

TEST SERIES

PAPER-I

Time : 3 hrs.

M.M.: 180

TEST CODE - A

TOPIC COVERED :

PHYSICS: Complete XI and XII Syllabus

CHEMISTRY: Complete XI and XII Syllabus

MATHEMATICS: Complete XI and XII Syllabus

ATTENTION: Kindly ask for the Roll No. from the invigilator to fill in OMR SHEET. Mark the Roll No. & Test code on the answer sheet properly. (No other sheet will be issued)

GENERAL INSTRUCTIONS :

1. The Test Paper consists of **60** questions
2. There are **Three Subjects (Physics, Chemistry & Mathematics)** in the question paper.
3. **This paper is divided into 2 parts: Physics Section (I), (II); Chemistry Section (I), (II) and Mathematics Section (I) & (II).**
 - **Multiple correct answer type questions : Physics Section (I) (1 to 10) Chemistry Section I (11 to 20) and Mathematics Section I (21 to 30), 3 marks for each correct answer and no negative marking for incorrect answer.**
 - **Integer Type: Physics Section-II (1 to 10); Chemistry Section-II (11 to 20) and Mathematics Section- II (21 to 30), 3 marks for each correct answer and no negative marking for incorrect answer.**

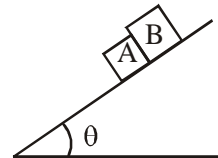
PHYSICS

SECTION- I: MULTIPLE CORRECT ANSWERS TYPE

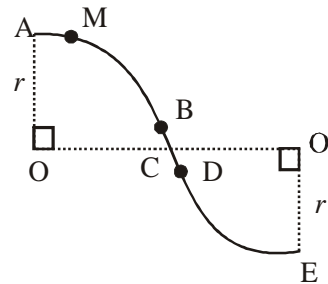
This section contains **10** multiple choice questions numbered **1** to **10**. Each question has **4** choice (A), (B), (C) and (D), out of which **ONE OR MORE** is/are correct

1. The two blocks A and B of equal mass are initially in contact when released from rest on the inclined plane. The coefficients of friction between the inclined plane and A and B are μ_1 and μ_2 respectively

- (a) If $\mu_1 > \mu_2$, the blocks will always remain in contact
- (b) If $\mu_1 < \mu_2$, the blocks will slide down with different accelerations
- (c) If $\mu_1 > \mu_2$, the blocks will have a common acceleration $\frac{1}{2}(\mu_1 + \mu_2)g \sin \theta$
- (d) If $\mu_1 < \mu_2$, the blocks will have a common acceleration $\frac{\mu_1 \mu_2 g}{\mu_1 + \mu_2} \sin \theta$



2. ABCDE is a smooth iron track in the vertical plane. The sections ABC and CDE are quarter circles. Points B and D are very close to C. M is a small magnet of mass m . The force of attraction between M and the track is F , which is constant and always normal to the track. M starts from rest at A.



- (a) If M is not leave the track at C then $C \geq 3mg$
 (b) At B, the normal reaction of the track is $F - 3mg$
 (c) At D, the normal reaction of the track is $F + 3mg$
 (d) none of these

3. A metal wire of length L , area of cross-section A and Young's modulus Y is stretched by a variable force F such that F is always slightly greater than the elastic forces of resistance in the wire. When the elongation of the wire is l ,

- (a) the work done by F is $\frac{YAl^2}{2L}$
 (b) the work done by F is $\frac{YAl^2}{L}$
 (c) the elastic potential energy stored in the wire is $\frac{YAl^2}{2L}$
 (d) no heat is produced during the elongation

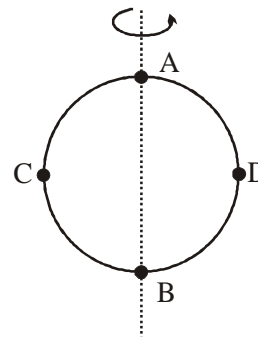
4. For an ideal gas,

- (a) the change in internal energy in a constant pressure process from temperature T_1 to T_2 is equal to $nC_v(T_2 - T_1)$, where C_v is the molar heat capacity at constant volume and n is the number of moles of the gas
 (b) the change in internal energy of the gas and the work done by the gas are equal in magnitude in an adiabatic process
 (c) the internal energy does not change in an isothermal process
 (d) no heat is added or removed in an adiabatic process

5. A string of length L is stretched along the x -axis and is rigidly clamped at its two ends. It undergoes transverse vibration. If n is an integer, which of the following relations may represent the shape of the string at any time t ?

- (a) $y = A \sin\left(\frac{n\pi x}{L}\right) \cos \omega t$ (b) $y = A \sin\left(\frac{n\pi x}{L}\right) \sin \omega t$
 (c) $y = A \cos\left(\frac{n\pi x}{L}\right) \cos \omega t$ (d) $y = A \cos\left(\frac{n\pi x}{L}\right) \sin \omega t$

6. Assume that the sun rotates about an axis through its centre and perpendicular to the plane of rotation of the earth about the sun. The appearance of the sun, from any one point on the earth, is shown. Light belonging to a particular spectral line, as received from the point A, B, C and D on the edge of the sun, are analyzed.



- (a) Light from all four points have the same wavelength
 (b) Light from C has greater wavelength than the light from D
 (c) Light from D has greater wavelength than the light from C
 (d) Light from A has the same wavelength as the light from B.
7. A converging lens of focal length f_1 is placed in front of ; coaxially with a convex mirror of focal length f_2 . Their separation is d . A parallel beam of light incident on the lens returns as a parallel beam from the arrangement.
- (a) The beam diameters of the incident and reflected beams must be the same
 (b) $d = f_1 - 2|f_2|$
 (c) $d = f_1 - |f_2|$
 (d) If the entire arrangement is immersed in water, the conditions will remains unaltered.
8. Current flows through a straight cylindrical conductor of radius r . The current is distributed uniformly over its cross-section. The magnetic field at a distances x from the axis of the conductor has magnitude B.
- (a) $B = 0$ at the axis (b) $B \propto x$ for $0 \leq x \leq r$ (c) $B \propto \frac{1}{x}$ for $x > r$ (d) B is maximum for $x = r$.
9. When an electron moving at a high speed strikes a metal surface, which of the following are possible?
- (a) The entire energy of the electron may be converted into an X-ray photon
 (b) Any fraction of the energy of the electron may be converted into an X-ray photon.
 (c) The entire energy of the electron may get converted to heat
 (d) The electron may undergo elastic collision with the metal surface.
10. A particle moves in the xy plane with a constant acceleration g in the negative y-direction. Its equation of motion is $y = ax - bx^2$, where a and b are constants. Which of the following are correct?
- (a) The x-components of its velocity is constant
 (b) At the origin, the y-components of its velocity is $a\sqrt{\frac{g}{2b}}$
 (c) At the origin, its velocity makes an angle $\tan^{-1}a$ with the x-axis
 (d) The particle moves exactly like a projectile.

SECTION- I: MULTIPLE CORRECT ANSWERS TYPE

This section contains 10 multiple choice questions numbered 11 to 20. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

11. Which statement are correct for the cell: $\text{Pt}|\text{M}(\text{Hg})||\text{M}^{n+}(\text{aq})||\text{M}$

(a) $E_{\text{cell}}^{\circ} = E_{\text{M}^{n+}|\text{M}}^{\circ} - E_{\text{M}^{n+}|\text{M}(\text{Hg})\text{Pt}}^{\circ}$

(b) $E_{\text{M}(\text{Hg})|\text{M}^{n+}} = E_{\text{M}(\text{Hg})|\text{M}^{n+}}^{\circ} - \frac{RT}{nF} \log[\text{M}^{n+}]$

(c) $E_{\text{cell}} = E_{\text{M}^{n+}|\text{M}} - E_{\text{M}^{n+}|\text{M}(\text{Hg})\text{Pt}}$

(d) $E_{\text{M}^{n+}|\text{M}} = E_{\text{M}^{n+}|\text{M}}^{\circ} + \frac{RT}{nF} \log[\text{M}^{n+}]$

12. Which of the following compounds do not evolve Ammonia on heating?



13. Which are correct statements about HF?

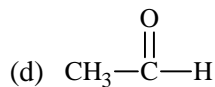
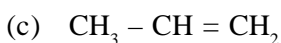
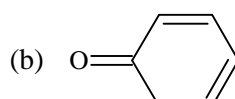
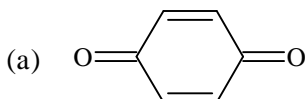
(a) It is a non aqueous solvent showing self ionisation as $2\text{HF} \rightleftharpoons [\text{H}_2\text{F}]^+ + \text{F}^-$

(b) All mineral acids acts as proton acceptors in HF

(c) Fluoride acceptor acids such as SbF_5 , BF_3 , etc., acts as acid in HF

(d) Perchloric acid acts as proton acceptor in HF

14. Which of the following do not show Tautomerism?



15. Select the correct statements:

(a) The pH of a mixture of two weak acids is independent of their concentration

(b) The pH of an amphiprotic salt say NaHS is independent of its concentration

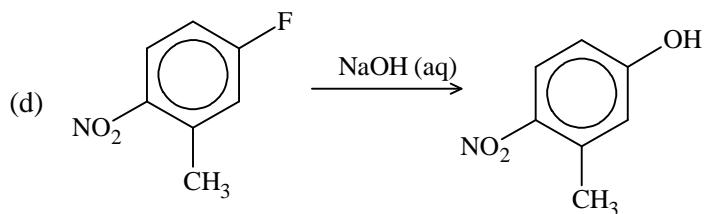
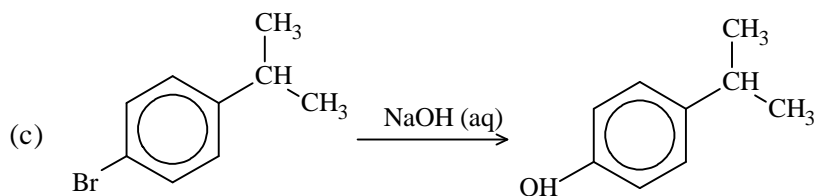
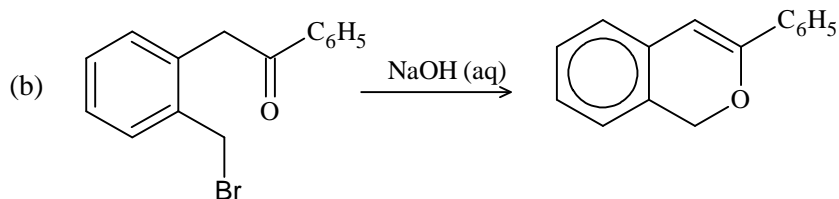
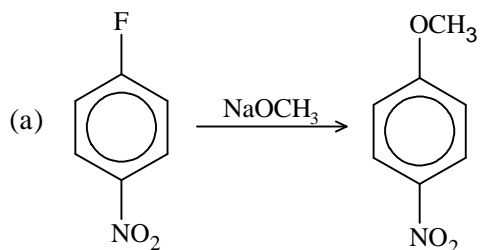
(c) A mixture of 25 mL of 0.2 M HCl and 60 mL of 0.1 M NaCN will act as a buffer

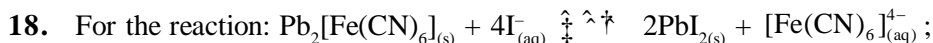
(d) The pH of Aniline acetate in water is independent of salt concentration

16. Which of the following statements are wrong :

- (a) Be(II) compounds always involve Be^{2+} ion
- (b) Oxygen on earth's atmosphere is produced by photosynthesis
- (c) H_3BO_3 is monobasic acid as it loses an H^+ ion
- (d) Xenon forms + 8 oxidation state with Fluorine only

17. Which reactions are correctly represented?





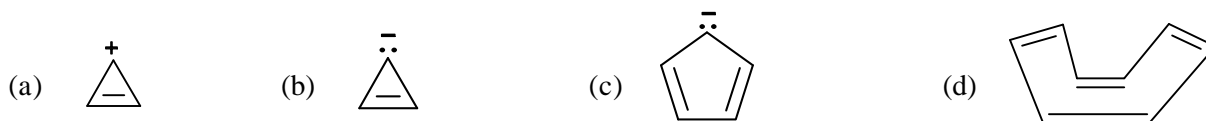
equilibrium constant is given by K_1 . If K_{SP_1} and K_{SP_2} are solubility product of PbI_2 and $\text{Pb}_2[\text{Fe}(\text{CN})_6]$, then which of the following is/are incorrect?

(a) $K_1 = \frac{K_{\text{SP}_2}}{K_{\text{SP}_1}}$ (b) $K_1 = \frac{K_{\text{SP}_1}}{K_{\text{SP}_2}}$ (c) $K_1 = \frac{K_{\text{SP}_2}}{K_{\text{SP}_1}^2}$ (d) $K_1 = \frac{(K_{\text{SP}_1})^2}{(K_{\text{SP}_2})}$

19. Select the correct statements:

- (a) Protection of Fe against corrosion is cathodic protection
- (b) Protection of Al against corrosion is anodic protection
- (c) Protection of Al against corrosion is cathodic protection
- (d) Protection of Fe against corrosion is anodic protection

20. Which of the following compounds/species are aromatic?



MATHEMATICS

SECTION- I: MULTIPLE CORRECT ANSWERS TYPE

This section contains 10 multiple choice questions numbered 21 to 30. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

21. A straight line touches the rectangular hyperbola $9x^2 - 9y^2 = 8$ and the parabola $y^2 = 32x$. the equation of the line is

(a) $9x + 3y - 8 = 0$ (b) $9x - 3y + 8 = 0$ (c) $9x + 3y + 8 = 0$ (d) $9x - 3y - 8 = 0$

22. Solution of the equation $\frac{dy}{dx} + \frac{1}{x} \tan y = \frac{1}{x^2} \tan y \sin y$ is

(a) $2x = \sin y (1 + 2cx^2)$ (b) $2x = \sin y (1 + cx^2)$
(c) $2x + \sin y (1 + cx^2) = 0$ (d) none of these

(where c is arbitrary constant)

23. The last digit of $3^{3^n} + 1$, $n \in N$, is
 (a) 4C_3 (b) 8C_7 (c) 8 (d) 4
24. If $1, \omega, \omega^2, \dots, \omega^{n-1}$ are the n , n^{th} roots of unity, then $(2-\omega)(2-\omega^2) \dots (2-\omega^{n-1})$ equals
 (a) $2^n - 1$ (b) ${}^nC_1 + {}^nC_2 + \dots + {}^nC_n$
 (c) $[{}^{2n}C_0 + {}^{2n+1}C_1 + {}^{2n+1}C_2 + \dots + {}^{2n+1}C_n]^{1/2} - 1$ (d) $2^n + 1$
25. If a, b, c are rational and no two of them are equal, then the equations $(b-c)x^2 + (c-a)x + (a-b) = 0$ and $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$
 (a) have rational roots (b) will be such that at least one has rational roots
 (c) have exactly one root common (d) have at least one root common
26. The determinant $\Delta = \begin{vmatrix} a^2 + x^2 & ab & ac \\ ab & b^2 + x^2 & bc \\ ac & bc & c^2 + x^2 \end{vmatrix}$ is divisible by
 (a) x (b) x^2 (c) x^3 (d) none of these
27. In a triangle ABC if $a^4 + b^4 + c^4 = 2c^2(a^2 + b^2)$ then angle C is equal to
 (a) 60° (b) 120° (c) 45° (d) 135°
28. If $(4 + \sqrt{15})^n = I + f$, where $n (> 1)$ is an odd natural number, I is an integer and $0 < f < 1$, then
 (a) I is a natural number (b) I is an even integer
 (c) $(1 + f)(1 - f) = 1$ (d) $1 - f = (4 - \sqrt{15})^n$
29. If $f(m) = \sum_{i=0}^m \binom{30}{30-i} \binom{20}{m-i}$ where $\binom{p}{q} = {}^pC_q$, then
 (a) maximum value of $f(m)$ is ${}^{50}C_{25}$ (b) $f(0) + f(1) + \dots + f(50) = 2^{50}$
 (c) $f(m)$ is always divisible by 50 (d) the value of $\sum_{m=0}^{50} (f(m))^2 = {}^{100}C_{50}$
30. A line parallel to the line $x - 3y = 2$ touches the circle $x^2 + y^2 - 4x + 2y - 5 = 0$ at the point
 (a) $(1, -4)$ (b) $(1, 2)$ (c) $(3, -4)$ (d) $(3, 2)$

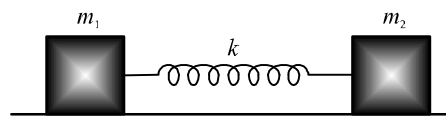
SECTION- II: INTEGER ANSWER TYPE

This section contains 30 questions. The answer to each of the question is a single digit integer, ranging from 0 to 9. The bubble corresponding to the correct answer is to be darkened in the ORS.

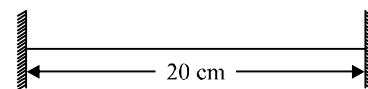
PHYSICS

- The velocity of a particle at time t (in second) is related to its displacement x (in metre) as $v = \sqrt{3x+4}$. Find the initial velocity of the particle in m/sec.
- Two sources A and B are sounding notes of frequency 680 Hz. A listener moves from A to B with a constant velocity u . If the speed of sound is 340 ms^{-1} , the value of u so that he hears 10 beats per second is $2.5 \times 10^n \text{ m/sec}$. Find the value of n .
- A slab of stone of area 0.34 m^2 and thickness 10 cm is exposed on the lower face to steam at 100°C . A block of ice at 0°C rests on the upper face of the slab. In one hour, 3.6 kg of ice is melted. Assume that the heat loss from the sides is negligible. The latent heat of fusion of ice is $3.4 \times 10^5 \text{ J kg}^{-1}$. The thermal conductivity of the stone is $n \text{ Js}^{-1} \text{ m}^{-1} \text{ C}^{-1}$. Find the value of n .

- Two blocks of mass $m_1 = m$ and $m_2 = 3m$ are connected by spring of force constant k and placed on a horizontal frictionless surface as shown in figure. The spring is stretched by an amount x and released. The system executes simple harmonic motion. The relative velocity of the blocks when the spring is at its natural length is $nx\sqrt{\frac{k}{3m}}$. Find the value of n .



- A 20 cm long string, having a mass of 1.0g, is fixed at both ends. The tension in the string is 0.5N. The string is set into vibrations using an external vibrator of frequency 100 Hz. Find the separation (in cm) between the successive nodes on the string.

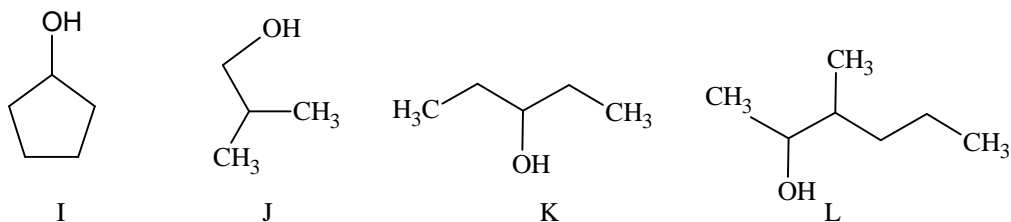
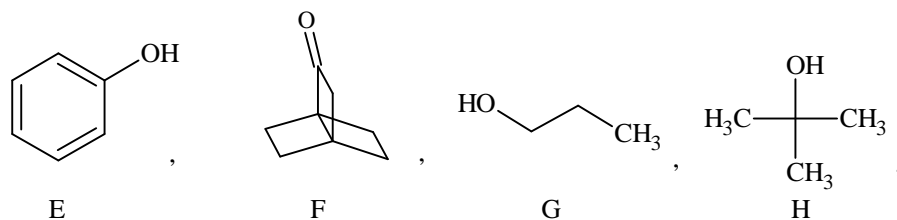
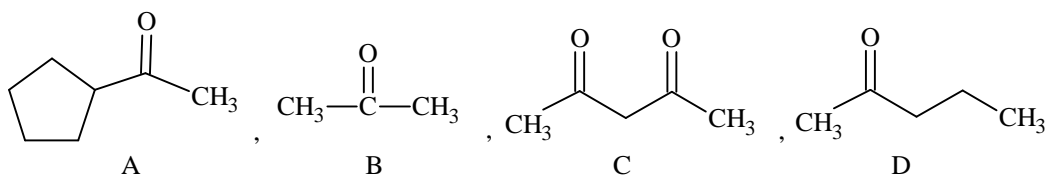


- A stretched string of length ' l ' is excited by plucking the string at right angles to its length at a point which is a distance of ' $l/4$ ' from one end and stopping the vibration at the centre of the string with a finger. Find the number of antinodes for the vibration.
- A long glass capillary tube of radius r is placed horizontally and filled with water (angle of contact for water-glass = 0°). If the tube is made vertical, then the length of water column that remains in the capillary is $\frac{\eta T}{r\rho g}$ where ' T ' is the surface tension of water, ρ is density of water. Find η .

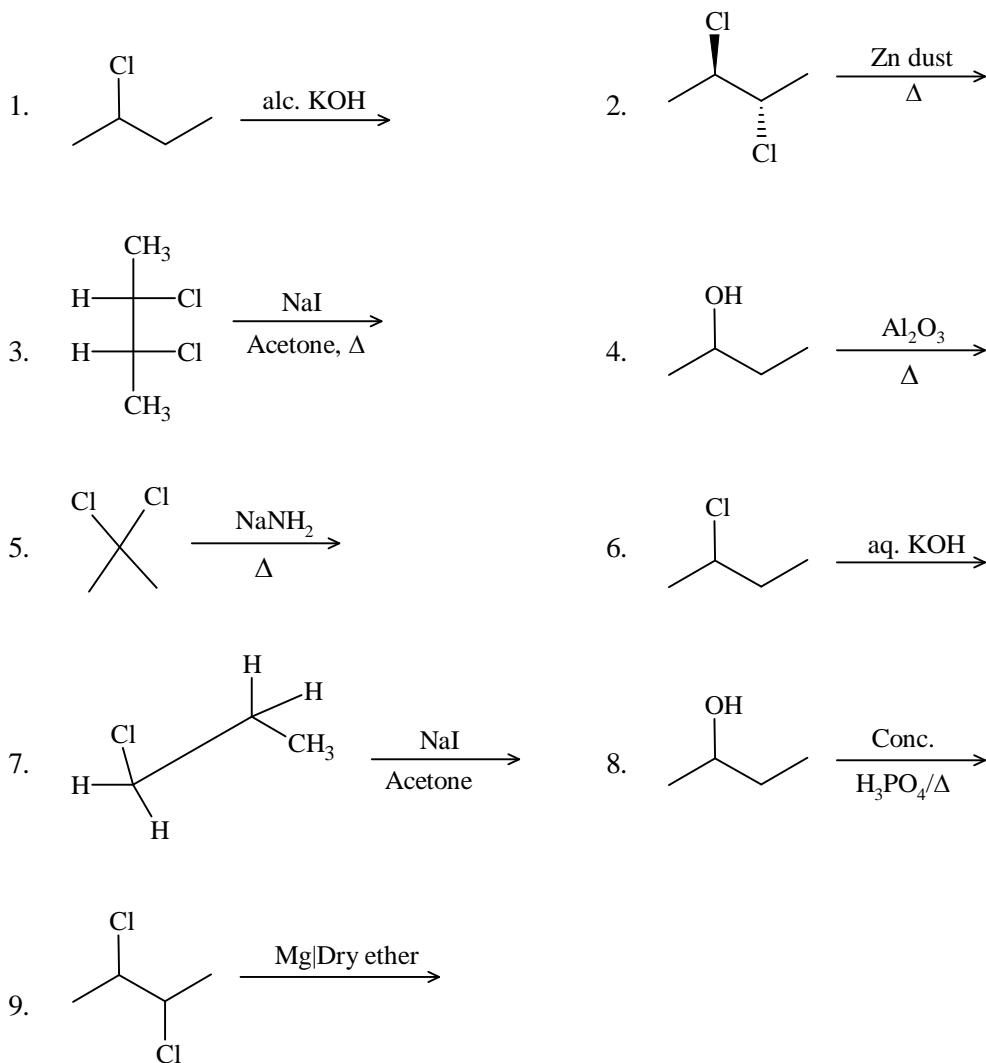
8. Three blocks A, B and C of masses 5 kg, 10 kg and 15 kg respectively connected by two ideal strings are present on a smooth horizontal surface. An external horizontal force of 30 N acts on the block A to pull the system. The difference in the tensions in strings connecting A and B, and B and C, is found to be $5T$ then find out value of T .
9. The mass per unit length of a rod series as $m = \left(\frac{M_0}{L}\right)x$ where M_0 is a constant and x is the distance of any point on rod measured from one end. Centre of mass of the rod from the given end is at a distance of $\frac{KL}{3}$ on the rod. Find the value of K .
10. If an ideal linear spring is stretched by x then energy stored in it is E and when it is stretched by a further $2x$ then energy stored add a further kE . Find the value of k .

CHEMISTRY

11. Identify total number of compounds that give the Iodoform test:

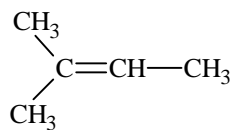


12. Identify total number of β -elimination reaction :



13. The half life period of radioactive element is 40 days. If 32 g of this element is stored for 160 days, calculate the weight of the element that would remain in gram.

14. How many stereoisomers are possible for the following compound?



15. From the following compounds/ions, find the total no. of electrophiles:

- (a) CH_3^+ (b) NH_4^+ (c) BF_3 (d) NH_3
(e) $\text{NH}_2 - \text{NH}_2$ (f) PCl_3 (g) PCl_5 (h) SbCl_5
(i) GaCl_3 (j) AlCl_3 (k) $\text{C}^- \equiv \text{N}$ (l) F^-

16. Number of lone pairs around the central atom in I_3^- ion is :

17. Tri alkyl aluminium molecules exists as dimers which contains 3 centred – 2 electron bond. The co-ordination number of bridged carbon is

18. A typical air bag contains approximately 260 g of NaN_3 . The No. of moles of Nitrogen produced when the azide is detonated.

19. Average oxidation state of Chlorine in bleaching powder is ...

20. How many Faradays are required to reduce 1 mol of BrO_3^- to Br^- in basic medium?

MATHEMATICS

21. If $\int_n^{n+1} f(x)dx = n^2 + n \forall n \in I$ then the value of $\int_{-3}^3 f(x)dx = 4^k$. k is _____.

22. The difference between the lengths of the major axis and latus rectum of an ellipse in terms of a and e is $2ae^k$, then k _____.

23. If the distance between the foci of a hyperbola is 16 and its eccentricity is $\sqrt{2}$, then the equation of hyperbola is $x^2 - y^2 = 2^k$. k is _____.

24. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, then $\sum_{r=1}^2 \frac{x^{100r} + y^{103r}}{\sum_{r=1}^2 x^{204r} y^{204r}} = \lambda$. Now $[\lambda]$

25. In ΔABC , if $A = 60^\circ$ then $\frac{b}{c+a} + \frac{c}{a+b}$ equals _____.

26. If P is a point on the curve $3x^2 - 4y^2 = 72$, which is nearest to the line $3x + 2y + 1 = 0$, then its distance from the point (0, 3) is
27. For $a \in (0, 1)$, $\lim_{b \rightarrow 0^+} \int_b^{1-b} t^{-a} (1-t)^{a-1} dt = g(a)$, then find the value of $g'(1/2)$.
28. Let $f(x) = \begin{cases} (2+x)^3, & -3 < x \leq -1 \\ x^{2/3}, & -1 < x < 2 \end{cases}$, then find total number of points of local maxima and local minima of $f(x)$.
29. Total number of roots of $x^2 - x \cos x + \sin x + 1 = 0$ for $(-\infty, \infty)$ is/are
30. If $|z - 3 - 4i| = 5$, then find the minimum value of $|z - 3|$

JEE-ADVANCE: TEST-1

TEST SERIES

PAPER-I

Time : 3 hrs.

M.M.: 180

TEST CODE - A

ANSWERS

Physics: Section I

- | | | | | |
|----------|----------|--------------|--------------|---------------|
| 1. (a,b) | 2. (d) | 3. (a,c) | 4. (a,b,c,d) | 5. (a,b) |
| 6. (c,d) | 7. (a,b) | 8. (a,b,c,d) | 9. (a,b,c) | 10. (a,b,c,d) |

Chemistry: Section I

- | | | | | |
|---------------|-------------|-------------|-----------|-------------|
| 11. (a,b,c,d) | 12. (a,b,c) | 13. (a,b,c) | 14. (a,c) | 15. (b,c,d) |
| 16. (a,c,d) | 17. (a,b,d) | 18. (a,b,d) | 19. (a,b) | 20. (a,c) |

Mathematics: Section I

- | | | | | |
|-------------|-----------|-----------|-------------|-----------|
| 21. (b,c) | 22. (a,b) | 23. (a,d) | 24. (a,b) | 25. (a,c) |
| 26. (a,b,c) | 27. (c,d) | 28. (a,c) | 29. (a,b,d) | 30. (b,c) |

Physics: Section-II

- | | | | | |
|--------|--------|--------|--------|---------|
| 1. (2) | 2. (0) | 3. (1) | 4. (2) | 5. (5) |
| 6. (2) | 7. (4) | 8. (2) | 9. (2) | 10. (8) |

Chemistry: Section II

- | | | | | |
|---------|---------|---------|---------|---------|
| 11. (4) | 12. (6) | 13. (2) | 14. (0) | 15. (7) |
| 16. (3) | 17. (5) | 18. (6) | 19. (0) | 20. (6) |

Mathematics: Section II

- | | | | | |
|---------|---------|---------|---------|---------|
| 21. (2) | 22. (2) | 23. (5) | 24. (1) | 25. (1) |
| 26. (6) | 27. (0) | 28. (2) | 29. (0) | 30. (1) |