FINAL ANSWER KEY

Question Paper Code: 11/2026/OL

Exam:KEAM 2026 - 4

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1. Let $X = \{a, b, c, d, e\}$ and $A = \{a, b, c, d, \}$. Let $\mathrm{P}=\{B: B \subseteq \mathrm{X}\ an\, \mathrm{d}\ \mathrm{A} \backslash \mathrm{B} = \{d\}\}$. Then the number of elements in the set P , is

A) 1

B) 2

C) 4

D) 3

E) 8

Correct Answer : Option B

2. Let $X = \{1, 2, 3, 4, 5, 6, 7\}$. Let $R = \{(1, 1), (1, 2), (1, 3), (5, 6), (6, 7), (7, 5)\}$ be a relation on *X*. Then the relation *R* will become reflexive if we include the pairs

A) (2,7),(3,3),(5,5),(6,6) and (7,7)

B) (2,2),(4,3),(5,5),(6,6) and (7,7)

C) (2,2),(3,3),(5,5),(6,6) and (7,6)

D) (2,2),(3,3),(5,5) and (7,7)

E) (2,2),(3,3),(4,4),(5,5),(6,6) and (7,7)

Correct Answer : Option E

3. Let $f(x) = \frac{2025x + 2026}{2027x - 2025}, x \in \mathbb{R}, x \neq \frac{2025}{2027}$ be a function. Then $f^{1000}(100)$, where $f^2(x) = f(f(x))$ is equal to

A) 10

B) 20028

C) 100

D) 1000

E) 202846

Correct Answer : Option C

4. Let $f(x) = x^2 + 2x + 3, x \leq -1$. Then the domain of the inverse of $f(x)$ is

A) $[-2, \infty)$

B) $[12, \infty)$

C) $[-22, \infty)$

D) $[-12, \infty)$

E) $[2, \infty)$

Correct Answer : Option E

5. Given that $i^2 = -1$. Then $(i^1)(i^2)(i^3)\ldots(i^{2026})$ is equal to

A) -1

B) 1

C) $2i$

D) i

E) $-i$

Correct Answer : Option E

6. Given that $i^2 = -1$. If $z_1 = (7 + i\sqrt{5})^2 + (7 - i\sqrt{5})^2$ and $z_2 = (3 + 2i)^3 - (3 - 2i)^3$, then

A) z_1 is a purely imaginary number and z_2 is a purely real number

B) z_1 is a purely real number and z_2 is a purely imaginary number

C) both z_1 and z_2 are purely imaginary numbers

D) both z_1 and z_2 are purely real numbers

E) z_1+z_2 is a purely real number

Correct Answer : Option B

7. If $z_1 = 1+3i$, $z_2 = -3i+5$, then $\left(z_1\overline{z_2} + z_2\overline{z_1}\right) + \overline{\left(z_1\overline{z_2} + z_2\overline{z_1}\right)}$ is equal to

A) -16

B) $1+i$

C) 1

D) $1-i$

E) $-16i$

Correct Answer : Option A

8. $\left|\frac{cos\alpha + \mathrm{i}\ sin\alpha}{sin\alpha - \mathrm{i}\ cos\alpha}\right|^{1000} + \left|\frac{sin\,\alpha\ + \mathrm{i}\ cos\alpha}{\cos\alpha\ - \mathrm{i}\ sin\,\alpha}\right|^{2000}$ is equal to

A) 1

B) 5

C) 4

D) 16

E) 2

Correct Answer : Option E

9. Let $t_1, t_2, t_3, \ldots, t_n$ be in G.P. Then $\left(\frac{t_4}{t_2}\right)^3$ is equal to

A) $\left(\frac{t_7}{t_3}\right)^2$

B) $\left(\frac{t_7}{t_4}\right)^2$

C) $\left(\frac{t_6}{t_4}\right)^2$

D) $\left(\frac{t_7}{t_2}\right)^2$

E) $\left(\frac{t_9}{t_8}\right)^2$

Correct Answer : Option B

10. The sum of the first n terms in a G.P. is $s_n = 100 - 100^{1-n}$. The common ratio r is

A) $\frac{3}{100}$

B) $\frac{1}{500}$

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

D) $\frac{1}{50}$

E) $\frac{1}{100}$

Correct Answer : Option E

11. Let $a_1, a_2, 6, a_4$ be in G.P. Then the value of $(6a_1 + 6a_2 + a_1a_4 + a_2a_4)^2$ is equal to

A) $(6 + a_2)^4$

B) $(6 + a_1)^4$

C) $(6 + a_4)^4$

D) $(6 + a_3)^4$

E) $(6 + 2a_2)^4$

Correct Answer : Option A

12. The two geometric means between 2 and 8 are g_1 and g_2 . Then $g_1^3 + g_2^3$ is equal to

A) 160

B) 140

C) 180

D) 164

E) 174

Correct Answer : Option A

13. The number of positive integers up to 100, which are divisible by 3 or 7 but not by both 3 and 7, is

A) 47
B) 33
C) 42
D) 43
E) 45

Correct Answer:-Question Cancelled

14. If $n_{C_4} = 1365$ then the value of n is equal to

A) 13
B) 14
C) 15
D) 12
E) 16

Correct Answer : Option C

15. A polygon has 170 diagonals. The number of sides of the polygon, is

A) 20
B) 24
C) 25
D) 30
E) 28

Correct Answer : Option A

16. The coefficient of x^8 in the expansion of $\left(x^2+\sqrt{1-x^2}\right)^5+\left(x^2-\sqrt{1-x^2}\right)^5$, is

A) -20
B) -10
C) -30
D) -40
E) 20

Correct Answer : Option A

17. If $n_{P_5} = 6720$ and $(n-1)_{P_4} = 840$, then n_{P_3} is equal to

A) 346
B) 348
C) 396
D) 376
E) 336

Correct Answer : Option E

18. Let A be a square matrix and A^T be its transpose. Which one of the following is true?

A) $A+A^T$ is skew symmetric and $A-A^T$ is symmetric.

B) both $A + A^T$ and $A - A^T$ are skew symmetric

C) both $A + A^T$ and $A - A^T$ are symmetric

D) $A + A^T$ is symmetric and $A - A^T$ is skew symmetric

E) $-A - A^T$ is skew symmetric

Correct Answer : Option D

19. The value of the determinant $\begin{vmatrix} (10^5+10^{-5})^2 & (10^5-10^{-5})^2 & 1 \\ (100^6+100^{-6})^2 & (100^6-100^{-6})^2 & 1 \\ (6^{100}+6^{-100})^2 & (6^{100}-6^{-100})^2 & 1 \end{vmatrix}$ is equal to

A) 100

B) 200

C) 0

D) 6000

E) 60600

Correct Answer : Option C

20. Let $A = \begin{pmatrix} 1 & tanx \\ -tanx & 1 \end{pmatrix}$. Then AA^T is equal to

A) $\begin{pmatrix} sec^2x & -1 \\ -1 & sec^2x \end{pmatrix}$

B) $\begin{pmatrix} sec^2x & 1 \\ 1 & sec^2x \end{pmatrix}$

C) $\begin{pmatrix} sec^2x & 1 \\ 0 & sec^2x \end{pmatrix}$

D) $\begin{pmatrix} sec^2x & 0 \\ 1 & sec^2x \end{pmatrix}$

E) $\begin{pmatrix} sec^2x & 0 \\ 0 & sec^2x \end{pmatrix}$

Correct Answer : Option E

21. If $\begin{vmatrix} x+2 & 8 & 9 \\ 4 & x+6 & 9 \\ 4 & 8 & x+7 \end{vmatrix} = (x-2)^2(ax+b)$, then the values of a and b respectively, are

A) 2 and 19

B) 1 and 21

C) 1 and 19

D) 1 and -19

E) -1 and 19

Correct Answer : Option C

22. If $\frac{2x-10}{x+2} \geq x-5$ then x lies in

A) $(-\infty, -1) \cup [0, 6]$

B) $(-\infty, -2) \cup [-1, 5]$

C) $(-\infty, -2) \cup [0, 10]$

D) $(-\infty, 0) \cup [0, 5]$

E) $(-\infty, -2) \cup [0, 5]$

Correct Answer : Option E

23. If $10 < |x+10| \leq 25$, then x lies in

A) $[-45, -20) \cup (0, 15]$

B) $[-35, -25) \cup (0, 15]$

C) $[-35, -20) \cup (0, 15]$

D) $[-35, -20) \cup (0, 25]$

E) $[-35, -10) \cup (0, 15]$

Correct Answer : Option C

24. The value of $3cot(-405^o)tan315^o - 5cot495^o tan(-585^o)$ is equal to

A) 8

B) $-8\sqrt{2}$

C) 2

D) -8

E) -2

Correct Answer : Option E

25. $sin\left(\frac{3\pi}{4}+x\right) + cos\left(\frac{3\pi}{4}+x\right) - sin\left(\frac{3\pi}{4}-x\right) - cos\left(\frac{3\pi}{4}-x\right) =$

A) $-2\sqrt{2}sinx$

B) $\sqrt{2}sinx$

C) $2\sqrt{2}sinx$

D) $3\sqrt{2}sinx$

E) $-\sqrt{2}sinx$

Correct Answer : Option A

26. $2^{11}sin(\frac{x}{2^{10}})cos(\frac{x}{2})cos(\frac{x}{2^2})cos(\frac{x}{2^3})\ldots cos(\frac{x}{2^{10}})$ is equal to

A) $sinx$

B) $2sinx$

C) $-2sinx$

D) $4sinx$

E) $8sinx$

Correct Answer : Option B

27. The value of $sin5^o sin10^o sin15^o sin20^o \ldots sin240^o$ is equal to

A) $\frac{1}{2^{24}}(sin15^o + cos15^o)$

B) $\frac{1}{2^{12}}(sin15^o + cos15^o)$

C) $\frac{1}{2^{22}}(sin15^o + cos15^o)$

D) $\frac{1}{2^{42}}(sin15^o + cos15^o)$

E) 0

Correct Answer : Option E

28. The domain of the function $f(x) = sin^{-1}(5 - 4x^2) + cos^{-1}(5 - 4x^2)$ is

A) $\left[1, \sqrt{\frac{3}{2}}\right] \cup \left[-\sqrt{\frac{3}{2}}, -1\right]$

B) $\left[1, \sqrt{\frac{5}{2}}\right] \cup \left[-\sqrt{\frac{3}{2}}, -1\right]$

C) $\left[1, \sqrt{\frac{3}{2}}\right] \cup \left[-\sqrt{\frac{5}{2}}, -1\right]$

D) $\left[2, \sqrt{\frac{3}{2}}\right] \cup \left[-\sqrt{\frac{3}{2}}, -1\right]$

E) $\left[1, \sqrt{\frac{3}{2}}\right] \cup \left[-\sqrt{\frac{3}{2}}, -2\right]$

Correct Answer : Option A

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

A) $\frac{4\pi}{9}$

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

C) $\frac{5\pi}{9}$

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

E) $\frac{7\pi}{9}$

Correct Answer : Option A

30. If $A \leq 2sin^{-1}x + cos^{-1}x \leq B$, then A and B respectively, are

A) $\frac{\pi}{2}$ and π

B) 0 and 2π

C) $\frac{\pi}{4}$ and $\frac{\pi}{2}$

D) $\frac{\pi}{4}$ and π

E) 0 and π

Correct Answer : Option E

31. Let O be the origin and R be any point on $y^2 = 2x$. The locus of the midpoint of the line segment OR , is

A) $(y-1)^2 = 2x$

B) $y^2 = 3x - 1$

C) $y^2 + 1 = 2x$

D) $y^2 = x$

E) $x^2 = 2y$

Correct Answer : Option D

32. A straight line has y -intercept -5 . If it makes 120^o with the x -axis, then the equation of the line is

A) $\sqrt{3}x + y + 20 = 0$

B) $\sqrt{3}x + y + 10 = 0$

C) $\sqrt{3}x - y + 10 = 0$

D) $\sqrt{3}x + y - 10 = 0$

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

Correct Answer : Option E

33. The nearest point on the line $x + 2y = 5$ from the point $P(7, 9)$ is equal to

A) (6,1)

B) (7,6)

C) (2,3)

D) (8,3)

E) (3,1)

Correct Answer : Option E

34. The equation of a chord to the circle $x^2 + y^2 = 25$ is $x + y - 5 = 0$. The equation of a circle whose diameter is $x + y - 5 = 0$, is

A) $x^2 + y^2 - 6x - 5y = 0$

B) $x^2 + y^2 - 5x - 6y = 0$

C) $x^2 + y^2 - 5x - 5y = 0$

D) $x^2 + y^2 - 6x - 6y = 0$

E) $x^2 + y^2 - 3x - 3y = 0$

Correct Answer : Option C

35. The length of the latus rectum of the ellipse $225x^2 + 125y^2 = 28125$ is

A) $\frac{50}{3}$

B) $\frac{25}{3}$

C) 5

D) $\frac{50}{7}$

E) $\frac{125}{3}$

Correct Answer : Option A

36. Let the eccentricity of an ellipse be $\frac{1}{2}$. If $S(3, 2)$ is a focus and $x - 9 = 0$ is the corresponding directrix of the ellipse, then the equation of the ellipse is

A) $3x^2 + 4y^2 - 6x - 16y - 29 = 0$

B) $3x^2 + 4y^2 - 8x - 16y - 29 = 0$

C) $3x^2 + 4y^2 - 6x - 12y - 29 = 0$

D) $3x^2 + 4y^2 - 6x - 16y + 29 = 0$

E) $13x^2 + 5y^2 - 6x - 16y - 29 = 0$

Correct Answer : Option A

37. The eccentricity of the hyperbola $25x^2 - 36y^2 - 50x - 72y - 911 = 0$, is

A) $\frac{\sqrt{61}}{6}$

B) $\frac{\sqrt{65}}{6}$

C) $\frac{\sqrt{61}}{4}$

D) $\frac{\sqrt{59}}{6}$

E) $\frac{\sqrt{71}}{6}$

Correct Answer : Option A

38. The vectors $2\vec{a}+6\vec{b}$ and $3\vec{a}-7\vec{b}$ are position vectors of the points A and B respectively. A point P divides the line segment AB internally in the ratio 3:5 . Then $\vec{PB}$ =

A) $\frac{5\vec{a}-65\vec{b}}{8}$

B) $\frac{5\vec{a}-55\vec{b}}{8}$

C) $\frac{5\vec{a}-45\vec{b}}{8}$

D) $\frac{5\vec{a}-60\vec{b}}{8}$

E) $\frac{5\vec{a}+65\vec{b}}{8}$

Correct Answer : Option A

39. The position vectors of the vertices of a triangle are $\hat{\imath}+2\hat{j}-4\hat{k}$, $-\hat{\imath}-2\hat{j}-4\hat{k}$ and $2\hat{\imath}+3\hat{j}+5\hat{k}$. The perimeter of the triangle is

A) $\sqrt{20}+\sqrt{115}+\sqrt{83}$

B) $\sqrt{20}+\sqrt{117}+\sqrt{83}$

C) $\sqrt{22}+\sqrt{115}+\sqrt{83}$

D) $\sqrt{20}+\sqrt{115}+\sqrt{84}$

E) $\sqrt{20}+\sqrt{125}+\sqrt{83}$

Correct Answer : Option A

40. Let $|\vec{a}\,|=2$, $|\vec{b}\,|=\sqrt{13+6\sqrt{3}}$ and $|\vec{c}\,|=3$. If $\vec{a}-\vec{b}+\vec{c}=0$, then the angle between $\vec{a}$ and $\vec{c}$ is

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

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

C) $\frac{\pi}{12}$

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

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

Correct Answer : Option E

41. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $|\vec{a}| = 2, |\vec{b}| = 3, |\vec{c}| = 4$ and $\vec{a}.\vec{b} = \vec{a}.\vec{c} = 0$ If the angle between $\vec{b}$ and $\vec{c}$ is $\frac{\pi}{3}$, then $\vec{a}$ is equal to

A) $\pm\frac{1}{\sqrt{3}}(\vec{b} \times \vec{c})$

B) $\pm\frac{1}{2\sqrt{3}}(\vec{b} \times \vec{c})$

C) $\pm\frac{1}{3\sqrt{2}}(\vec{b} \times \vec{c})$

D) $\pm\frac{1}{3\sqrt{3}}(\vec{b} \times \vec{c}$
$)$

E) $\pm\frac{1}{2\sqrt{2}}(\vec{b} \times \vec{c})$

Correct Answer : Option D

42. The straight line $\vec{r} = (2-3t)(\hat{i}+\hat{j}) + (6t+1)(\hat{j}+\hat{k}) + (12t-11)(\hat{k}+\hat{i}), t \in \mathbb{R}$, is parallel to the vector

A) $3\hat{i} - \hat{j} + 6\hat{k}$

B) $3\hat{i} + \hat{j} + 6\hat{k}$

C) $3\hat{i} + \hat{j} - 6\hat{k}$

D) $-3\hat{i} + \hat{j} + 6\hat{k}$

E) $3\hat{i} + 2\hat{j} + 5\hat{k}$

Correct Answer : Option B

43. The equation of a line passing through (-1,6,5) and (-2,4,3) , is

A) $\frac{-x-1}{-1} = \frac{6+y}{-2} = \frac{-z+5}{-2}$

B) $\frac{-x-1}{-1} = \frac{6-y}{-2} = \frac{-z+5}{-2}$

C) $\frac{-x-1}{-1} = \frac{6-y}{-2} = \frac{-z-5}{-2}$

D) $\frac{-x-1}{-1} = \frac{6-y}{2} = \frac{-z+5}{-2}$

E) $\frac{-x-1}{-1} = \frac{6-y}{-2} = \frac{-z+5}{-2}$

Correct Answer:-Question Cancelled

44. If α, β, γ are the angles made by the straight line $\frac{x-5}{2} = \frac{y+1}{3} = \frac{z-2}{\sqrt{7}}$ with the *x*-axis, *y*-axis and z-axis respectively, then $\cos\alpha, \cos\beta, \cos\gamma$ are respectively,

A) $\frac{1}{\sqrt{5}}, \frac{7}{2\sqrt{5}}, \frac{\sqrt{7}}{2\sqrt{5}}$

B) $\frac{1}{\sqrt{5}}, \frac{3}{2\sqrt{5}}, \frac{3\sqrt{7}}{2\sqrt{5}}$

C) $\frac{-1}{\sqrt{5}}, \frac{3}{2\sqrt{5}}, \frac{\sqrt{7}}{2\sqrt{5}}$

D) $\frac{1}{\sqrt{5}}, \frac{-3}{2\sqrt{5}}, \frac{\sqrt{7}}{2\sqrt{5}}$

E) $\frac{1}{\sqrt{5}}, \frac{3}{2\sqrt{5}}, \frac{\sqrt{7}}{2\sqrt{5}}$

Correct Answer : Option E

45. The shortest distance between the lines $\vec{r} = (2\hat{\imath} + 6\hat{\jmath} + 3\hat{k}) + t(2\hat{\imath} + 3\hat{\jmath} + 4\hat{k}), t \in \mathbb{R}$ and $\vec{r} = (2\hat{\imath} - 3\hat{k}) + s(\hat{\imath} + 2\hat{\jmath} + 3\hat{k}), s \in \mathbb{R}$, is

A) 8

B) 5

C) 0

D) 4

E) 1

Correct Answer:-Question Cancelled

46. Let $x_1, x_2, ..., x_n$ be the data with respective frequencies $f_1, f_2, ..., f_n$. If $\sum_{i=1}^{n} f_i\left(\left|x_i - \bar{x}\right|\right) = 400$ and the mean deviation from the mean $\bar{x}$ is 10, then $\sum_{i=1}^{n} f_i$ is equal to

A) 55

B) 50

C) 36

D) 40

E) 25

Correct Answer : Option D

47. Consider the data $x_1, x_2, ..., x_n$. If $\sum_{i=1}^{10} \left(\left|x_i - \bar{x}\right|\right)^2 = 662$, where $\bar{x}$ is the mean, then the standard deviation is approximately, equal to

A) 6.452

B) 9.126

C) 8.136

D) 9.145

E) 7.111

Correct Answer : Option C

48. Let A and B be two events such that $P(A) = \frac{1}{8}$, $P(A / B) = \frac{1}{4}$ and $P(B / A) = \frac{2}{5}$. Then $P(B)$ is equal to

A) $\frac{1}{5}$

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

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

D) $\frac{2}{15}$

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

Correct Answer : Option A

49. A number x is randomly chosen from the set of natural numbers less than or equal to 100. Then the probability of the event that the chosen number satisfies the inequality $\frac{(x-15)(x-70)}{x-30} \geq 0$, is

A) 0.36

B) 0.47

C) 0.48

D) 0.49

E) 0.46

Correct Answer : Option E

50. Let $f(x) = -\sqrt{49-x^2}$. Then $\lim_{x \to 1} \frac{f(x)-f(1)}{x-1}$ is equal to

A) $\frac{1}{3\sqrt{3}}$

B) $\frac{1}{2\sqrt{3}}$

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

D) $\frac{1}{4\sqrt{3}}$

E) $\frac{1}{5\sqrt{3}}$

Correct Answer : Option D

51. Let $[x]$ denote the greatest integer less than or equal to x . Then $\lim_{x \to 0^-} \frac{sin[x]}{[x]}$ is equal to

A) 1

B) -sin1

C) -2

D) 0

E) sin1

Correct Answer : Option E

52. If the function $f(x)=\begin{cases} \frac{x^2}{2}, & 0\le x<1 \\ 2x^2-ax+1.5, & 1\le x\le 5 \end{cases}$ is continuous on $[0,5]$, then the value of a is

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

Correct Answer : Option D

53. The value of $\lim\limits_{x\to \frac{\pi}{2}^-}(tanx-secx)$ is equal to

A) $\frac{1}{2}$
B) $\frac{1}{4}$
C) 0
D) 2
E) 1

Correct Answer : Option C

54. Consider the $f(x)=xe^{-\frac{2}{x}}$ function . Which one of the following is not true?

A) $f(x)$ is continuous at x =1
B) $f(x)$ is continuous at x =-1
C) $f(x)$ is continuous at x =2
D) $f(x)$ is continuous at x =-2
E) $f(x)$ is continuous at x =0

Correct Answer : Option E

55. Let $f(x)=\begin{cases} 1-x, & x<1 \\ (1-x)(2-x), & 1\le x\le 2 \end{cases}$. Which one of the following is not true?

A) $f(x)$ is differentiable in (-1,1)
B) $f(x)$ is differentiable in $(-\infty,1)$
C) $f(x)$ is differentiable at x =-2026
D) $f(x)$ is not differentiable at x =1
E) $f(x)$ is continuous at x =1.5 and x =1.5 differentiable at

Correct Answer : Option D

56. Let $g(x)=\begin{vmatrix} x^4 & -\cos x & -\sin 2x \\ -8 & 4 & 3 \\ 2 & 4 & 8 \end{vmatrix}$. Then $g'''(0)$ is equal to

A) -310
B) 320
C) -360
D) -320
E) -380

Correct Answer : Option D

57. If $x = s\,\text{ec}\theta\ - cos\,\theta\,, y = sec^{10}\,\theta\ - cos^{10}\,\theta$, then $(\frac{dy}{dx})^2$ is equal to

A) $100\,(\frac{y^2+4}{x^2+4})$
B) $100\,(\frac{y^4-4}{x^4+4})$
C) $100\,(\frac{y^2+4}{x^2-4})$
D) $100\,(\frac{y^4+2}{x^4+4})$
E) $100\,(\frac{y^4+4}{x^4+2})$

Correct Answer : Option A

58. Let $y = x^{sin\,\frac{\pi}{2}x}$. Then at $x = 1, \frac{dy}{dx}$ is equal to

A) -1
B) 0
C) -2
D) 2
E) 1

Correct Answer : Option E

59. Let $y = tan^{-1}(\frac{sinx+cosx}{sinx-cosx}), 0 < x < \frac{\pi}{2}$. Then $\frac{dy}{dx}$ is equal to

A) x
B) -1
C) $-x$
D) $2x$
E) $-2x$

Correct Answer : Option B

60. Let $f(x) = \frac{log(e+x)}{log(\pi + x)}, -2 < x < \infty$. Then f is

A) decreasing on (-2,∞)

B) decreasing only on (0,∞)

C) increasing only on (0,e)

D) increasing on (-2,∞)

E) increasing only on (0,π)

Correct Answer : Option D

61. Let $f(x) = a_0 + a_1x^2 + a_2x^4 + a_3x^6, x \in \mathbb{R}$ where $0 < a_0 < a_1 < a_2 < a_3$ The minimum value of $f(x)$ is

A) $a_0 + a_1 + a_2 + a_3$.

B) $a_1 + a_2$

C) a_0

D) a_3

E) $a_0 + a_3$

Correct Answer : Option C

62. If $|f(x_1) - f(x_2)| \leq (x_1 - x_2)^2, x_1, x_2 \in \mathbb{R}$ and if $f(0) = 2026$, then $f(2025)$ is equal to

A) 2025

B) 4051

C) 4050

D) 2026

E) 1

Correct Answer : Option D

63. Consider the circle $x^2 + y^2 = 1$. The point on the circle which is nearest from the point (1,1) , is

A) $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

B) $\left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

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

D) $\left(-\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$

E) (0,1)

Correct Answer : Option C

64. $\int \frac{y^2 - 3y + 2}{y^2 + y} dy$ is equal to

A) $y + 2log\,|\,y\,| - 4log\,|\,1 + y\,| + C$
B) $y + 2log\,|\,y\,| - 6log\,|\,1 + y\,| + C$
C) $y + 3log\,|\,y\,| - 6log\,|\,1 + y\,| + C$
D) $y + 2log\,|\,y\,| + 6log\,|\,1 + y\,| + C$
E) $y + 7log\,|\,y\,| - 6log\,|\,1 + y\,| + C$

Correct Answer : Option B

65. $\int tan\frac{\theta}{2}\,sin\,\theta\;cos\,\theta\;d\,\theta$ is equal to

A) $sin\,\theta - \frac{1}{2}\theta - \frac{sin2\theta}{6} + C$
B) $sin\,\theta - \frac{1}{2}\theta - \frac{sin2\theta}{2} + C$
C) $2sin\,\theta - \frac{1}{2}\theta - \frac{sin2\theta}{4} + C$
D) $sin\,\theta - \frac{1}{2}\theta - \frac{sin2\theta}{4} + C$
E) $sin\,\theta - \frac{1}{4}\theta - \frac{sin2\theta}{4} + C$

Correct Answer : Option D

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

A) $\log\,|\,tan^{-1}\left(\frac{1-x}{1+x}\right)\,| + C$
B) $\log\,|\,tan^{-1}\left(\frac{1+x}{1-x}\right)\,| + C$
C) $\frac{1}{2}\log\,|\,tan^{-1}\left(\frac{1+x}{1-x}\right)\,| + C$
D) $\frac{1}{4}\log\,|\,tan^{-1}\left(\frac{1+x}{1-x}\right)\,| + C$
E) $\frac{1}{4}\log\,|\,tan^{-1}\left(\frac{1+x^2}{1-x}\right)\,| + C$

Correct Answer : Option B

67. $\int e^x(2e^x + sinx + cosx + 2)dx$ is equal to

A) $e^x(e^x + cosx + 2) + C$
B) $e^x(e^x + sinx + 2x) + C$
C) $e^x(e^x + sinx + 2) + C$
D) $e^x(e^x + sinx + 1) + C$
E) $e^x(e^x - sinx + 2) + C$

Correct Answer : Option C

68. $\int \left(\frac{1}{1+e^t}\right)dt$ is equal to

A) $t + log(1 + e^t) + C$

B) $t - log(1 - e^t) + C$

C) $2t - log(1 + e^t) + C$

D) $t - e^t log(1 + e^t) + C$

E) $t - log(1 + e^t) + C$

Correct Answer : Option E

69. $\int_{\pi/6}^{\pi/3} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\,dx$ is equal to

A) 0

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

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

D) $\frac{\pi}{12}$

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

Correct Answer : Option D

70. $\int_0^1 \left(\frac{x^{15}}{1+x^{32}}\right)\left[\cos\left(\tan^{-1} x^{16}\right)\right]dx$ is equal to

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

B) $\frac{1}{8\sqrt{2}}$

C) $\frac{1}{32\sqrt{2}}$

D) $\frac{1}{4\sqrt{2}}$

E) $\frac{1}{16\sqrt{2}}$

Correct Answer : Option E

71. Let $[x]$ be the greatest integer function. Then $\int_{-4}^{4} (x-[x])\,dx$ is equal to

A) 8

B) 6

C) 4

D) 16

E) 12

Correct Answer : Option C

72. $\int_0^5 \frac{(x+8)^{2026}}{(x+8)^{2026}+(13-x)^{2026}}\,dx$ is equal to

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

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

C) 5

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

E) $\frac{5}{2}$

Correct Answer : Option E

73. The order and degree of the differential Equation $\left(1+\frac{dy}{dx}+\frac{d^2y}{dx^2}\right)^{\frac{3}{2}} = \left(x+y+\frac{dy}{dx}+\frac{d^3y}{dx^3}\right)^{\frac{2}{3}}$ respectively, are

A) 4 and 2

B) 3 and 3

C) 3 and 4

D) 2 and 3

E) 3 and 2

Correct Answer : Option C

74. The solution of the differential equation $(2y-1)dy-(y-2)dx=0$ is

A) $2y+3log\mid y-2\mid = 2x+c$

B) $2y+4log\mid y-2\mid = x+c$

C) $y+3log\mid y-2\mid = x+c$

D) $2y+3log\mid y-2\mid = x+c$

E) $3y+2log\mid y-2\mid = x+c$

Correct Answer : Option D

75. Consider the Linear Programming Problem (LPP):
Maximize $z=20x+40y$ subject to the constraints .
$3x+y\leq 14; x+3y\leq 10; x\geq 0; y\geq 0$ The number of corner points of the feasible region is

A) 5

B) 4

C) 3

D) 2

E) 6

Correct Answer : Option B

76. The dimensional formula for the rate of change of momentum of a moving body is

A) ML^2T^{-2}

B) MLT^{-1}

C) $ML^{-1}T^{-1}$

D) MLT^{-2}

E) M^0LT^{-1}

Correct Answer : Option D

77. If the time period of oscillation of a liquid drop is given by $T = k\sqrt{\frac{\rho r^4}{\sigma}}$, where ρ refers to its density, r , its radius and k is a dimensionless constant, then σ has the units of

A) surface

B) restoring force

C) coefficient of viscosity

D) vapour pressure

E) surface tension

Correct Answer : Option B

78. The area under the velocity-time graph of a particle is equal to its

A) acceleration

B) displacement

C) speed

D) velocity

E) angular velocity

Correct Answer : Option B

79. If both *x* and *y* components of a vector are equal, its angle with *x*-axis is

A) 30°

B) 45°

C) 60°

D) 90

E) 0°

Correct Answer : Option B

80. The position vector of a particle is given by $\vec{x} = (t^3 - 3t^2 + 2)\,\hat{i}$, the time at which the velocity of the moving particle becomes zero is

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

Correct Answer : Option B

81. A particle of mass *m* is initially at rest. A time varying force $F = kt$ acts on it. Its velocity after time t is

A) $\frac{kt^2}{2m}$
B) $\frac{kt^2}{m}$
C) $\frac{2kt^2}{m}$
D) $\frac{k^2t^2}{m}$
E) $\frac{2k^2t^2}{m}$

Correct Answer : Option A

82. A passenger of mass m stands on a weighing scale in an elevator accelerating upward with an acceleration of $\frac{g}{2}$. The scale would read (g = acceleration due to gravity)

A) $\frac{3mg}{2}$
B) $\frac{mg}{2}$
C) $\frac{2mg}{2}$
D) mg
E) $\frac{mg}{3}$

Correct Answer : Option A

83. A block of mass 2 kg slides on a rough horizontal surface $(\mu_k = 0.2)$ with initial speed 10 ms^{-1}. The distance travelled by the block before it stops is (g = 10 ms^{-2})

A) 5 m
B) 12 m
C) 15 m
D) 21 m
E) 25 m

Correct Answer : Option E

84. A non-conservative force is one for which

A) work depends only on initial position

B) work depends only on final position

C) work is always zero

D) work depends on path

E) energy is conserved

Correct Answer : Option D

85. A flywheel in a steam engine ensures a smooth ride for the passengers on the vehicle because it has

A) low mass

B) high speed

C) low acceleration

D) large moment of inertia

E) high friction

Correct Answer : Option D

86. Two bodies *A* and *B* of masses 80 *g* and 120 *g* move with same speed, 6 cm s^{-1} in a plane. The speed of the centre of mass of the system is

A) 6.2 cm s^{-1}

B) 6.0 cm s^{-1}

C) 2.4 cm s^{-1}

D) 2.0 cm s^{-1}

E) 3.2 cm s^{-1}

Correct Answer:-Question Cancelled

87. A satellite revolves around a planet in a circular orbit of radius *R* with the time period t . If the orbital radius is 3*R*, then its time period of revolution is

A) t

B) $2t$

C) $\sqrt{27}t$

D) $\sqrt{3}t$

E) $2\sqrt{2}t$

Correct Answer : Option C

88. The maximum and minimum distances of a planet from the sun are respectively $r_1 \text{and}$ r_2 . If it moves with a maximum speed of v_1 and the minimum speed of v_2 around the sun then the ratio $v_1 : v_2$ is

A) $r_1^2 : r_1^2$

B) $r_1 : r_2$

C) $r_2 : r_1$

D) $r_2^2 : r_1^2$

E) $\sqrt{r_1} : \sqrt{r_2}$

Correct Answer : Option C

89. If a capillary tube is dipped vertically in water of surface tension *T*, the capillary rise is 4 *cm*. If the same tube is dipped in a liquid of density 800 kgm^{-3} of surface tension $\frac{T}{2}$, then the capillary rise will be

A) 2.5 cm

B) 3.2 cm

C) 1.2 cm

D) 2.4 cm

E) 5.0 cm

Correct Answer : Option A

90. A brass rod has a length 1*m* linear coefficient of thermal expansion, $2 \times 10^{-5} \, /^{o} C$ and Young's modulus $1 \times 10^{11} Nm^{-2}$. When it is heated by 50 °C, the thermal stress developed in it (in Nm^{-2}) due to heating is

A) 1×10^{8}

B) 1×10^{6}

C) 2×10^{6}

D) 2×10^{8}

E) 3×10^{6}

Correct Answer : Option A

91. Two different liquids of having same mass at temperatures T_1 and T_2 and of specific heat capacities, *S* and 1.2 *S*, respectively, are mixed in an insulated system. If $T_1 > T_2$, then the temperature of the mixture is

A) $\frac{5T_1 + 6T_2}{11}$

B) $\frac{6T_1 + 5T_2}{11}$

C) $T_1 + T_2$

D) $T_1 - T_2$

E) $\frac{T_1 + T_2}{2}$

Correct Answer : Option A

92. If the kinetic energy of 1 mole of a monoatomic gas is 24.942 *kJ*, then its temperature is (*R* = 8.314 J $kg^{-1}K^{-1}$)

A) 200 K

B) 300 K

C) 400 K

D) 2000 K

E) 3000 K

Correct Answer : Option D

93. One mole of a monoatomic gas is heated at constant volume such that its temperature increases from T to $3T$. The heat supplied is (R- Universal Gas constant)

A) $3RT$

B) RT

C) $\frac{3}{2}RT$

D) $\frac{5}{2}RT$

E) $5RT$

Correct Answer : Option A

94. If the *rms* speed of ideal gas molecules increases by 20% at constant volume, the percentage increase in their pressure is

A) 20 %

B) 40 %

C) 44 %

D) 10 %

E) 32 %

Correct Answer : Option C

95. A gas has pressure 2.76×10^5 Pa at 400 K. If Boltzmann constant $k = 1.38 \times 10^{-23}$ JK^{-1}, its number density is

A) 5.5×10^{27}

B) 5.0×10^{27}

C) 6.5×10^{27}

D) 6.5×10^{25}

E) 5.0×10^{25}

Correct Answer : Option E

96. If the instantaneous displacements of any two particles executing S.H.M are given by $x_1 = a \sin \omega t$ and $x_2 = a \cos \omega t$, then the phase difference between them is

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

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

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

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

E) $\frac{\pi}{12}$

Correct Answer : Option C

97. Two springs of spring constants *k* and 2*k*, are connected in series and suspended vertically. If the mass *m* attached at its free end is allowed to oscillate vertically, then its time period of oscillation is

A) $2\pi\sqrt{\frac{3m}{k}}$

B) $2\pi\sqrt{\frac{2m}{3k}}$

C) $2\pi\sqrt{\frac{3m}{2k}}$

D) $2\pi\sqrt{\frac{m}{3k}}$

E) $2\pi\sqrt{\frac{m}{2k}}$

Correct Answer : Option C

98. The force between two equal and opposite charges kept at a certain distance of separation in air medium is F. If the charges are kept at the same separation distance in a medium of dielectric constant k , then the force between the charges becomes

A) $\frac{k}{F}$

B) Fk

C) $\frac{F}{k}$

D) F

E) $\frac{F}{k^2}$

Correct Answer : Option C

99. An oil drop of mass m carrying a charge q is descending under its own weight. If it is made to remain stationary by applying an electric field of intensity E , then the value of q is (g = acceleration due to gravity)

A) mgE

B) $\frac{mg}{E}$

C) $\frac{Eg}{m}$

D) $\frac{m}{Eg}$

E) $\frac{2m}{Eg}$

Correct Answer : Option B

100. The electric field at a point just outside a positively charged perfect spherical conductor is

A) zero

B) parallel to the surface

C) perpendicular to the surface and directed away from the surface

D) at any random direction to the surface

E) perpendicular to the surface and directed towards the surface

Correct Answer : Option C

101. 64 small identical globules of mercury, each of radius *r* carrying a charge *q* each combine to form a big globule. The ratio of the surface charge density of each small globule to that of the big globule is:

A) 1 : 2

B) 2 : 1

C) 16 : 1

D) 1 : 4

E) 4 : 1

Correct Answer : Option D

102. A copper wire of temperature coefficient of resistance $4 \times 10^{-3} K^{-1}$ has resistance 10 Ω at 20° C. Its resistance at 80° C is

A) 1.22 Ω

B) 12.2 Ω

C) 24.4 Ω

D) 38.8 Ω

E) 2.44 Ω

Correct Answer : Option B

103. When the electric field applied across a conductor is doubled without changing its temperature, the drift velocity

A) doubles

B) triples

C) quadruples

D) becomes half

E) remains unchanged

Correct Answer : Option A

104. Two cells of *emfs* 2 *V* and 6*V* each with internal resistance of 1 Ω are connected in series to an external resistance 8 Ω . Then the current in the circuit is

A) 2 A

B) 0.5 A

C) 1 A

D) 0.8 A

E) 1.5 A

Correct Answer : Option D

105. Two long straight conductors carrying currents 1 *A* and 2 *A* are kept parallel to each other in air medium with a separation of 10 cm. The force acting on each conductor per unit length is

A) $4 \times 10^{-8} Nm^{-1}$

B) $4 \times 10^{-6} Nm^{-1}$

C) $4 \times 10^{-3} Nm^{-1}$

D) $2 \times 10^{-8} Nm^{-1}$

E) $2 \times 10^{-4} Nm^{-1}$

Correct Answer : Option B

106. A bar magnet of length *l* has magnetic moment *M*. If its length is halved, its magnetic moment becomes

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

B) M

C) $\frac{M}{4}$

D) $2M$

E) $4M$

Correct Answer : Option A

107. A solenoid has 1000 turns per metre and carries a current of $\frac{7}{\pi}$ A. The magnetic field inside the solenoid is

A) $7.0 \times 10^{-3} T$

B) $7.0 \times 10^{-4} T$

C) $4.0 \times 10^{-4} T$

D) $1.4 \times 10^{-3} T$

E) $2.8 \times 10^{-3} T$

Correct Answer : Option E

108. A proton and an alpha particle are accelerated in the same cyclotron using the same magnetic field. The ratio of their respective cyclotron frequencies is

A) 1 : 2

B) 2 : 1

C) 1 : 4

D) 4 : 1

E) 8 : 1

Correct Answer : Option B

109. In an *ac* circuit containing an *ac* source of frequency f , a capacitor offers a reactance which is proportional to

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

B) $\frac{1}{f^2}$

C) f

D) f^2

E) $\sqrt{f}$

Correct Answer : Option A

110. A circular coil of radius 10 *cm* with 200 turns is placed perpendicular to a uniform magnetic field of 0.4 *T*. If the magnetic field is reduced to zero uniformly in 0.2 *s*, then the average induced *emf* (in volt) is

A) 4π

B) 120

C) 20

D) 15

E) 40π

Correct Answer : Option A

111. If the total energy transferred to a completely absorbing surface by an EM wave in unit time is 3.6 *J*, then the radiation pressure exerted by the wave on the surface is

A) $1 \times 10^8 Nm^{-2}$

B) $1.8 \times 10^8 Nm^{-2}$

C) $1 \times 10^7 Nm^{-2}$

D) $1.2 \times 10^7 Nm^{-2}$

E) $1.2 \times 10^{-8} Nm^{-2}$

Correct Answer : Option E

112. In a single slit diffraction experiment, if the slit width is reduced to half while wavelength and screen distance remain constant, the angular width of the central maximum will

A) remain unchanged
B) become half
C) become double
D) become four times
E) become one-fourth

Correct Answer : Option C

113. Sustained interference is observed with

A) two independent sources
B) two coherent sources
C) a single coherent source
D) a single independent source
E) a single monochromatic source

Correct Answer : Option B

114. An aperture of size 2 *mm* is illuminated by a parallel light beam of wavelength 400 *nm*. The distance up to which ray optics in a good approximation is

A) 20 m
B) 10 m
C) 15 m
D) 30 m
E) 50 m

Correct Answer : Option B

115. If an electron and a proton have same kinetic energy and their de Broglie wavelengths are λ_e and λ_p, respectively, then the ratio $\lambda_p : \lambda_e$ is

A) 1:1
B) 1 : 1836
C) 1836 : 1
D) $\sqrt{1836}$: 1
E) 1: $\sqrt{1836}$

Correct Answer : Option E

116. Stopping potentials for the metals A and B are 0.4 V and 1.6 V, respectively. When illuminated by same light, the difference in their work functions is:

A) 2.0 *eV*
B) 1.2 *eV*
C) 6.4 *eV*
D) 0.4 *eV*

E) 2.0 V

Correct Answer : Option B

117. Identify the isotones among the given nuclei

a. ${}^{14}_{6}C$ b. ${}^{14}_{7}N$ c. ${}^{15}_{7}N$ d. ${}^{16}_{8}O$

A) a and c only
B) b and d only
C) a, c and d only
D) b and c only
E) c and d only

Correct Answer : Option C

118. In Bohr's theory of hydrogen atom, if the speed of an electron in its first orbit is v, then its speed in its 3rd orbit is

A) v
B) $\frac{v}{3}$
C) $\frac{v}{9}$
D) $3v$
E) $\frac{v}{2}$

Correct Answer : Option B

119. Identify the **incorrectly** matched pair about the characteristics of a pn junction diode

A) Cut-in voltage – Voltage up to which voltage-independent reverse current exists
B) Reverse bias - Leakage current region below breakdown voltage
C) No bias - No net current due to diffusion and drift
D) Breakdown Voltage - Sudden large current due to avalanche effect occurs
E) Forward bias - moderate ohmic region above barrier voltage

Correct Answer : Option A

120. Ripple frequency in full-wave rectifier of input frequency f is:

A) f
B) $\frac{f}{2}$
C) $2f$
D) $4f$
E) $3f$

Correct Answer : Option C

121. The mass of sodium acetate required to prepare 250 mL of 0.4 M aqueous solution is (Molar mass of sodium acetate = 82 g mol^{-1})

A) 4.1 g

B) 8.2 g

C) 16.4 g

D) 2.05 g

E) 0.82 g

Correct Answer : Option B

122. A 250 watt bulb emits monochromatic light of wavelength 198.78 nm. How many photons are emitted by the bulb per second?
(Planck's constant = 6.626 x 10^{-34} J s and velocity of light = 3 x 10^{8} ms^{-1}).

A) 2.5 x 10^{20} s^{-1}

B) 2.5 x 10^{18} s^{-1}

C) 2 x 10^{20} s^{-1}

D) 2.2 x 10^{16} s^{-1}

E) 2.6 x10^{20} s^{-1}

Correct Answer : Option A

123. Which of the following statements are incorrect about boundary surface diagram of orbital?
(i) A boundary surface is drawn in space for an orbital on which the value of probability density| Ψ $|^2$ is constant.
(ii) The boundary surface for | Ψ $|^2$ and | Ψ | are not identical.
(iii) The density of the dots represents the probability density of finding the electron in the region.
(iv) In 1s and 2s orbitals, the probability of finding electron at a given distance is not equal in all the directions.
(v) The 2p orbitals in the boundary surface diagram are not spherical.

A) (i), (iv)

B) (iii), (iv)

C) (ii), (iv)

D) (ii), (iii)

E) (i), (ii)

Correct Answer : Option C

124. Which of the following ions are isoelectronic?

A) K^{+}, Al^{3+}, Ca^{2+}, Sc^{2+}.

B) $O2^{-}$, Al^{3+}, Cl^{-}, Sc^{2+}.

C) K^{+}, S^{2-}, Ca^{2+}, Cl^{-}.

D) Na^{+}, Mg^{2+}, Ca^{2+}, Sc^{2+}.

E) Mg^{2+}, Al^{3+}, Ca^{2+}, S^{2-}.

Correct Answer : Option C

125. The correct order of metallic radius of the elements is

A) Be < B < Al < Mg < Li

B) Mg < Li < Al < B < Be

C) Li < Mg < B < Be < Al

D) B < Be < Al < Li < Mg

E) Li < Mg < Be < B < Al

Correct Answer : Option D

126. The correct increasing order of number of electrons around the central atom in the following molecules is

A) $SF_6 < SCl_2 < PF_5$

B) $SCl_2 < PF_5 < SF_6$

C) $PF_5 < SCl_2 < SF_6$

D) $SCl_2 < SF_6 < PF_5$

E) $PF_5 < SF_6 < SCl_2$

Correct Answer : Option B

127. Which of the following molecule has double bond with two л bonds?

A) Ne_2

B) O_2

C) B_2

D) C_2

E) Li_2

Correct Answer : Option D

128. The quantity of heat necessary to raise the temperature of 60 g of metal 'X' from 30˚C to 54˚C is (Molar heat capacity of metal, 'X' is 25 J mol^{-1} K^{-1} and molar mass is 30 g mol^{-1})

A) 1.02 kJ

B) 1.20 kJ

C) 1.25 kJ

D) 2.40 kJ

E) 1.80 kJ

Correct Answer : Option B

129. The ΔG° for the reaction $3X_{(g)} + 2Y_{(g)} \rightarrow 3Z_{(g)}$, at 298 K is ($\Delta H^\circ$ = -13 kJ mol^{-1} and ΔS° = – 45 J $K^{-1}mol^{-1}$)

A) – 0.41 kJ mol^{-1}

B) – 0.21 kJ mol^{-1}

C) +0.41 kJ mol^{-1}

D) – 0.14 kJ mol^{-1}

E) +0.32 kJ mol^{-1}

Correct Answer : Option C

130. For the equilibrium, $2A_{(g)} \leftrightharpoons 2B_{(g)}+C_{(g)}$, the value of the equilibrium constant, K_p is 0.1662 atm at 1000 K. The value of K_c for the equilibrium at the same temperature is (R = 0.0831 lit atm mol^{-1})

A) 1 x 10^{-3} mol lit^{-1}

B) 2 x 10^{-3} mol lit^{-1}

C) 0.4 x 10^{-3} mol lit^{-1}

D) 1.6 x 10^{-3} mol lit^{-1}

E) 0.6 x 10^{-3} mol lit^{-1}

Correct Answer : Option B

131. CO_2 is taken in a closed container at 1500 K and at a pressure of 0.6 bar. When a certain amount of carbon is added to the system at equilibrium some of CO_2 is converted into CO and the equilibrium pressure is 0.9 bar. What is the Kp value at 1500 K for the equilibrium $CO2_{(g)} + C_{(s)} \leftrightharpoons 2CO_{(g)}$?

A) 0.1 bar

B) 0.2 bar

C) 0.3 bar

D) 0.4 bar

E) 0.5 bar

Correct Answer:-Question Cancelled

132. In the reaction, $O_{2(g)} + 4H^+_{(aq)} + 4\ e^- \rightarrow 2H_2O_{(l)}$, the quantity of electricity needed to reduce one mole of gaseous oxygen is (E°cell = 1.23V)

A) 386000 Coulombs

B) 96500 Coulombs

C) 24125 Coulombs

D) 19300 Coulombs

E) 579000 Coulombs

Correct Answer : Option A

133. Which of the following metal is incorporated into the electrodes of fuel cell to increase the rate of reaction?

A) Nickel

B) Zinc

C) Palladium

D) Tin

E) Magnesium

Correct Answer : Option C

134. 3 g of benzoic acid dissolved in 25 g of benzene shows a depression in freezing point equal to 2.5 K. What is the experimental molar mass of benzoic acid in benzene? (Molal depression constant for benzene is 5 K kg mol-^{1}).

A) 122 g mol^{-1}

B) 244 g mol^{-1}

C) 240 g mol^{-1}

D) 242 g mol^{-1}

E) 250 g mol^{-1}

Correct Answer : Option C

135. The rate constant of a reaction at 400 K and 500 K are 0.04 min-1 and 0.08 min-1 respectively. The activation energy of the reaction is about
(2.303 R = 19 J K^{-1} mol^{-1}, log2 = 0.3010)

A) 8.5 kJ

B) 6.5 kJ

C) 10.5 kJ

D) 11.5 kJ

E) 15 kJ

Correct Answer : Option D

136. A reaction is third order with respect to a reactant. If the concentration of the reactant is doubled, the rate of reaction increased by

A) 2 times

B) 3 times

C) 4 times

D) 8 times

E) 5 times

Correct Answer : Option D

137. The correct order of standard electrode potentials of the following transition elements is

A) Cr < V < Fe < Co

B) V < Cr < Fe < Sc

C) Fe < Cr < V < Co

D) Co < V < Cr < Fe

E) Cr < Fe < V < Co

Correct Answer:-Question Cancelled

138. IUPAC name of $[CoCl_2(en)_2]Cl$ is

A) Bis(ethane-1,2-diamine)dichloridocobalt(III)chloride

B) Dichloridobis(ethane-1,2-diamine)cobalt(II)chloride

C) Dichloridobis(ethylenediamine)cobalt(III)chloride

D) Dichloridobis(ethane-1,2-diamine)cobalt(III)chloride

E) Dichloridobis(ethylenediamine)cobalt(II)chloride

Correct Answer : Option D

139. The order of field strength of the following ligands in the spectrochemical series is

A) $NCS^- < CN^- < SCN^- < S^{2-} < OH^-$

B) $NCS^- < OH^- < S^{2-} < NCS^- < CN^-$

C) $CN^- < S^{2-} < OH^- < NCS^- < SCN^-$

D) $SCN^- < S^{2-} < OH^- < NCS^- < CN^-$

E) $SCN^- < S^{2-} < CN- < NCS^- < OH^-$

Correct Answer : Option D

140. The technique used to purify liquids having very high boiling points and decompose at or below their boiling point is

A) steam distillation

B) distillation

C) differential extraction

D) distillation under reduced pressure

E) fractional distillation

Correct Answer : Option D

141. One mole of an alkene on ozonolysis gives one mole of propanal and one mole of pent-3-one. The alkene is

A) 3-ethylpent-2-ene

B) 4-ethylhex-3-ene

C) 2-methylpropene

D) 3-ethylhex-2-ene

E) 3-ethylhexene

Correct Answer:-Question Cancelled

142. The number of possible structural isomers of $C_3H_6Cl_2$ are

A) 3

B) 2

C) 5

D) 4

E) 6

Correct Answer : Option D

143. Match the following:

Compound	**Use**
(a) Methylene chloride	(i) Solvent for iodine
(b) Chloroform	(ii) Manufacture of propellents
(c) Iodoform	(iii) Metal cleaning
(d) Carbon tetrachloride	(iv) Antiseptic

A) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
B) (a)-(i), (b)-(ii), (c)-(iv), (d)-(iii)
C) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
D) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)
E) (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

Correct Answer : Option A

144. The major products formed by heating $C_6H_5CH_2$–O-$C_6H_5$with HI are

A) $C_6H_5CH_2$Iand C_6H_5-CH_2OH
B) $C_6H_5CH_3$ and C_6H_5OH
C) $C_6H_5CH_2$ I and C_6H_6
D) C_6H_5-CH_2OH and C_6H_5I
E) $C_6H_5CH_2I$ and C_6H_5OH

Correct Answer : Option E

145. Match the following reactions with the corresponding reagents

Reactions	**Reagents**
(a) Oxidation of secondary alcohols to ketones	(i) 85% H_3PO_4, 440 K
(b) Dehydration of secondary alcohols to alkenes	(ii) $Na_2Cr_2O_7/H_2SO_4$
(c) Reduction of ketones to secondary alcohols	(iii) Chromic anhydride
(d) Oxidation of phenol to benzoquinone	(iv) $NaBH_4$

A) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
B) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
C) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)
D) (a)-(i), (b)-(iv), (c)-(ii), (d)-(iii)
E) (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

Correct Answer : Option B

146. In aldol condensation reaction, 1, 3-diphenylprop-2-en-1--one is obtained as major product in the reaction between

A) benzaldehyde and benzophenone
B) benzaldehyde and acetophenone
C) propan-2-one and benzaldehyde
D) acetophenone and propan-2-one
E) benzaldehye and butan-2-one

Correct Answer : Option B

147. Which of the following is NOT correctly matched for the compound and use mentioned below?

A) Esters of Benzoic acid - Perfumery
B) Hexanedioic acid - Detergents
C) Ethanoic acid - Food industry

D) Methanoic acid - Electroplating
E) Sodium benzoate - Food preservative

Correct Answer : Option B

148. An aromatic compound ‘A’ on treatment with ethanolic NaCN forms compound ‘B’ which on reduction with H_2/Ni gives a compound ‘C’ of molecular formula, $C_8H_{11}N$. The compounds A, B and C are

A) chlorobenzene, phenylnitrile and 2-phenyl methanamine
B) chlorobenzene, phenylnitrile and 2-phenyl ethanamine
C) chlorobenzene, phenylethane nitrile and 2-phenyl methanamine
D) chlorophenyl methane, phenylethane nitrile and 2-phenyl ethanamine
E) dichlorobenzene, phenylnitrile and 2-phenyl methanamine

Correct Answer : Option D

149. Which of the following amine has lowest pK_b value in aqueous phase?

A) Ethanamine
B) Methanamine
C) N-Methylmethanamine
D) N-Ethylethanamine
E) N, N-Diehtylmethanamine

Correct Answer : Option D

150. The linkage formed between 5’ and 3’ carbon atoms of the pentose sugar in nucleotides is

A) glycosidic
B) phosphomonoester
C) amide
D) peptide
E) phosphodiester

Correct Answer : Option E