

TS EAMCET 2025 Engineering Question Paper May 4 Shift 1

Time Allowed :180 minutes	Maximum Marks :160	Total Questions :160
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The **TS EAMCET 2025 Engineering** examination (May 4 – Shift 1) is conducted in **Computer-Based Test (CBT)** mode.
2. The duration of the test is **3 hours**.
3. The question paper consists of **160 multiple-choice questions (MCQs)** divided into three sections:
 - **Botany – 40 Questions**
 - **Zoology – 40 Questions**
 - **Physics – 40 Questions**
 - **Chemistry – 40 Questions**
4. Each question carries **1 mark**. There is **no negative marking**.
5. The medium of the question paper is **English and Telugu/Urdu (as opted by the candidate)**.
6. Candidates must report at the test center **at least 90 minutes before** the commencement of the examination.
7. Candidates must carry:
 - **TS EAMCET 2025 Hall Ticket**
 - **Filled-in Online Application Form (printout)**
 - **Valid Photo ID Proof** (Aadhaar, Passport, PAN, Driving Licence, etc.)
8. Rough work must be done only on the provided rough sheets. Additional sheets will not be provided.
9. Use of **calculators, mobile phones, smart watches, or any electronic devices** is strictly prohibited.
10. Follow the invigilator's instructions carefully. Any malpractice will result in **disqualification**.

1. If $f(x) = x^2 + bx + c$ and $f(1+k) = f(1-k) \forall k \in \mathbb{R}$, for two real numbers b and c , then

- (A) $f(1) < f(0) < f(-1)$
- (B) $f(-1) < f(0) < f(1)$
- (C) $f(0) < f(-1) < f(1)$
- (D) $f(0) < f(1) < f(-1)$
-

2. The domain of the real valued function $f(x) = \log_5(\sqrt{x^2 + x} + \sqrt{x^2 - x})$ is

- (A) $[-1, 1]$
- (B) $(-\infty, -1] \cup [1, \infty)$
- (C) $(-\infty, \infty)$
- (D) $(0, \infty)$
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3. $t_1, t_2, t_3, \dots, t_n$ are positive integers, $S_n = t_1 + t_2 + t_3 + \dots + t_n$, $S_1 = 1^2$, $S_2 = 3^2$, $S_3 = 6^2$, $S_4 = 10^2$, $S_5 = 15^2$ and similarly other terms are there. Following this pattern, if $S_{10} = k^2$ then $k =$

- (A) 55
- (B) 45
- (C) 36
- (D) 21
-

4. If $x = \alpha, y = \beta, z = \gamma$ is the solution of the system of equations $2x + 3y + z = -1$, $3x + y + z = 4$, $x - 3y - 2z = 1$, then the value of β is

- (A) -2
- (B) -1
- (C) 2

(D) 1

5. The positive value of 'a' for which the system of linear homogeneous equations $x + ay + z = 0$, $ax + 2y - z = 0$, $2x + 3y + z = 0$ has non-trivial solutions is

(A) 0

(B) 1

(C) $\frac{1+\sqrt{5}}{2}$

(D) $\frac{\sqrt{5}-1}{2}$

6. If $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{pmatrix}$, then $|\text{Adj}(A^2)| =$

(A) 9

(B) 27

(C) 729

(D) 81

7. The expression for K is given as a sum of terms up to infinity. Find the value of K.

(A) 1

(B) 2

(C) 3

(D) 4

8. $(\frac{1+i}{1-i})^{228}$
(A) $-4(\frac{1-i}{1+i})^{226}$

- (B) $4\left(\frac{1-i}{1+i}\right)^{226}$
- (C) $\left(\frac{1-i}{1+i}\right)^{228}$
- (D) $-\left(\frac{1-i}{1+i}\right)^{228}$

9. Let $z = x+iy$ represent a point $P(x, y)$ in the Argand plane. If z satisfies the condition that amplitude of $\frac{z-3}{z-2i} = \frac{\pi}{2}$, then the locus of P is

- (A) the circle $x^2 + y^2 - 3x - 2y = 0$
- (B) the arc of the circle $x^2 + y^2 - 3x - 2y = 0$ intercepted by the diameter $2x + 3y - 6 = 0$ containing the origin and excluding the points $(3,0)$ and $(0,2)$
- (C) the arc of the circle $x^2 + y^2 - 3x - 2y = 0$ intercepted by the diameter $2x + 3y - 6 = 0$ not containing the origin and excluding the points $(3,0)$ and $(0,2)$
- (D) the circle $x^2 + y^2 - 3x - 2y = 0$ not containing the point $(0,2)$

10. $(1 - i\sqrt{3})^{2025} =$

- (A) 2^{2025}
- (B) 2^{2026}
- (C) -2^{2025}
- (D) -2^{2026}

11. One of the roots of the equation $(x+1)^4 + 81 = 0$ is

- (A) $3\left(\frac{1+i}{\sqrt{2}}\right)$
- (B) $\frac{-3+\sqrt{2}+3i}{\sqrt{2}}$
- (C) $-\left(\frac{3+\sqrt{2}+i}{\sqrt{2}}\right)$
- (D) $-\left(\frac{3+3i}{\sqrt{2}}\right)$

12. If α, β are the roots of the equation $x^2 + 3x + k = 0$ and $\alpha + 1/\beta, \beta + 1/\alpha$ are the roots of the equation $4x^2 + px + 18 = 0$ then k satisfies the equation

(A) $2x^2 - 13x + 20 = 0$

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

(C) $2x^2 - 7x + 3 = 0$

(D) $x^2 - 8x + 15 = 0$

13. If $f(x)$ is a second degree polynomial such that $f(x) \geq 0 \forall x \in \mathbb{R}$, $f(-3) = 0$ and $f(0) = 18$ then $f(3) =$

(A) 36

(B) 72

(C) 144

(D) 288

14. If one of the roots of the equation $6x^3 - 25x^2 + 2x + 8 = 0$ is an integer and $\alpha > 0$, $\beta < 0$ are the other two roots, then $\frac{4}{\alpha} + \frac{1}{\beta} =$

(A) 0

(B) 1

(C) -2

(D) 4

15. If $\alpha, \beta, \gamma, \delta, \epsilon$ are the roots of the equation $x^5 + x^4 - 13x^3 - 13x^2 + 36x + 36 = 0$ and $\alpha < \beta < \gamma < \delta < \epsilon$ then $\frac{\epsilon}{\alpha} + \frac{\delta}{\beta} + \frac{1}{\gamma} =$

(A) 0

(B) 1

(C) -1

(D) -3

16. 5 boys and 5 girls have to sit around a table. The number of ways in which all of them can sit so that no two boys and no two girls are together is

(A) 14400

(B) 2880

(C) 576

(D) 625

17. All possible words (with or without meaning) that contain the word 'GENTLE' are formed using all the letters of the word 'INTELLIGENCE'. Then the number of words in which the word 'GENTLE' appears among the first nine positions only is

(A) 1440

(B) 5040

(C) 2520

(D) 720

18. ${}^{20}P_3 - {}^{19}P_3 =$

(A) ${}^{19}P_4$

(B) $4({}^{19}P_4)$

(C) $5!(646)$

(D) $6!(646)$

19. If $C_0, C_1, C_2, \dots, C_{10}$ represent the binomial coefficients in the expansion of $(1+x)^{10}$, then $C_0C_6 + C_1C_7 + C_2C_8 + C_3C_9 + C_4C_{10} =$

(A) 9690

(B) 4845

(C) 1615

(D) 3230

20. When $|x| < 1/2$, the coefficient of x^6 in the expansion of $(\frac{2-x^2}{1+2x})^6$ is

(A) 1320

(B) 2640

(C) 1088

(D) 1980

21. If $\frac{x+1}{x^3(x-1)} = \frac{a}{x} + \frac{b}{x^2} + \frac{c}{x^3} + \frac{d}{x-1}$ then

(A) $a = b = c = -d$

(B) $a = b = 2c = -d$

(C) $a = 2b = c = -d$

(D) $a = b = 2c = d$

22. If $\cos \theta + \sin \theta = \sqrt{2} \cos \theta$ and $0 < \theta < \frac{\pi}{2}$, then $\sec(2\theta) + \tan(2\theta) =$

(A) $\cot \theta$

(B) $\tan \theta$

(C) $\cos \theta$

(D) $\sin \theta$

23. If $0 \leq A, B \leq \frac{\pi}{4}$ and $\cot A + \cot B + \tan A + \tan B = \cot A \cot B - \tan A \tan B$ then $\sin(A+B) =$

(A) 0

(B) $\frac{1}{2}$

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

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

24. If the extreme values of the function $f(x) = (2\sqrt{6} + 1)\cos x + (2\sqrt{2} - \sqrt{3})\sin x - 6$ are m and M, then $\sqrt{|M^2 - m^2|} =$

(A) 6

(B) 12

(C) $6\sqrt{2}$

(D) $12\sqrt{3}$

25. Number of solutions of the equation $\tan^2 x + 3\cot^2 x = 2\sec^2 x$ lying in the interval $[0, 2\pi]$ is

(A) 3

(B) 4

(C) 5

(D) 6

26. $\sin^{-1}(-\cos 2) + \cos^{-1}(\sin 3) + \tan^{-1}(\cot 5) =$

(A) 7

(B) 5

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

(D) π

27. If $x = \log_e 3$, then $\tanh(2x) + \operatorname{sech}(2x) =$

(A) $\frac{4}{3}$

(B) $\frac{49}{41}$

(C) $\frac{4}{5}$

(D) $\frac{41}{49}$

28. If $a=3$, $b=5$, $c=7$ are the sides of a triangle ABC, then $\cot A + \cot B + \cot C =$

(A) $\frac{15\sqrt{3}}{4}$

(B) $\frac{7}{\sqrt{3}}$

(C) $\frac{83}{15\sqrt{3}}$

(D) $\frac{83\sqrt{3}}{15}$

29. Let p_1, p_2, p_3 be the altitudes of a triangle ABC drawn through the vertices A, B, C respectively. If $r_1 = 4, r_2 = 6, r_3 = 12$ are the ex-radii of triangle ABC then $\frac{1}{p_1^2} + \frac{1}{p_2^2} + \frac{1}{p_3^2} =$

(A) $\frac{25}{72}$

(B) $\frac{25}{144}$

(C) $\frac{25}{288}$

(D) $\frac{25}{216}$

30. ABCD is a tetrahedron. $\vec{i} - 2\vec{j} + 3\vec{k}$, $-2\vec{i} + \vec{j} + 3\vec{k}$, $3\vec{i} + 2\vec{j} - \vec{k}$ are the position vectors of the points A, B, C respectively. $-\vec{i} + 2\vec{j} - 3\vec{k}$ is the position vector of the centroid of the triangular face BCD. If G is the centroid of the tetrahedron, then $\vec{GD} =$

(A) $\frac{\sqrt{13}}{\sqrt{2}}$

(B) $\sqrt{23}$

(C) $\frac{\sqrt{213}}{\sqrt{2}}$

(D) $\sqrt{46}$

31. If $\vec{a} = \vec{i} - 2\vec{j} + 2\vec{k}$, $\vec{b} = 6\vec{i} + 3\vec{j} - 2\vec{k}$, $\vec{c} = -4\vec{i} + 3\vec{j} + 12\vec{k}$ are three vectors then the value of the expression is...

- (A) 13
- (B) 130
- (C) 6
- (D) $10\sqrt{3}$

32. Let $\vec{a}$ and $\vec{b}$ be two vectors such that $|\vec{a}| = |\vec{b}|$ and $|\vec{a} + 2\vec{b}| = |2\vec{a} - \vec{b}|$. If $\vec{c}$ is a vector parallel to $\vec{a}$ then the angle between $\vec{b}$ and $\vec{c}$ is

- (A) 0°
- (B) 30°
- (C) 60°
- (D) 90°

33. If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}| = |\vec{b}| = \sqrt{6}$ and $\vec{a} \cdot \vec{b} = -1$, then $|\vec{a} \times \vec{b}| \sin(\vec{a}, \vec{b}) =$

- (A) $(|\vec{a}|^2 - 1)(|\vec{b}|^2 + 1)$
- (B) $\frac{1}{6}$
- (C) $(|\vec{a}|^2 - 1)(1 + \frac{1}{|\vec{b}|^2})$
- (D) $\frac{\sqrt{35}}{6}$

34. If the volume of a tetrahedron having $\vec{i} + 2\vec{j} - 3\vec{k}$, $2\vec{i} + \vec{j} - 3\vec{k}$ and $3\vec{i} - \vec{j} + p\vec{k}$ as its coterminous edges is 2, then the values of p are the roots of the equation

- (A) $x^2 + 4x - 12 = 0$
- (B) $x^2 + 8x + 12 = 0$
- (C) $x^2 - 4x - 12 = 0$
- (D) $x^2 - 8x + 12 = 0$

35. The coefficient of variation for the following data is

Class interval తరగతి అంతరం	0-2	2-4	4-6	6-8	8-10
Frequency పౌనఃపున్యం	2	3	5	3	2

(A) $\frac{8\sqrt{22}}{3}$

(B) $\frac{8\sqrt{110}}{\sqrt{3}}$

(C) $\frac{4\sqrt{110}}{\sqrt{3}}$

(D) $\frac{4\sqrt{22}}{3}$

36. If two smallest squares are chosen at random on a chess board then the probability of getting these squares such that they do not have a side in common is

(A) $\frac{1}{18}$

(B) $\frac{5}{36}$

(C) $\frac{17}{18}$

(D) $\frac{7}{36}$

37. Let A and B be two events in a random experiment. If $P(A \cap \bar{B}) = 0.1$, $P(\bar{A} \cap B) = 0.2$ and $P(B) = 0.5$ then $P(A \cap B) =$

(A) 0.6

(B) 0.5

(C) 0.4

(D) 0.3

38. An urn contains 7 red, 5 white and 3 black balls. Three balls are drawn randomly one after the other without replacement. If it is known that first ball drawn is red and the second ball drawn is white, then the probability that the third ball drawn is not red is

(A) $\frac{10}{13}$

(B) $\frac{8}{13}$

(C) $\frac{12}{13}$

(D) $\frac{7}{13}$

39. The range of a discrete random variable X is $\{1, 2, 3\}$ and the probabilities of its elements are given by $P(X = 1) = 3k^3$, $P(X = 2) = 2k^2$ and $P(X = 3) = 7 - 19k$. Then $P(X = 3) =$ (A) $\frac{2}{3}$

(B) $\frac{2}{9}$

(C) $\frac{1}{9}$

(D) $\frac{4}{9}$

40. Among every 8 units of a product, one is likely to be defective. If a consumer has ordered 5 units of that product, then the probability that atmost one unit is defective among them is (A) $\frac{15}{8}(\frac{7}{8})^6$

(B) $\frac{57}{8^8}$

(C) $\frac{36}{8^5}$

(D) $\frac{3}{2}(\frac{7}{8})^4$

41. If $A = (0,1)$, $B = (1,2)$, $C = (-2,1)$ then the equation of the locus of a point P such that area of triangle $PAB =$ area of triangle PAC is

(A) $x^2 - 2xy - 3y^2 + 2x + 6y - 3 = 0$

(B) $x^2 + 2xy - 3y^2 + 2x + 6y - 4 = 0$

(C) $x^2 - 2xy - 3y^2 + 2x - 6y + 4 = 0$

(D) $x^2 - 2xy + 3y^2 - 2x + 6y - 3 = 0$

42. (a,b) are the new coordinates of the point $(2,3)$ after shifting the origin to the point $(3,2)$ by translation of axes. If (c,d) are the new coordinates of the point (a,b) after rotating the axes through an angle $\frac{\pi}{4}$ about the origin in the anti-clockwise direction, then $d-c =$

- (A) 0
 - (B) 1
 - (C) $\sqrt{2}$
 - (D) $2\sqrt{2}$
-

43. The lines $x+y+4=0$, $x-2y-4=0$ and $3x+4y-2=0$

- (A) are concurrent
 - (B) form an isosceles triangle
 - (C) form a right-angled triangle
 - (D) form a scalene triangle
-

44. The area of the triangle formed by the line L with the coordinate axes is 12 sq. units. If L passes through the point $(12,4)$ and the product P of X -intercept of L and square of the Y -intercept of L is negative, then $P =$

- (A) -48
 - (B) -24
 - (C) -192
 - (D) -72
-

45. The area of the quadrilateral formed by the lines $x+2y+3=0$, $2x+4y+9=0$, $x-2y+3=0$ and $3x-6y+11=0$ is

- (A) $\frac{5}{12}$

- (B) $\frac{1}{4}$
(C) $\frac{3}{4}$
(D) $\frac{7}{12}$
-

46. If $(-1,-1)$ is the point of intersection of the pair of lines $2x^2 + 5xy - 3y^2 + 2gx + 2fy + c = 0$ then $g+f=$

- (A) $4c$
(B) $3c$
(C) $2c$
(D) c
-

47. If the length of the chord $2x+3y+k=0$ of the circle $x^2 + y^2 - 2x + 4y - 11 = 0$ is $2\sqrt{3}$, then the sum of all possible values of k is

- (A) 26
(B) 8
(C) 13
(D) 4
-

48. The power of a point $(2,-1)$ with respect to a circle C of radius 4 is 9. The centre of the circle C lies on the line $x+y=0$ and in the 2nd quadrant. If (α, β) is the centre of the circle C , then $\beta - \alpha =$

- (A) -4
(B) -10
(C) 4
(D) 10

49. The angle between the tangents drawn from the point $P(k, 6k)$ to the circle $x^2 + y^2 + 6x - 6y + 2 = 0$ is $2 \tan^{-1}(\frac{4}{3})$. If the coordinates of P are integers, then $k =$

- (A) 1
- (B) 2
- (C) 3
- (D) -2

50. The tangents drawn from a point $(2, -1)$ touch the circle $x^2 + y^2 + 4x - 2y + 1 = 0$ at the points A and B . If C is the centre of the circle, then the area (in sq. units) of the triangle ABC is

- (A) $\frac{4}{5}$
- (B) 4
- (C) 8
- (D) $\frac{8}{5}$

51. If θ is the angle between the circles $x^2 + y^2 - 4x + 2y - 4 = 0$ and $x^2 + y^2 - 2x + 4y - 11 = 0$, then $\sin \theta =$

- (A) $\frac{\sqrt{47}}{24}$
- (B) $\frac{23}{25}$
- (C) $\frac{23}{24}$
- (D) $\frac{\sqrt{3}}{5}$

52. If the line $x + y = 2$ cuts the circle $x^2 + y^2 + 2x - 4y + 4 = 0$ at two points A and B then the radius of the circle passing through A , B and orthogonal to $x^2 + y^2 - 2x - 4y - 4 = 0$ is

- (A) 3
- (B) 4
- (C) 5
- (D) 6

53. A normal chord PQ drawn at a point P on the parabola $y^2 = 5x$ subtends a right angle at the vertex. If P lies in the first quadrant, then the other end Q of the normal chord is

- (A) $(\frac{5}{4}, \frac{5}{2})$
- (B) (5, -5)
- (C) $(10, -5\sqrt{2})$
- (D) $(\frac{5}{2}, \frac{5\sqrt{2}}{2})$

54. If L(p,q), q > 3 is one end of the latus rectum of the parabola $(y - 2)^2 = 3(x - 1)$ then the equation of the tangent at L to this parabola is

- (A) $2x + y - 7 = 0$
- (B) $4x - 4y + 7 = 0$
- (C) $2x - y - 3 = 0$
- (D) $2x - 3y + 7 = 0$

55. If P is any point on the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and S, S' are its foci, then the maximum area (in sq. units) of $\triangle SPS' =$

- (A) 15
- (B) 12
- (C) 6

(D) 25

56. Let e be the eccentricity of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. If $a=5$, $b=4$ and the equation of the normal drawn at one end of the latus rectum that lies in the first quadrant is $lx + my = 27$, then $l+m=$

(A) $\frac{3}{e}$

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

(C) $\frac{6}{e}$

(D) $\frac{1}{e}$

57. If the latus rectum through one of the foci of a hyperbola $\frac{x^2}{9} - \frac{y^2}{b^2} = 1$ subtends a right angle at the farther vertex of the hyperbola, then $b^2 =$

(A) 4

(B) 16

(C) 25

(D) 27

58. The equation of the locus of a point whose distance from XY-plane is twice its distance from Z-axis is

(A) $2x^2 + 2y^2 - z^2 = 0$

(B) $2y^2 + 2z^2 - x^2 = 0$

(C) $4y^2 + 4z^2 - x^2 = 0$

(D) $4x^2 + 4y^2 - z^2 = 0$

59. If α is the angle between any two diagonals of a cube and β is the angle between a diagonal of a cube and a diagonal of its face, which intersects this diagonal of the

cube then $\cos \alpha + \cos^2 \beta =$

- (A) $\frac{5}{9}$
 - (B) $\frac{2}{9}$
 - (C) 1
 - (D) $\frac{2}{3}$
-

60. If the angle between the planes $ax-y+3z=2a$ and $3x+ay+z=3a$ is $\frac{\pi}{3}$ then the direction ratios of the line perpendicular to the plane $(a+2)x+(a-4)y+2az=a$ are

- (A) (2,-1,2)
 - (B) (2,1,-2)
 - (C) (2,1,2)
 - (D) (2,2,-1)
-

61. If $\lim_{x \rightarrow 0} \frac{3x^3 - (1-x^2)^{3/2}}{x^2 \sin x} = p + \log q$ then $pq =$

- (A) $\frac{2}{3}$
 - (B) 2
 - (C) 3
 - (D) -2
-

62. If $[x]$ is the greatest integer function and $f(x) = \begin{cases} \frac{2[x]-x}{|x|} & x \neq 0 \\ 1 & x = 0 \end{cases}$ is a real valued function, then f is

- (A) continuous at $x=0$
- (B) continuous at $x=1$

- (C) left continuous at $x=0$
(D) right continuous at $x=1$
-

63. If $x = 2\sqrt{2}\sqrt{\cos 2\theta}$ and $y = 2\sqrt{2}\sqrt{\sin 2\theta}$, $0 < \theta < \frac{\pi}{4}$ then the value of $\frac{dy}{dx}$ at $\theta = 22\frac{1}{2}^\circ$ is

- (A) 1
(B) -1
(C) 0
(D) $\sqrt{3}$
-

64. The domain of the derivative of the function $f(x) = \cos^{-1}(2x - 5) - \sin^{-1}(x - 2)$ is

- (A) $[2, 3]$
(B) $(-\infty, 2] \cup [3, \infty)$
(C) $(-\infty, 2) \cup (3, \infty)$
(D) $(2, 3)$
-

65. If $y = \tan^2(\cos^{-1} \sqrt{\frac{1+x^2}{2}})$, then $\frac{dy}{dx} =$

- (A) $\frac{4x}{(1-x^2)^2}$
(B) $\frac{4x}{(1+x^2)^2}$
(C) $\frac{-4x}{(1+x^2)^2}$
(D) $\frac{4x}{1+x^2}$
-

66. If $y = x^{\log x} + (\log x)^x$, $x > 1$ then $(\frac{dy}{dx})_{x=e} =$

- (A) 0
- (B) 1
- (C) 2
- (D) 3

67. If the curves $y^2 = 12x - 3$ and $y^2 = 12 - kx$ cut each other orthogonally then the length of the sub tangent at (1,b) on the curve $y^2 = 12 - kx$ is

- (A) 4
- (B) 6
- (C) 5
- (D) 12

68. A rod of length 41 m with an end A on the floor and another end B on the wall perpendicular to the floor is sliding away horizontally from the wall at the rate of 3 ft/min. When the end B is at the height of 9 ft from the floor, then the rate at which the area of the triangle formed by the rod with wall and floor changes at that instant is (in ft/min)

- (A) $\frac{1519}{6}$
- (B) $\frac{1618}{3}$
- (C) $\frac{1600}{3}$
- (D) $\frac{1509}{6}$

69. There is a possible error of 0.02 cm in measuring the base diameter of a right circular cone as 14 cm. If the semi-vertical angle of the cone is 45° , then the approximate error in its volume is (in cu. cm)

- (A) 1.078

- (B) 3.08
 - (C) 1.54
 - (D) 6.16
-

70. The real valued function $f(x) = \frac{x^2}{2} - \log(x^2 + x + 1)$ is

- (A) Strictly decreasing in $(1, \infty)$
 - (B) Strictly increasing in $(1, \infty)$
 - (C) Strictly increasing in $(-\infty, 0)$
 - (D) Strictly decreasing in $(0, \infty)$
-

71. If x and y are two positive real numbers such that $xy=4$ then the minimum value of $\sqrt{x + \frac{y^2}{2}}$ is

- (A) 4
 - (B) $\frac{5}{2}$
 - (C) $2\sqrt{2}$
 - (D) $\sqrt{2}$
-

72. If $\int x^3 \sin(3x)dx = \frac{1}{27}[f(x) \cos(3x) + g(x) \sin(3x)] + c$ then $f(1)+g(1)=$

- (A) 14
 - (B) 6
 - (C) 4
 - (D) 12
-

73. If $I_1 = \int \sin^6 x \, dx$ and $I_2 = \int \cos^6 x \, dx$ then $I_1 + I_2 =$

- (A) $\frac{5x}{8} + \frac{3 \cos 4x}{32} + c$
 - (B) $\frac{1}{32}(20x - 3 \sin 4x) + c$
 - (C) $\frac{1}{32}(20x + 3 \sin 4x) + c$
 - (D) $\frac{5x}{4} + \frac{3 \sin 4x}{16} + c$
-

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

- (A) $x \tan\left(\frac{\pi}{4} + \frac{x}{2}\right) + c$
 - (B) $x \tan\left(\frac{x}{2}\right) + c$
 - (C) $x \cot\left(\frac{x}{2}\right) + c$
 - (D) $x \cot\left(\frac{\pi}{4} + \frac{x}{2}\right) + c$
-

75. $\int \frac{1}{(x+2)\sqrt{x^2+x+2}} dx =$

- (A) $-\frac{1}{2} \sinh^{-1}\left(\frac{2-3x}{\sqrt{7}(x+2)}\right) + c$
 - (B) $-\frac{1}{2} \sin^{-1}\left(\frac{2+3x}{\sqrt{7}(x+2)}\right) + c$
 - (C) $\frac{1}{2} \cosh^{-1}\left(\frac{2+3x}{\sqrt{7}(x+2)}\right) + c$
 - (D) $\frac{1}{2} \cos^{-1}\left(\frac{2-3x}{\sqrt{7}(x+2)}\right) + c$
-

76. $\int_{-1}^5 \frac{1}{\sqrt{20+x-x^2}} dx =$

- (A) $\frac{81\pi}{8}$
- (B) $\frac{9\pi}{2}$
- (C) π
- (D) $\frac{\pi}{10}$

77. $\int_0^{\pi/2} \frac{dx}{\cos x - \sqrt{3} \sin x} =$

(A) 0

(B) $\frac{1}{2} \log(2 - \sqrt{3})$

(C) $\frac{1}{2} \log(2 + \sqrt{3})$

(D) $\frac{1}{2} \log(2\sqrt{3} - 3)$

78. $\int_0^{\pi/2} \sqrt{\tan x} dx =$

(A) $\frac{\pi}{\sqrt{2}}$

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

(C) $\sqrt{2}\pi$

(D) 2π

79. If $y=f(x)$ is the solution of the differential equation $(1 + \cos^2 x)f'(x) - 4 \sin(2x) - f(x) \sin(2x) = 0$ when $f(0)=0$, then $f(\pi/3) =$

(A) 3

(B) $\frac{12}{5}$

(C) $\frac{3}{5}$

(D) 4

80. The differential equation corresponding to the family of ellipses $\frac{x^2}{a^2} + \frac{y^2}{4} = 1$, where 'a' is an arbitrary constant is

(A) $xy \frac{dy}{dx} = 4 - y^2$

(B) $xy \frac{dy}{dx} = 4 - x^2$

(C) $xy \frac{dy}{dx} = x^2 - 4$

(D) $xy \frac{dy}{dx} = y^2 - 4$

81. Match the "Technology" given in List-1 with the "Principle of Physics" given in List-2.

List – 1 (Technology) జాబితా – 1 (సాంకేతిక శాస్త్రం)		List – 2 (Principle of Physics) జాబితా – 2 (భౌతికశాస్త్ర సూత్రము)	
A	Steam engine ఆవిరి యంత్రం	I	Magnetic confinement of plasma ప్లాస్మా అయస్కాంతీయ బంధనం
B	Electron microscope ఎలక్ట్రాన్ సూక్ష్మ దర్శిని	II	Laws of thermodynamics ఉష్ణగతిక శాస్త్ర నియమాలు
C	Non-reflecting coatings అపరావర్తక పూతలు	III	Wave nature of electrons ఎలక్ట్రాన్ల తరంగ స్వభావం
D	Tokamak టోకమాక్	IV	Interference of light కాంతి వ్యతిరేకరణం

(A) A-I, B-II, C-III, D-IV

(B) A-II, B-III, C-IV, D-I

(C) A-II, B-IV, C-III, D-I

(D) A-II, B-I, C-III, D-IV

82. In an experiment, the coefficient of viscosity (in mPa s) of a liquid was determined as 2.62, 2.68, 2.58, 2.57, 2.54 and 2.55. The mean absolute error in the determination of the coefficient of viscosity of the liquid is

(A) 0.08 mPa s

(B) 0.12 mPa s

(C) 0.06 mPa s

(D) 0.04 mPa s

83. The relation between the displacement 'x' (in metre) and the time 't' (in second) of a particle is $t = 2x^2 + 3x$. If the displacement of the particle is 25 cm from the origin (x=0), then the acceleration of the particle is

(A) $+\frac{1}{16}\text{ms}^{-2}$

(B) $-\frac{1}{16}\text{ms}^{-2}$

(C) $+\frac{1}{8}\text{ms}^{-2}$

(D) $-\frac{1}{8}\text{ms}^{-2}$

84. A body projected at certain angle ($\neq 90^\circ$) from the ground crosses a point in its path at a time of 2.3 s and from there it reaches the ground after a time of 5.7 s. The maximum height reached by the body is (Acceleration due to gravity = 10 ms^{-2})

(A) 80 m

(B) 120 m

(C) 40 m

(D) 160 m

85. A circular path of radius 75 m is banked at an angle of $\tan^{-1}(0.2)$. If the coefficient of static friction between the tyres of the car and the circular path is 0.1, then the maximum permissible speed of the car to avoid slipping is

(A) 10 ms^{-1}

(B) 20 ms^{-1}

(C) 15 ms^{-1}

(D) 30 ms^{-1}

86. A horizontal force of 10 N is applied on a block of mass 1.5 kg which is initially at rest on a rough horizontal surface. The work done by the applied force in a time of 6 s from the beginning of the motion is (Acceleration due to gravity = 10 ms^{-2} ; the coefficient of kinetic friction between the block and the surface is 0.2)

(A) 588 J

(B) 360 J

(C) 840 J

(D) 420 J

87. A ball is allowed to fall freely from a height of 42 m from the ground. If the coefficient of restitution between the ball and the ground is 0.4, then the total distance travelled by the ball before it comes to rest is

(A) 84 m

(B) 87 m

(C) 72 m

(D) 58 m

88. A thin uniform wire of mass 'm' and linear density ' ρ ' is bent in the form of a circular ring. The moment of inertia of the ring about a tangent parallel to its diameter is

(A) $\frac{3m^3}{8\pi^2\rho^2}$

(B) $\frac{8m^3}{3\pi^2\rho^2}$

(C) $\frac{8\pi^2m^3}{3\rho^2}$

(D) $\frac{3\pi^2m^3}{8\rho^2}$

89. A solid sphere and a thin uniform circular disc of same radius are rolling down an inclined plane without slipping. If the acceleration of the sphere is 3 ms^{-2} , then the acceleration of the disc is

(A) 4 ms^{-2}

(B) 2.8 ms^{-2}

(C) 3 ms^{-2}

(D) 3.2 ms^{-2}

90. If the amplitudes of a damped harmonic oscillator at times $t=0$, t_1 and t_2 are A_0 , A_1 and A_2 respectively, then the amplitude of the oscillator at a time of (t_1+t_2) is

- (A) $\frac{A_0+A_1+A_2}{3}$
- (B) $\frac{A_2A_0}{A_1}$
- (C) $\frac{A_1A_0}{A_2}$
- (D) $\frac{A_1A_2}{A_0}$

91. A meteor of mass ' m ' having a speed ' v ' at infinity reaches the surface of the earth with a speed of (v_e is escape speed from the earth's surface)

- (A) $\sqrt{2}v_e$
- (B) v_e
- (C) $2\sqrt{v^2 + v_e^2}$
- (D) $\sqrt{v^2 + v_e^2}$

92. The work to be done to produce a strain of 10^{-3} in a steel wire of mass 2.96 kg and density 7.4 gcm^{-3} is (Young's modulus of steel = $2 \times 10^{11} \text{ Nm}^{-2}$)

- (A) 0.04 kJ
- (B) 0.04 J
- (C) 100 kJ
- (D) 400 J

93. A wooden block of outer volume 1 litre and specific gravity $\frac{3}{4}$ having a cavity floats with half of its volume immersed in water. Then the volume of the cavity is

- (A) 250 ml

- (B) 500 ml
 - (C) 333.3 ml
 - (D) 666.6 ml
-

94. When 'n' identical mercury drops combine to form a single big drop

- (A) Surface area increases and heat is released
 - (B) Surface area decreases and heat is released
 - (C) Surface area increases and heat is absorbed
 - (D) Surface area decreases and heat is absorbed
-

95. The temperature of a body shown by a faulty Celsius thermometer is 49°C and by a correct Fahrenheit thermometer is 122°F . The correction to be applied to the faulty thermometer is

- (A) -12°C
 - (B) $+1^{\circ}\text{C}$
 - (C) $+12^{\circ}\text{C}$
 - (D) -1°C
-

96. If the radiation emitted by a perfect radiator has maximum intensity at a wavelength of $2900\text{ \AA}$, the intensity of radiation emitted by it is (Stefan-Boltzmann's constant $= 5.67 \times 10^{-8}\text{ Wm}^{-2}\text{K}^{-4}$ and Wein's constant $= 2.9 \times 10^{-3}\text{ mK}$)

- (A) $5.67 \times 10^8\text{ Wm}^{-2}$
- (B) 5.67 Wm^{-2}
- (C) 5670 Wm^{-2}
- (D) 2.9 Wm^{-2}

97. The ratio of the work done, change in internal energy and heat absorbed when a diatomic gas expands at constant pressure is

- (A) 2:3:5
- (B) 7:5:2
- (C) 5:3:2
- (D) 2:5:7

98. If the temperature of a gas is increased from 127 °C to 527 °C, then the rms speed of the gas molecules

- (A) increases by 4 times
- (B) becomes $\sqrt{2}$ times
- (C) becomes half
- (D) decreases by $\sqrt{2}$ times

99. An air column in a tube of length 50 cm, closed at one end is vibrating in its fifth harmonic. The phase difference between a particle at the open end and a particle at 42 cm from the open end is

- (A) 90°
- (B) 180°
- (C) 0°
- (D) 270°

100. A metal rod of length 125 cm is clamped at its midpoint. If the speed of the sound in the metal is 5000ms^{-1} , then the fundamental frequency of the longitudinal vibrations of the rod is

- (A) 2 kHz
 - (B) 20 kHz
 - (C) 0.2 kHz
 - (D) 200 kHz
-

101. If the distances of the object and its real image from the principal focus of a concave mirror are 16 cm and 9 cm respectively, then the focal length of the mirror is

- (A) 30 cm
 - (B) 12 cm
 - (C) 18 cm
 - (D) 24 cm
-

102. If the angle of minimum deviation produced by an equilateral prism is equal to the angle of the prism, then the refractive index of the material of the prism is nearly

- (A) 1.515
 - (B) 1.414
 - (C) 1.732
 - (D) 1.625
-

103. When two light waves of equal intensity superimpose, the maximum intensity obtained is I . If the intensity of one of the waves is quadrupled, then the maximum intensity obtained is

- (A) $\frac{4I}{9}$
- (B) $\frac{9I}{4}$

(C) $\frac{2I}{3}$

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

104. The electric field due to an infinitely long thin straight wire with uniform linear charge density of $2.5 \times 10^{-7} \text{ Cm}^{-1}$ at a radial distance of x from the wire is $7.5 \times 10^4 \text{ NC}^{-1}$. Then $x =$

(A) 2 cm

(B) 3 cm

(C) 4 cm

(D) 6 cm

105. A parallel plate capacitor of capacitance $10 \mu\text{F}$ is charged by a 220 V supply. The capacitor is then disconnected from the supply and is connected to another uncharged parallel plate capacitor of capacitance $12 \mu\text{F}$. The loss of electrostatic energy in this process is

(A) 132 mJ

(B) 220 mJ

(C) 66 mJ

(D) 110 mJ

106. The lengths of two wires made of the same material are in the ratio 2:3 and their radii are in the ratio 1:2. If the two wires are connected in parallel to a battery, then the ratio of the drift velocities of free electrons in the two wires is

(A) 2:1

(B) 3:1

(C) 3:2

(D) 3:4

107. In a potentiometer experiment for the determination of the internal resistance of a cell, when an external resistance of R is connected parallel to the cell, the balancing length decreases by 10%. The internal resistance of the cell is

(A) $R/9$

(B) $R/7$

(C) $R/5$

(D) $R/11$

108. The number of turns of two circular coils A and B are 300 and 200 respectively. The magnetic moments of the two coils A and B are in the ratio 1:2. If the two coils carry equal currents, then the ratio of radii of coils A and B is

(A) $2:\sqrt{3}$

(B) 2:3

(C) 1:2

(D) $1:\sqrt{3}$

109. Two long straight parallel wires carry currents of 8 A and 10 A in opposite directions. If the distance of separation between the wires is 9 cm, then the net magnetic field at a point between the two wires, which is at a perpendicular distance of 4 cm from the wire carrying 8 A current is

(A) Zero

(B) 4×10^{-5} T

(C) 8×10^{-5} T

(D) 12×10^{-5} T

110. A short bar magnet of magnetic moment 2.5 Am^2 is kept in a uniform magnetic field of $4 \times 10^{-5} \text{ T}$. The work done in moving the magnet from its most stable position to most unstable position is

- (A) $40 \times 10^{-5} \text{ J}$
 - (B) $25 \times 10^{-5} \text{ J}$
 - (C) $10 \times 10^{-5} \text{ J}$
 - (D) $20 \times 10^{-5} \text{ J}$
-

111. The radius of a coil of N turns is R . If the plane of the coil is placed parallel to a uniform magnetic field B , then the flux linked with the coil is

- (A) πBNR^2
 - (B) $2\pi BNR^2$
 - (C) $\frac{\pi BNR^2}{2}$
 - (D) Zero
-

112. The inductance L , Capacitance C and resistance R are the values of the components connected in series to an ac source of angular frequency ω . The inductive and capacitive reactances are X_L and X_C respectively. If the circuit is purely resistive, then

- (A) $L = C$
 - (B) $X_L = X_C$
 - (C) $\omega L = \omega C$
 - (D) $R = L = C$
-

113. If the rate of change of electric field across the plates of a parallel plate capacitor is E and the displacement current is I , then the area of one plate of the capacitor is (ϵ_0 is permittivity of free space)

(A) $\frac{I}{2\epsilon_0 E}$

(B) $\frac{2I}{\epsilon_0 E}$

(C) $I\epsilon_0 E$

(D) $\frac{I}{\epsilon_0 E}$

114. The work done to accelerate an electron from rest so that it can have a de Broglie wavelength of $6600 \text{ \AA}$ is nearly (Planck's constant = $6.6 \times 10^{-34} \text{ Js}$ and mass of electron = $9 \times 10^{-31} \text{ kg}$)

(A) $5.56 \times 10^{-25} \text{ eV}$

(B) 1.88 eV

(C) $5.56 \times 10^{-25} \text{ J}$

(D) 1.88 J

115. If the total energy of an electron in an orbit is positive, then

(A) electron will revolve in a circular orbit

(B) electron will revolve in an elliptical orbit

(C) electron will not follow a closed orbit

(D) electron will fall into the nucleus

116. If 87.5% of atoms of a radioactive element decay in 6 days, then the fraction of atoms of the element that decay in 8 days is

(A) $\frac{1}{8}$

(B) $\frac{7}{8}$

(C) $\frac{1}{16}$

(D) $\frac{15}{16}$

117. If the ratio of the mass numbers of two nuclei is 27:125, then the ratio of their surface areas is

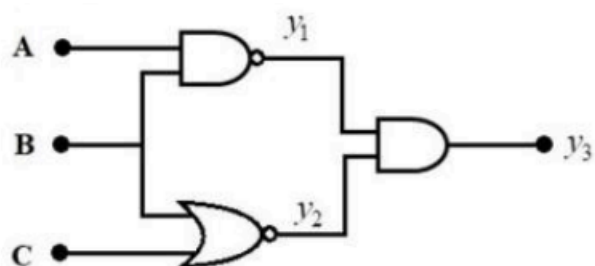
(A) 3:5

(B) 9:25

(C) 27:125

(D) 1:1

118. At absolute zero temperature, a semiconductor behaves like



(A) semiconductor

(B) superconductor

(C) conductor

(D) insulator

119. Three logic gates are connected as shown in the figure. If the inputs are $A=1$, $B=0$ and $C=1$, then the values of y_1 , y_2 and y_3 respectively are

(A) 1,0,0

(B) 0,1,0

(C) 1,1,0

(D) 1,0,1

120. The radio horizon of a transmitting antenna of height 39.2 m is (Radius of the earth = 6400 km)

(A) 44.8 km

(B) 19.6 km

(C) 22.4 km

(D) 78.4 km

121. The radius of second orbit of hydrogen atom is same as that of orbit (n) of an ion (x). n and x are respectively

(A) 4, Be^{2+}

(B) 3, Li^{2+}

(C) 4, Be^{3+}

(D) 2, He^+

122. An electromagnetic radiation of wavelength 331.5 nm is made to strike the surface of a metal. Electrons are emitted with a kinetic energy of $1.2 \times 10^5 \text{ J mol}^{-1}$. The work function (in eV) of the metal is ($h=6.63 \times 10^{-34} \text{ Js}$, $N_A = 6 \times 10^{23} \text{ mol}^{-1}$)

(A) 1.5

(B) 3.0

(C) 3.5

(D) 2.5

123. Match the following

	List-1 (Element)		List-2 (Block)
A	Cd	I	f-block
B	Eu	II	s-block
C	Se	III	d-block
D	Ba	IV	p-block

(A) A-IV, B-III, C-II, D-I

(B) A-II, B-IV, C-I, D-III

(C) A-III, B-IV, C-II, D-I

(D) A-III, B-I, C-IV, D-II

124. In long form of periodic table an element 'E' has atomic number 78. The period and group number of the element are x and y respectively. (x+y) is equal to

(A) 18

(B) 15

(C) 17

(D) 16

125. In which of the following options, the molecules are correctly arranged in the increasing order of their bond angles?

(A) $\text{NH}_3 < \text{O}_3 < \text{H}_2\text{O} < \text{SO}_2$

(B) $\text{H}_2\text{O} < \text{O}_3 < \text{NH}_3 < \text{SO}_2$

(C) $\text{H}_2\text{O} < \text{NH}_3 < \text{SO}_2 < \text{O}_3$

(D) $\text{H}_2\text{O} < \text{NH}_3 < \text{O}_3 < \text{SO}_2$

126. In which of the following, the compounds are correctly arranged in the decreasing order of boiling points?

- (A) $\text{HF} > \text{H}_2\text{O} > \text{NH}_3 > \text{PH}_3$
- (B) $\text{H}_2\text{O} > \text{HF} > \text{NH}_3 > \text{PH}_3$
- (C) $\text{H}_2\text{O} > \text{HF} > \text{PH}_3 > \text{NH}_3$
- (D) $\text{HF} > \text{NH}_3 > \text{H}_2\text{O} > \text{PH}_3$
-

127. The force (F) required to maintain the flow of layers of a liquid is equal to (A = area of contact of layers, dz = distance between the layers, du = change in velocity, η = coefficient of viscosity)

- (A) $\eta \frac{du}{dz} \frac{1}{A}$
- (B) $\eta \frac{dz}{du} A$
- (C) $\eta A \frac{du}{dz}$
- (D) $\eta \frac{dz}{A} \frac{1}{du}$
-

128. Consider the following redox reaction in basic medium. $x\text{Cr}(\text{OH})_3 + y(\text{IO}_3)^- + z(\text{OH})^- \rightarrow a(\text{CrO}_4)^{2-} + b(\text{I})^- + c(\text{H}_2\text{O})$. The incorrect option about it is

- (A) $x+y=3$
- (B) $a+b=7$
- (C) $z=4$
- (D) $b=1$
-

129. The entropy and enthalpy changes for the reaction $\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$ at 300 K and 1 atm are respectively -42.4 JK^{-1} and -41.2 kJ . The temperature at which the reaction will go in the reverse direction is

- (A) 761.8 K
- (B) 671.8 K

(C) 961.8 K

(D) 971.8 K

130. The volume of water required to dissolve 0.1 g PbCl_2 to get a saturated solution (in mL) is (Given $K_{sp}(\text{PbCl}_2) = 3.2 \times 10^{-8}$; Atomic mass of Pb = 207u)

(A) 150

(B) 100

(C) 120

(D) 180

131. 1 mL of "x volume" H_2O_2 solution on heating gives 20 mL of oxygen gas at STP. The (w/v) % corresponding to "x volume" of H_2O_2 is

(A) 3.03

(B) 6.06

(C) 9.09

(D) 30.3

132. Identify the correct statements from the following

I. LiF is less soluble in water than NaF

II. Both LiCl and MgCl_2 are insoluble in ethanol

III. Both Li and Mg form nitrides

IV. Na_2CO_3 gives CO_2 on heating

(A) I IV

(B) I III

(C) I II

(D) II III

133. The major ingredient (51%) in Portland cement is

- (A) Ca_2SiO_4
- (B) Ca_3SiO_5
- (C) $\text{Ca}_3\text{Al}_2\text{O}_6$
- (D) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

134. Boron trifluoride on reaction with lithium aluminium hydride in ether gives LiF , AlF_3 and X. X on reaction with NH_3 gives Y. Y on further heating gives a compound Z. The number of σ -bonds and π -bonds in Z are x and y respectively. (x+y) is equal to

- (A) 15
- (B) 12
- (C) 14
- (D) 18

135. Consider the following sequence of reactions. $2\text{CH}_3\text{Cl} + \text{Si} \xrightarrow[573 \text{ K}]{\text{Cu}} \text{X} \xrightarrow{\text{H}_2\text{O}} \text{Y} \xrightarrow{\text{Polymerization}} \text{Z}$. The repeating structural unit in Z is

- (A) $-\text{[O} - \text{CH}_3\text{Si(O-)]}-$
- (B) $-\text{[(CH}_3)_2\text{Si-O]}-$
- (C) $-\text{[O} - \text{Si(CH}_3\text{)-O]}-$ with another CH_3 attached to Si
- (D) $-\text{[CH}_2 - \text{Si(CH}_3\text{)-O]}-$ with another CH_3 attached to Si

136. Which of the following is not the common component of photochemical smog?

- (A) Ozone

- (B) Formaldehyde
 - (C) Acrolein
 - (D) Sulphur dioxide
-

137. Identify the compound (Z) in the following reaction sequence

- (A) Propanal
 - (B) Propanone
 - (C) Propanoic acid
 - (D) Propanamide
-

138. The correct IUPAC name of the following compound is

- (A) 5-Amino-4-hydroxy-1-bromo-1-cyanopentan-4-ol
 - (B) 1-Amino-6-bromo-3-hydroxy-4-oxopentanenitrile
 - (C) 6-Amino-2-bromo-5-hydroxy-3-oxohexanenitrile
 - (D) 6-Amino-2-bromo-5-hydroxy-3-oxopentanenitrile
-

139. Which purification method is generally used for a high boiling organic liquid compound, which decompose below its boiling point?

- (A) Distillation
 - (B) Distillation under reduced pressure
 - (C) Steam distillation
 - (D) Fractional distillation
-

140. Match the following

List – 1 (Reaction) జాబితా – 1 (చర్య)		List – 2 (Major product) జాబితా – 2 (ప్రధాన ఉత్పన్నం)	
A	$\text{CH}_3 - \text{C} \equiv \text{CH} \xrightarrow[\text{333K}]{\text{H}_2\text{O}, \text{Hg}^{2+}/\text{H}^+}$	I	$\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$
B	$\text{CH}_3\text{COONa} \xrightarrow[\text{విద్యుద్విశ్లేషణ}]{\text{H}_2\text{O}, \text{Pt}, \text{electrolysis}}$	II	$\text{CH}_3 - \underset{\text{O}}{\text{C}} - \text{CH}_3$
C	$\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow{\text{H}_2\text{O}/\text{H}^+}$	III	$\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \underset{\text{OH}}{\text{CH}_2}$
D	$\text{CH}_3 - \text{CH} = \text{CH}_2 \xrightarrow[\text{273K}]{\text{H}_2\text{O}, \text{dil KMnO}_4}$	IV	$\text{CH}_3 - \text{CH}_3$
		V	CH_4

(A) A-II, B-IV, C-I, D-III

(B) A-II, B-V, C-I, D-III

(C) A-III, B-IV, C-II, D-I

(D) A-II, B-III, C-IV, D-I

141. Sodium metal crystallises in a body centred cubic lattice with edge length of x Å. If the radius of sodium atom is 1.86 Å, the value of x is

(A) 4.29

(B) 3.29

(C) 2.39

(D) 3.93

142. In a mixture of liquids A and B, if the mole fractions of component A in vapour phase and liquid mixture are x_1 and x_2 respectively, then the total vapour pressure of liquid mixture is (where P_A^0 and P_B^0 are the vapour pressures of pure A and B)

(A) $\frac{P_B^0 x_1}{x_2}$

(B) $\frac{P_B^0 x_2}{x_1}$

(C) $\frac{P_A^0 x_2}{x_1}$

(D) $\frac{P_A^0 x_1}{x_2}$

143. A current of 0.5 ampere is passed through molten AlCl_3 for 96.5 seconds. The mass of aluminium deposited at cathode is x mg and volume of chlorine liberated (at STP) at anode is y mL. x and y are respectively

- (A) 18.0, 22.4
- (B) 13.5, 16.8
- (C) 9.0, 11.2
- (D) 4.5, 5.6

144. $\text{R} \rightarrow \text{P}$ is a first order reaction. For this reaction a graph of $\ln[\text{R}]$ (on y-axis) and time (on x-axis) gave a straight line with negative slope. The intercept on y-axis is equal to (k=rate constant)

- (A) $\ln[\text{R}]_0$
- (B) $[\text{R}]_0$
- (C) $k \times 2.303$
- (D) $\frac{k}{2.303}$

145. The correct statements about the properties of colloidal solutions are

- A. Tyndall effect is used to distinguish between a colloidal solution and a true solution
- B. Zeta potential is related to movement of colloidal particles
- C. Brownian motion in colloidal solution is faster if the viscosity of the solution is very high
- D. Brownian motion stabilises the sols

- (A) A B
- (B) B C
- (C) A D
- (D) B D

146. The ore of which metal is concentrated by leaching?

- (A) Zn
- (B) Cu
- (C) Al
- (D) Fe

147. Arrange the following molecules in the correct order of their bond angles: S_8 , P_4 , S_6 , O_3

- (A) A > C > D > B
- (B) B > A > C > D
- (C) C > B > A > D
- (D) B > C > A > D

148. What are the products formed when ammonium dichromate is thermally decomposed?

- (A) NO_2 , Cr_2O_3 , H_2
- (B) N_2O , Cr_2O_3 , H_2O
- (C) N_2 , CrO_3 , H_2O
- (D) N_2 , Cr_2O_3 , H_2O

149. Sulphur dioxide on reaction with chlorine in the presence of charcoal gives compound (A). This on reaction with white phosphorus gives SO_2 and compound (B). The correct statement about 'B' is

- (A) The shape of 'B' is pyramidal

- (B) 'B' on hydrolysis gives phosphorus acid
- (C) 'B' in solid state exists as an ionic solid
- (D) In 'B' all bonds are equivalent
-

150. In which of the following transition metal ion (aquated) is not correctly matched with its colour?

- (A) Fe^{2+} - Green
- (B) Cu^{2+} - Blue
- (C) Fe^{3+} - Pink
- (D) V^{3+} - Green
-

151. Which one of the following complex ions is diamagnetic in nature?

- (A) $[\text{CoF}_6]^{3-}$
- (B) $[\text{Co}(\text{ox})_3]^{3-}$
- (C) $[\text{Mn}(\text{CN})_6]^{3-}$
- (D) $[\text{Fe}(\text{CN})_6]^{3-}$
-

152. Polymer X is an example of polyester and Y is an example of polyamide. X and Y are respectively

- (A) Novolac, Terylene
- (B) Dacron, Nylon 6,6
- (C) Nylon 6, Terylene
- (D) Teflon, Terylene
-

153. The general structure of alpha amino acid can be represented as $\text{H}_2\text{N}-\text{CH}(\text{R})-\text{CO}_2\text{H}$. Which amino acid is not correctly matched with R-given?

- (A) $\text{R} = -\text{CH}_2-\text{C}_6\text{H}_4-\text{OH}(\text{p})$ - (Tyrosine)
 - (B) $\text{R} = -\text{CH}_2-\text{SH}$ - (Cysteine)
 - (C) $\text{R} = -\text{CH}_2-\text{CH}_2-\text{S}-\text{CH}_3$ - (Serine)
 - (D) $\text{R} = -\text{CH}_2-\text{C}(=\text{O})-\text{NH}_2$ - (Asparagine)
-

154. Consider the following

Assertion (A): Aspirin is useful in the prevention of heart attacks

Reason (R): Aspirin acts as anti-blood clotting agent

The correct answer is

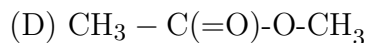
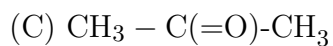
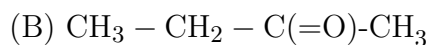
- (A) Both A and R are correct and R is the correct explanation of A
 - (B) Both A and R are correct and R is not the correct explanation of A
 - (C) A is correct and R is not correct
 - (D) A is incorrect and R is correct
-

155. Chlorobenzene when subjected to Fittig reaction gives a compound 'X'. The sum of σ and π -bonds in X is

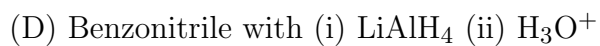
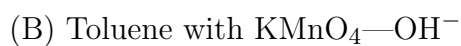
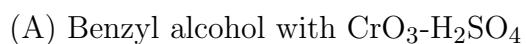
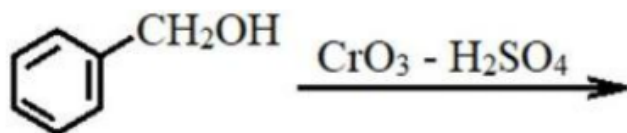
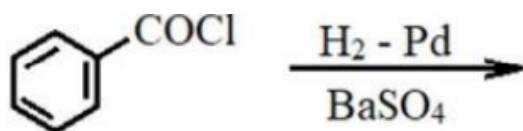
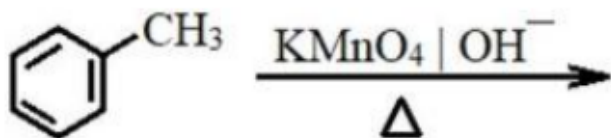
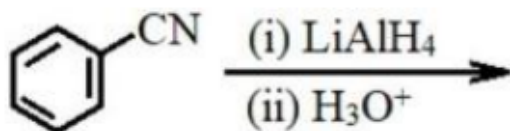
- (A) 30
 - (B) 28
 - (C) 18
 - (D) 29
-

156. Cumene on oxidation in air gives a compound, X. This on reaction with dilute acid gives Y and Z. Y reacts with sodium metal and not Z. What is Z?

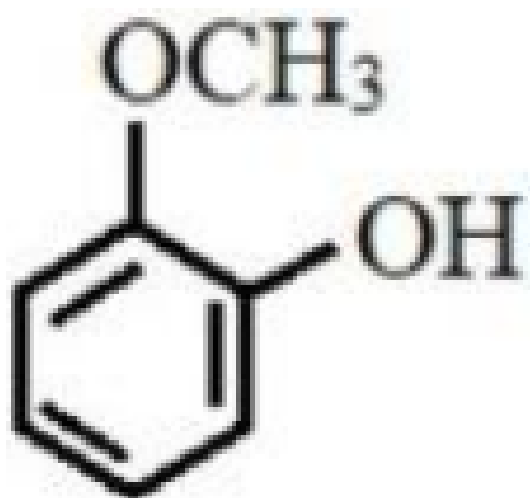
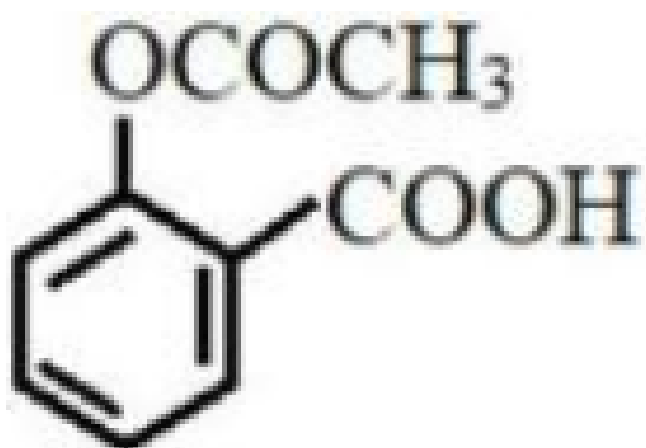
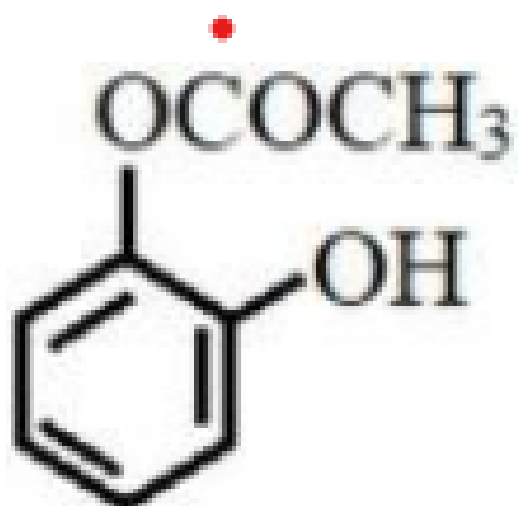
- (A) $\text{CH}_3 - \text{C}(=\text{O})-\text{H}$



157. The reaction of benzene with CO and HCl in the presence of anhydrous AlCl_3 gives a compound X. X can also be obtained from which of the following reaction?

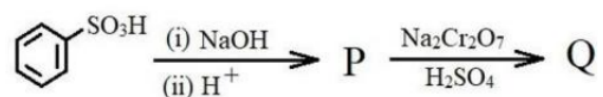


158. What is the product 'Z' in the given sequence of reactions?



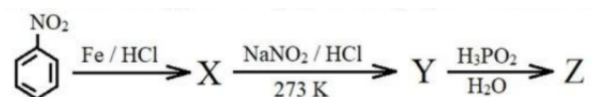
- (A) A phenyl ether with an ortho -OH group
 - (B) A phenyl ether with an ortho -COOH group
 - (C) A phenyl ether with a meta -OH group
 - (D) A phenyl ether with a para -OH group
-

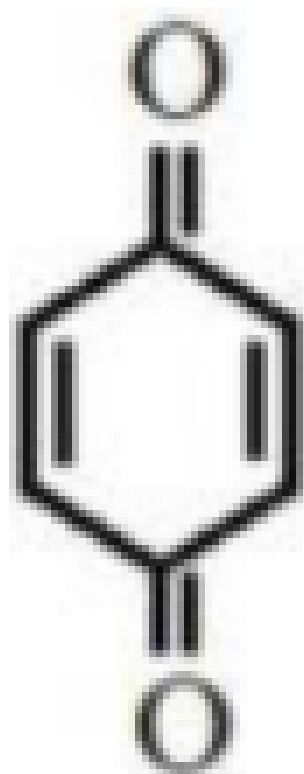
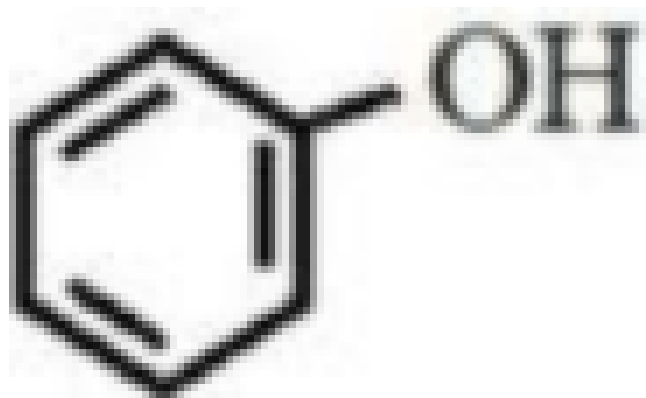
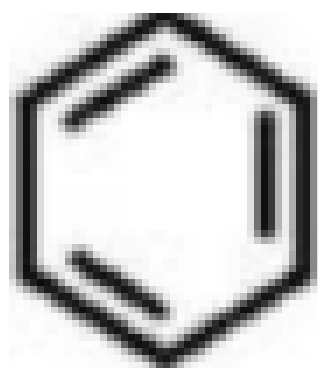
159. The ratio of σ bonds to π bonds in Q is



- (A) 3:1
 - (B) 1:3
 - (C) 4:1
 - (D) 2:1
-

160. What is the major product 'Z' in the given reaction sequence?





- (A) Benzene
 - (B) Phenol
 - (C) p-benzoquinone
 - (D) Chlorophenol
-