mass about its axis, then the radius of the cylinder in *cm* is

A) $3\sqrt{5}$

B) $5\sqrt{5}$

C) $2\sqrt{5}$

D) $8\sqrt{5}$

E) $7\sqrt{5}$

Correct Answer : Option D

87. The maximum and minimum distances of a satellite revolving in an elliptical orbit are in the ratio 3:1 . If the speed of the satellite at the nearest distance is v , then the speed at the farthest distance is

A) $\frac{v}{6}$

B) $3v$

C) $\frac{v}{3}$

D) $6v$

E) $9v$

Correct Answer : Option C

88. The ratio of the magnitudes of gravitational potential energy to that of kinetic energy of an earth satellite of mass *m* revolving in any orbit is

A) 1 : 2

B) 2 : 1

C) 2 : 3

D) 1 : 3

E) 3 : 1

Correct Answer : Option B

89. Which one of the following materials has the highest modulus of elasticity?

A) steel

B) aluminium

C) copper

D) glass

E) brass

Correct Answer : Option A

90. Two capillary tubes of radii in the ratio 1:2 are dipped in the same liquid. The ratio of heights through which the liquid will rise in the tubes is

A) 1:1

B) 1:2

C) 1:4

D) 4:1

E) 2:1

Correct Answer : Option E

91. The relative viscosity of blood $\left(\frac{\eta}{\eta_{water}}\right)$ is constant between

A) 10 ºC and 47 ºC

B) 0 ºC and 47 ºC

C) 0 ºC and 37 ºC

D) 30 ºC and 40 ºC

E) 20 ºC and 47 ºC

Correct Answer : Option C

92. There is no change in internal energy of an ideal gas in an

A) isothermal process

B) adiabatic process

C) isobaric process

D) isochoric process

E) both in adiabatic process and isobaric process

Correct Answer : Option A

93. Which one is not an extensive variable?

A) total mass

B) internal energy

C) volume

D) density

E) workdone (PdV)

Correct Answer : Option D

94. Experimental P-V curves and theoretically predicted P-V curves are in good agreement at

A) high temperature and high pressure

B) high temperature and low pressure
C) low temperature and high pressure
D) low temperature and atmospheric pressure
E) low temperature and low pressure

Correct Answer : Option B

95. The mass of one molecule of water is approximately

A) 8×10^{-26} kg
B) 6.5×10^{-26} kg
C) 3.5×10^{-28} kg
D) 2.5×10^{-28} kg
E) 3×10^{-26}kg

Correct Answer : Option E

96. If the instantaneous displacement of a wave is $y = 2(sin2\pi\ t + \sqrt{3}cos2\pi\ t)c\,\mathrm{m}$, then the amplitude of the wave in *cm*, is

A) 4
B) 3
C) 5
D) 2
E) 6

Correct Answer : Option A

97. The equation of a transverse wave in a string, $y = 3sin2\pi\ (25t + 0.4x\ )\mathrm{m}$. The wavelength of the wave is

A) 4.5 m
B) 3 m
C) 2.5 m
D) 3.5 m
E) 6.5 m

Correct Answer : Option C

98. If a spherical conductor of 10 *cm* radius contains 5 x 10^6 electrons, then the electric field on its surface (in NC^{-1}) is

A) 0.86
B) 0.36
C) 0.45
D) 1.44
E) 0.72

Correct Answer : Option E

99. When a capacitor of 9 pF is connected to a battery, the electrostatic energy stored in the capacitor is 18 x 10^{-8} *J*. The quantity of charge stored in the capacitor is

A) 1.2 nC
B) 1.8 nC
C) 2.7 nC
D) 3.6 nC
E) 2.4 nC

Correct Answer : Option B

100. If the electric potential is given by $V = 3x^2 + 4x$ volt, then the magnitude of the electric field at the point $x = 1m$ is

A) $6Vm^{-1}$
B) $4Vm^{-1}$
C) $8Vm^{-1}$
D) $10Vm^{-1}$
E) $12Vm^{-1}$

Correct Answer : Option D

101. Which one of the following statements is CORRECT?

A) The molecules of air are non-polar.
B) In a polar molecule, centres of positive and negative charges coincide.
C) A molecule of water is an example of a non-polar molecule.
D) Dielectrics are conducting substances.
E) In a non-polar molecule, centres of positive and negative charges coincide.

Correct Answer : Option E

102. If the drift velocity of electrons in a copper wire of cross-sectional area 2 mm^2 carrying current I is v_1 and that in another copper wire of cross-sectional area 1.5 mm^2 carrying current $2I$ is v_2, then the ratio $v_1 : v_2$ is

A) 3 : 8
B) 2 : 4
C) 8 : 3
D) 4 : 2
E) 1 : 3

Correct Answer : Option A

103. A uniform metallic wire of radius *r* and length *l* is heated by passing a current through it. The heat produced can be made 8 times if

A) *l* is doubled

B) both *l* and *r* are halved

C) *l* is doubled and *r* is halved

D) *r* is doubled

E) both *l* and *r* are doubled

Correct Answer : Option C

104. Two cells each of 2 V and internal resistance 0.1 Ω are connected in parallel combination. This combination is equivalent to a single cell with *emf* and internal resistance of

A) 1 *V* and 0.05 Ω

B) 2 *V* and 0.05 Ω

C) 2 *V* and 0.1 Ω

D) 4 *V* and 0.05 Ω

E) 4 *V* and 0.1 Ω

Correct Answer : Option B

105. When a bar magnet placed parallel to the magnetic field is rotated by 45º, the amount of work done is 2.07 *J*. The amount of work to be done to rotate the magnet further by 45º is

A) 2.07 J

B) 3 J

C) 4.41 J

D) 5 J

E) 6.21 J

Correct Answer : Option D

106. Two charged particles 2*q* and *q* having equal momentum enter a uniform magnetic field in a direction perpendicular to the magnetic field. Then their respective radii of circular paths r1 and r2 are in the ratio

A) 2:1

B) 1:4

C) 1:2

D) 1:3

E) 4:1

Correct Answer : Option C

107. A wire of certain length carrying current *I*, when bent into a circular coil of single turn produces a magnetic field *B* at its centre. If the same wire is bent into a circular coil of 3 turns and it carries the same current, then the magnetic field at the centre of the coil is

A) 12 *B*

B) 3 *B*

C) 6 *B*

D) 9 *B*

E) 15 *B*

Correct Answer : Option D

108. For an electron of mass m_e and charge e revolving around the nucleus of an atom, the ratio of its angular momentum to magnetic moment is

A) $\frac{e}{m_e}$

B) $\frac{e}{2m_e}$

C) $\frac{2e}{m_e}$

D) $\frac{e}{4m_e}$

E) em_e

Correct Answer : Option B

109. If an air core solenoid with self-inductance of 0.5 *mH* is filled with soft iron of relative permeability of 1500, its self-inductance becomes

A) 0.5 H

B) 1.5 H

C) 0.25 H

D) 1.25 H

E) 0.75 H

Correct Answer : Option E

110. The *r.m.s* current of an alternating current given by, $i = 4\sqrt{2}sin\,\omega\ t + 3\sqrt{2}cos\,\omega\ t$ is

A) $5\ A$

B) $3A$

C) $5\sqrt{2}A$

D) $2.5A$

E) $7\sqrt{2}A$

Correct Answer : Option A

111. The law that is a symmetrical counterpart of Faraday's law of electromagnetic induction is

A) Ampere-Maxwell law

B) Gauss law

C) Lenz's law

D) Ampere's circuital law

E) Coulomb's law

Correct Answer : Option A

112. A real object is placed at distance of f in front of a convex mirror of focal length f. The image will be formed at a distance

A) $2f$

B) $\frac{f}{8}$

C) f

D) $\frac{f}{4}$

E) $\frac{f}{2}$

Correct Answer : Option E

113. The magnifying power of a simple microscope can be increased by using

A) diverging lens of large radius of curvature

B) converging lens of small focal length

C) diverging lens of small focal length

D) converging lens of large focal length

E) diverging lens of large focal length

Correct Answer : Option B

114. The intensity of the transmitted light after passing through a first polaroid P_1 is I_0. If the second polaroid P_2 is rotated through an angle of 45º with respect to P_1, then the change in the intensity of the transmitted light after passing through the second polaroid is

A) $\frac{I_0}{2}$

B) $\frac{I_0}{4}$

C) $\frac{3I_0}{4}$

D) $\frac{I_0}{3}$

E) $\frac{3I_0}{2}$

Correct Answer : Option A

115. The order of the electric field required to pull out electrons from a metal by field emission (in Vm^{-1}) is

A) 10^2

B) 10^8

C) 10^5

D) 10^6

E) 10^4

Correct Answer : Option B

116. If the threshold wavelengths of two metals are in the ratio 1:3 , then the work functions of these metals are in the ratio

A) 1 : 3

B) 2 : 1

C) 3 : 1

D) 1 : 2

E) 3 : 2

Correct Answer : Option C

117. The radius of innermost orbit of an electron in the hydrogen atom is 0.53 $\overset{0}{A}$. Then, the radius of the 3rd electron orbit is

A) 1.59 $\overset{0}{A}$

B) 2.38 $\overset{0}{A}$

C) 0.53 $\overset{0}{A}$

D) 4.77 $\overset{0}{A}$

E) 9.54 $\overset{0}{A}$

Correct Answer : Option D

118. The energy released by 2.35 g of ^{235}U by fission in a nuclear reactor (in *MeV*) is (Average energy released per fission is 200 *MeV*)

A) 1.2×10^{24}

B) 0.4×10^{24}

C) 0.6×10^{24}

D) 0.8×10^{24}

E) 2.4×10^{24}

Correct Answer : Option A

119. In a silicon crystal containing N atoms, at absolute zero the 4 N energy states of

A) both the valence band and conduction band are completely occupied

B) the valence band is completely occupied and the conduction band is completely empty

C) both the valence band and conduction band are completely empty

D) the valence band is completely occupied and the conduction band is partially occupied

E) the valence band is completely empty and the conduction band is completely occupied

Correct Answer : Option B

120. The rate of fall of the voltage across the capacitor in a filter used in a diode rectifier depends

A) upon the difference of the capacitive reactance and load resistance

B) inversely only on the capacitance

C) directly on the product of the capacitance and load resistance

D) upon the sum of the capacitive reactance and load resistance

E) on the inverse of the product of the capacitance and effective load resistance

Correct Answer : Option E

121. What is the volume of methanol needed for making 2 L of 0.4 M solution? (Density of methanol = 0.64 kgL^{-1} and molar mass = 32 g mol^{-1})

A) 20 mL

B) 4 mL

C) 40 mL

D) 10 mL

E) 80 mL

Correct Answer : Option C

122. The minimum energy required to remove an electron from sodium atom is 3.313×10^{-19} J. What is the maximum wavelength of radiation that will eject photoelectron from sodium metal? [h = 6.626×10^{-34} Js]

A) 400 nm

B) 500 nm

C) 700 nm

D) 200 nm

E) 600 nm

Correct Answer : Option E

123. Which of the following statements are correct about the postulates of quantum mechanical model of an atom?
(i) The energy of electron in atom is quantized.
(ii) The existence of quantized electronic energy level is a result of the particle property of electrons.
(iii) The path of the electron can be determined accurately.
(iv) In a multi electron atom, the electrons are filled in various orbitals in the order of increasing energy.
(v) The probability of finding an electron at a point within an atom is proportional to the square of the orbital wave function.

A) (i), (iv), (v)

B) (i), (ii), (iv)

C) (i), (iii), (v)

D) (ii), (iii), (v)

E) (i), (ii), (v)

Correct Answer : Option A

124. Which of the following pair of elements have greater ability to form $p\pi - p\pi$ multiple bonds?

A) Carbon and Oxygen

B) Boron and Aluminium

C) Nitrogen and Phosphorus

D) Fluorine and Chlorine

E) Carbon and Silicon

Correct Answer : Option A

125. Which of the following statements are true about electronegativity?
(i) Electronegativity generally increases across a period and decreases down a group.
(ii) The electronegatitivity of a given element is constant.
(iii) The electronegativity values decreases with the increase in atomic radii.
(iv) Elecronegativity is directly related to the metallic property of the elements.
(v) Electronegativity is inversely related to the non-metallic property of the elements.

A) (i) and (iv)

B) (ii) and (iii)

C) (i) and (iii)

D) (iv) and (v)

E) (ii) and (v)

Correct Answer : Option C

126. Which of the following statements are correct about the PCl_5 molecule?
(i) It has trigonal bipyramidal geometry.
(ii) It has three equatorial and two axial bonds.
(iii) The equatorial bond pairs suffer more repulsive interaction from the axial bond pair.
(iv) The equatorial bonds are slightly weaker than axial bonds.
(v) The hybridization involved in the molecule is sp^3d.

A) (i), (ii), (iv)

B) (ii), (iii). (iv)

C) (i),(ii),(iii).

D) (ii), (iv),(v)

E) (i), (ii), (v)

Correct Answer : Option E

127. The geometry of a molecule of type AB_3E_2 with 3 bonding pairs and 2 lone pairs is

A) T-shape

B) trigonal pyramidal

C) trigonal bi-pyramidal

D) square pyramidal

E) see saw

Correct Answer : Option A

128. The enthalpy of combustion of benzene, graphite and dihydrogen at 298 K are -3260 kJ mol^{-1},-390 kJ $mol^{-1}$and -290 kJ mol^{-1}respectively. Enthalpy of formation of benzene is

A) –50 kJ mol^{-1}

B) +50 kJ mol^{-1}

C) +60 kJ mol^{-1}

D) –60 kJ mol^{-1}

E) +80 kJ mol^{-1}

Correct Answer : Option B

129. Choose the correct pair

Bond	Mean single bond enthalpy (kJ mol-1)
(a) C-H	(i) 464
(b) O-H	(ii) 569
(c) F-H	(iii) 293
(d) Si-H	(iv) 414

A) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

B) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

C) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

D) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

E) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

Correct Answer:-Question Cancelled

130. For the equilibrium, $X_{2(g)} + O_{2(g)} = 2XO_{(g)}$, the equilibrium concentrations of $X2_{(g)}$ and $O_{2(g)}$ are 4×10^{-3} M and 8×10^{-3} M respectively. What is the equilibrium concentration of $XO_{(g)}$? (Equilibrium constant Kc = 0.5)

A) 4×10^{-3} M

B) 6×10^{-3} M

C) 5×10^{-3} M

D) 2×10^{-3} M

E) 8×10^{-3} M

Correct Answer : Option A

131. The concentration of hydrogen ions in a hydrochloric acid solution is 3×10^{-3} M. Its pH value is about(log3 = 0.4771)

A) 2.32

B) 2.52

C) 2.47

D) 3.47

E) 5.52

Correct Answer : Option B

132. What is the emf of the cell at 298 K in which the following reaction takes place?
$Ni_{(s)} + 2Ag^{+}_{(0.002M)} \rightarrow Ni^{2+}_{(0.04M)} + 2Ag_{(s)}$. ($E^{\circ}$cell at 298 K = 1.05V)

A) 1.16 V
B) 0.93 V
C) 0.73 V
D) 0.83 V
E) 1.32 V

Correct Answer : Option B

133. Which of the following metals are normally used in the preparation of dihydrogen in the laboratory?

A) Na and Ca
B) Ca and Ba
C) Fe and Na
D) Zn and Mg
E) Na and Ba

Correct Answer : Option D

134. What is the mass of ethanoic acid required to prepare 0.5 m solution containing 100 g of be water? (Molar mass of ethanoic acid = 60 g mol^{-1}).

A) 3 g
B) 6 g
C) 0.3 g
D) 7.5 g
E) 2 g

Correct Answer : Option A

135. In a first order reaction, $N_2O_{5(g)} \rightarrow 2NO_{2(g)} + ½\ O_{2(g)}$, the initial concentration of N_2O_5 was 1.6×10^{-3}mol lit^{-1} at 300 K. The concentration of N_2O_5 after 23 minutes was 0.8×10^{-3}mol lit^{-1}. The rate constant of the reaction at 300 K is (log2 = 0.3010).

A) 0.04 min^{-1}
B) 0.06 min^{-1}
C) 0.3 min^{-1}
D) 0.6 min^{-1}
E) 0.03 min^{-1}

Correct Answer : Option E

136. Which of the following reactions are complex reactions?
(i) Oxidation of ethane
(ii) Thermal decomposition of HI on gold surface
(iii) Saponification of methyl acetate
(iv) Nitration of phenol
(v) Decomposition of NH_3 on hot Pt surface.

A) (i) and (iii)
B) (ii) and (iv)
C) (i) and (iv)
D) (ii) and (v)
E) (i) and (v)

Correct Answer : Option C

137. Which of the following transition metal has more than one metallic structure at normal temperature?

A) Chromium
B) Nickel
C) Manganese
D) Vanadium
E) Copper

Correct Answer : Option C

138. In chemotherapy, the ligand used to remove the excess of copper is

A) ethylenediamine
B) D-penicillamine
C) cupron
D) ethylenediamine
E) α-nitroso-β-napthol

Correct Answer : Option B

139. Some transition metal ions given below contain spin only magnetic moment (BM). Which of the following is not correctly matched?

A) Ni^{2+} (Z=28) 4.73
B) Ti^{2+} (Z=22) 2.84
C) Mn^{2+} (Z=25) 5.92
D) Fe^{2+} (Z=26) 4.90
E) Co^{2+} (Z=27) 3.87

Correct Answer : Option A

140. In Carious method, 0.40 g of an organic compound gave 0.188 g of AgBr. The percentage of bromine in the compound is (Atomic mass of Ag = 108 g mol^{-1} and Br = 80 g mol^{-1}).

A) 30 %
B) 25 %
C) 35 %
D) 24 %
E) 20 %

Correct Answer : Option E

141. Which of the following are carcinogenic hydrocarbons?
(i) 1,2-Benzathracene (ii) Pen-1-yne (iii) 1,2-Benzpyrene
(iv) Cyclohexane (v) 3-Methylcholanthrene

A) (i), (ii), (v)
B) (ii), (iii), (iv)
C) (i), (ii), (v)
D) (i), (iii), (v)
E) (ii), (iii), (iv)

Correct Answer : Option D

142. IUPAC name of $(CH_3)_3C\text{-}CH_2Br$ is

A) 1-Bromotrimethylpropane
B) neo-pentylbromide
C) 1-Bromo-2,2-dimethylpropane
D) 2,2-dimethylethylenediamine
E) 3-bromo-2,2-dimethylpropane

Correct Answer : Option C

143. In Swarts reaction, Freon-12 is manufactured from

A) dichloromethane
B) chloromethane
C) trichloromethane
D) methane
E) tetrachloromethane

Correct Answer : Option E

144. IUPAC name of $CH_3\text{-}CH(OH)\text{-}CH_2\text{-}CH(OH)\text{-}CH(C_2H_5)\text{-}CH_2CH_3$ is

A) 3-Ethylheptane-4, 6-diol
B) 3-Ethylheptane-4, 6-diol
C) 5, 5-Diethylpentane-2, 4-diol
D) 5-Ethylpentane-2, 4-diol
E) 2-Ethylheptane-4, 6-diol

Correct Answer:-Question Cancelled

145. Pyridiniumchlorochromate is a complex of

A) chromic aid with pyridine and Cl_2
B) potassium chromate with pyridine and KCl
C) chromium trioxide with pyridine and HCl
D) potassium dichromate with pyridine and HCl
E) chromic trioxide with pyrrolidine and HCl

Correct Answer : Option C

146. The reagent used for the conversion of decanol into decanoic acid is

A) Tollens's reagent

B) Jones reagent

C) Grignard reagent

D) Fehling's reagent

E) DIBAL-H

Correct Answer : Option B

147. An organic compound with molecular formula,$C_5H_{10}O$, does not reduce Tollen's reagent but forms an addition compound with sodium hydrogen sulphite and gives positive iodoform test. On vigorous oxidation, it gives ethanoic and propanoic acids. The compound is

A) pentan-3-one

B) pentanal

C) pentan-2-one

D) ethoxy ethane

E) pentanol

Correct Answer : Option C

148. The increasing order of boiling point of the following amines is

A) $C_2H_5N(CH_3)_2<(C_2H_5)_2NH<C_4H_9NH_2$

B) $C_4H_9NH_2<C_2H_5N(CH_3)_2<(C_2H_5)_2NH$

C) $C_2H_5NH(CH_3)_2<C_4H_9NH_2<(C_2H_5)_2NH$

D) $(C_2H_5)_2NH<C_4H_9NH_2<C_2H_5N(CH_3)_2$

E) $(C_2H_5)_2NH<C_2H_5N(CH_3)_2<C_4H_9NH_2$

Correct Answer : Option A

149. Which of the following amines does not form carbylamine?

A) Ethanamine

B) Benzenamine

C) Propan-2-amine

D) Propan-1-amine

E) N-Methylethanamine

Correct Answer : Option E

150. The vitamin present in vegetable oils and its deficiency causes muscular weakness is

A) vitamin-A

B) vitamin-E

C) vitamin-B6

D) vitamin-B12

E) vitamin-D

Correct Answer : Option B