

FIITJEE - JEE (Mains)

Batches: Two Yr CRP C-XI
PHYSICS, CHEMISTRY & MATHEMATICS
JEE – MAINS
PHASE – I
CODE: 123038

Time Allotted: 3 Hours

Maximum Marks: 360

- Do not open this Test Booklet until you are asked to do so.
- Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.

Important Instructions:

1. Immediately fill in the particulars on this page of the Test Booklet with *Blue / Black Ball Point Pen*. *Use of pencil is strictly prohibited.*
2. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of **90** questions. The maximum marks are **360**.
5. There are **three** parts in the question paper A, B, C consisting of **Physics, Chemistry and Mathematics** having 30 questions in each part of equal weightage. Each question is allotted **4 (four)** marks for correct response.
6. *Candidates will be awarded marks as stated above in instruction No.5 for correct response of each question. One mark will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.*
7. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 6 above.
8. Use **Blue / Black Ball Point Pen only** for writing particulars / marking responses on **Side-1** and **Side-2** of the Answer Sheet. **Use of pencil is strictly prohibited.**
9. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. except the Admit Card inside the examination hall / room.
10. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room / Hall. **However, the candidates are allowed to take away this Test Booklet with them.**
11. **Do not fold or make any stray marks on the Answer Sheet.**

Name of the Candidate (in Capital Letters) : _____

Enrolment Number : _____

Batch : _____ Date of Examination : _____

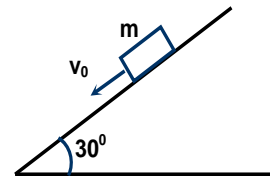
Section – I (PHYSICS)

1. A particle moving with uniform acceleration along a straight line covers distances a and b in successive intervals of p and q seconds. The acceleration of the particle is

(A) $\frac{pq(p+q)}{2(bp-aq)}$ (B) $\frac{2(aq-bp)}{pq(p+q)}$ (C) $\frac{2(bp-aq)}{pq(p-q)}$ (D) $\frac{2(bp-aq)}{pq(p+q)}$

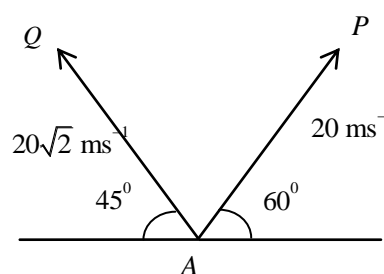
2. A block of mass m is pushed down on a rough inclined plane (coefficient of friction is 0.25) with a velocity v_0 as shown in the figure.

- Then, the block will
 (A) decelerate and come to rest
 (B) accelerate downward
 (C) move downward with velocity v_0
 (D) first accelerate then decelerate



3. Two particles P and Q are projected simultaneously away from each other from a point A as shown in figure. The velocity of P relative to Q in ms^{-1} at the instant when the motion of P is horizontal is

- (A) $10\sqrt{4-\sqrt{3}}$
 (B) $20\sqrt{4-\sqrt{3}}$
 (C) $10\sqrt{4+\sqrt{3}}$
 (D) $20\sqrt{4+\sqrt{3}}$

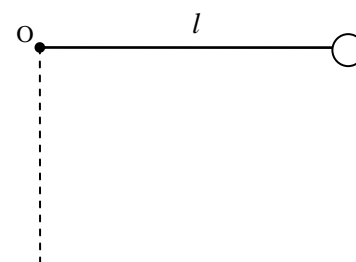


4. A particle is projected with speed u at angle α with horizontal to pass over a tower of height h . The product of the two possible times taken to pass over the tower is

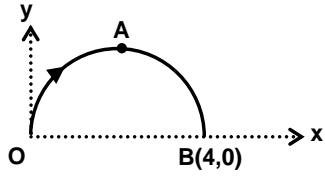
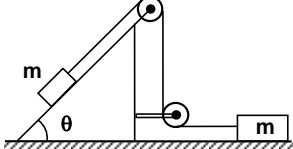
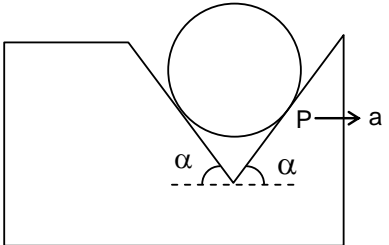
(A) $\frac{2u}{g}$ (B) $\frac{2h}{g}$ (C) $\frac{u}{g}$ (D) $\frac{4h}{g}$

5. A particle is attached to one end of a string whose other end is fixed at point 'O' in the vertical plane. The particle is released from rest when the string is horizontal. Then, the angle made by the string with the vertical when the net acceleration of particle is horizontal

- (A) $\tan^{-1}(\sqrt{2})$ (B) $\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$
 (C) $\tan^{-1}(2)$ (D) $\tan^{-1}\left(\frac{1}{2}\right)$

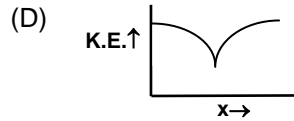
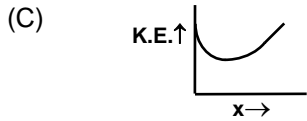
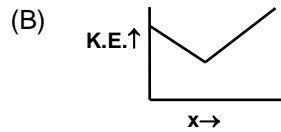
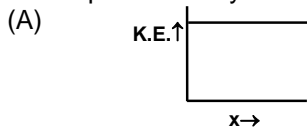


space for rough work

6. A car accelerates from rest to a speed of 10 m/s. Let the energy spent be E . If we accelerate the car from 10 m/s to 20 m/s, then the energy spent will be
 (A) E (B) $2E$ (C) $3E$ (D) $4E$
7. Given $\vec{F} = (xy^2)\hat{i} + (x^2y)\hat{j}$ Newton. Find the work done by \vec{F} when a particle is taken along the semicircular path OAB where the co-ordinates of B are (4, 0).
 (A) $\frac{65}{3}$ J (B) $\frac{75}{2}$ J
 (C) $\frac{73}{4}$ J (D) 0 J
- 
8. For the system shown in the figure, the pulleys are light and frictionless. Assume wedge to be fixed and smooth. The tension in the string will be
 (A) $\frac{2}{3} mgsin \theta$ (B) $\frac{3}{4} mgsin \theta$
 (C) $\frac{1}{2} mgsin \theta$ (D) $mgsin \theta$
- 
9. Assuming all surfaces to be smooth. Minimum value of 'a' so that sphere loses contact at P is
 (A) $g \sin \alpha$
 (B) $g \tan \alpha$
 (C) $g \cot \alpha$
 (D) $g \operatorname{cosec} \alpha$
- 
10. The work done on a particle of mass m by a force $K \left[\frac{x}{(x^2 + y^2)^{3/2}} \hat{i} + \frac{y}{(x^2 + y^2)^{3/2}} \hat{j} \right]$ (K being a constant of appropriate dimensions, when the particle is taken from the point $(a, 0)$ to the point $(0, a)$ along a circular path of radius a about the origin in the x - y plane is
 (A) $\frac{2K\pi}{a}$ (B) $\frac{K\pi}{a}$ (C) $\frac{K\pi}{2a}$ (D) 0
11. A projectile is given an initial velocity of $(\hat{i} + 2\hat{j})$ m/s, where \hat{i} is along the ground and \hat{j} is along the vertical. If $g = 10 \text{ m/s}^2$, the equation of its trajectory is:
 (A) $y = 2x - 5x^2$ (B) $4y = 2x - 5x^2$ (C) $4y = 2x - 25x^2$ (D) $y = x - 5x^2$

space for rough work

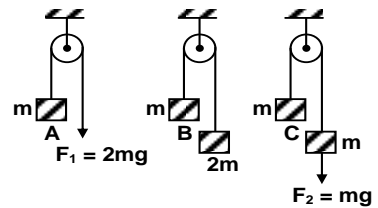
12. A ball is thrown up with a certain velocity at an angle θ to the horizontal. The variation of its kinetic energy K.E. with respect to the horizontal displacement 'X' from the point of projection is best represented by:



13. The kinetic energy K of a particle moving along a circle of radius R depends on the distance covered 's' as $K = as^2$ where 'a' is a constant. The force acting on the particle is

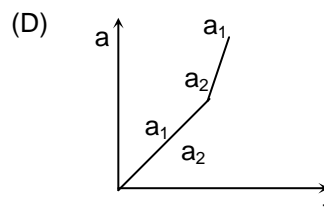
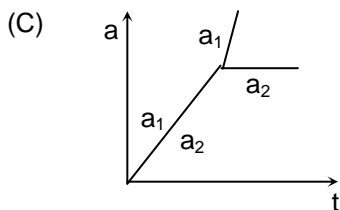
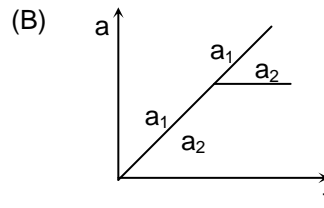
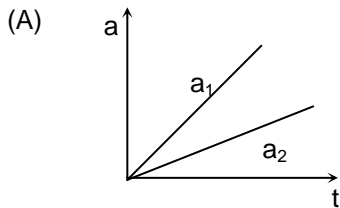
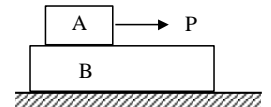
- (A) $\frac{2as^2}{R}$ (B) $2as\left(1 + \frac{s^2}{R^2}\right)^{1/2}$ (C) $2as$ (D) $2a$

14. In the figure, the blocks A, B and C of mass m each have accelerations a_1 , a_2 and a_3 respectively. F_1 and F_2 are external forces of magnitudes $2mg$ and mg respectively.



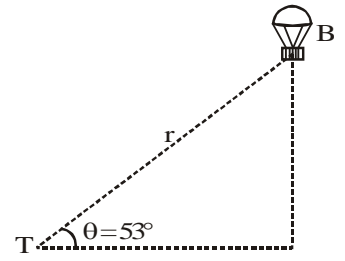
- (A) $a_1 = a_2 = a_3$
 (B) $a_1 > a_2 > a_3$
 (C) $a_1 > a_3 > a_2$
 (D) $a_1 > a_2, a_2 = a_3$

15. Block A is placed on block B, whose mass is greater than that of A. There is friction between the blocks, while the ground is smooth. A horizontal force P , linearly increasing with time, begins to act on A. The acceleration a_1 and a_2 of A and B respectively are plotted against time t . Choose the correct graph.



space for rough work

16. A balloon B is moving vertically upward and viewed by a telescope T. At a particular angular position $\theta = 53^\circ$ measured parameters are $r = 1$ km, $\frac{dr}{dt} = 3 \text{ m/s}$ and $\frac{d\theta}{dt} = 0.02 \text{ rad/s}$. The magnitude of the linear velocity of the balloon at this instant is
- (A) 1.2 m/s
(B) 2.4 m/s
(C) 3.6 m/s
(D) 4.8 m/s



17. If the coefficient of friction between an insect and hemispherical bowl of radius r is μ , the maximum height to which the insect can crawl in the bowl is:

(A) $\frac{r}{\sqrt{1+\mu^2}}$ (B) $r \left[1 - \frac{1}{\sqrt{1+\mu^2}} \right]$ (C) $r\sqrt{1+\mu^2}$ (D) $r \left[\sqrt{1+\mu^2} - 1 \right]$

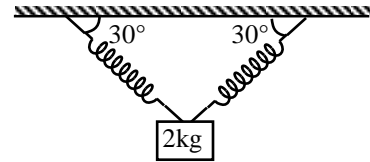
18. The velocity and acceleration of a particle at time $t = 0$ are $\vec{u} = a\sqrt{2}\hat{i} + a\sqrt{2}\hat{j}$ (m/s) and $\vec{a}_0 = a\hat{i} - a\hat{j}$ respectively. Find the angle made by the velocity of the particle at $t = 2$ sec with initial velocity.

(A) $\tan^{-1}(2)$ (B) $\tan^{-1}(\sqrt{2})$ (C) $\tan^{-1}(1)$ (D) $\tan^{-1}\left(\frac{1}{2}\right)$

19. A projectile is thrown with velocity u at an angle α above the horizontal. Find the average velocity during the time of ascent

(A) $u \cos \alpha$ (B) $\frac{u \sin \alpha}{2}$ (C) $\frac{u}{2} \sqrt{1 + 3 \cos^2 \alpha}$ (D) None of these

20. A block of mass 2 kg is hanging with two identical massless springs as shown in figure. The acceleration of the block just at the moment, the right spring breaks is ($g = 10 \text{ m/s}^2$)



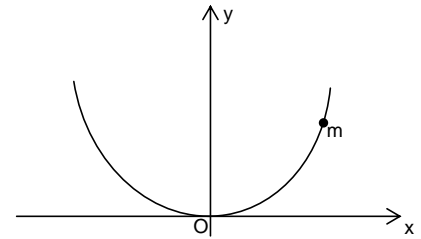
(A) 10 m/s^2 (B) 5 m/s^2 (C) 25 m/s^2 (D) 4 m/s^2

21. Velocity versus displacement curve of a particle moving in straight line is shown in the figure. From a point P, a line is drawn perpendicular to displacement axis and line PR is drawn normal to the curve at P. The magnitude of acceleration of the particle at point P is

(A) 1 m/s^2 (B) 2 m/s^2 (C) 3 m/s^2 (D) 2.5 m/s^2

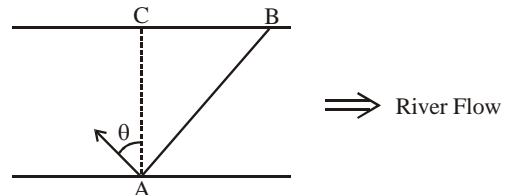
space for rough work

22. A bead of mass m is located on parabolic wire with its axis vertical and vertex at the origin as shown in figure and whose equation is $x^2 = 4ay$. The wire frame is fixed and bead can slide on it without friction. The bead is released from the point $y = 4a$ on the wire frame from rest. The tangential acceleration of the bead when it reaches the position given by $y = a$ is



- (A) $\frac{g}{2}$ (B) $\frac{\sqrt{3}}{2}g$
 (C) $\frac{g}{\sqrt{2}}$ (D) $\frac{g}{\sqrt{5}}$

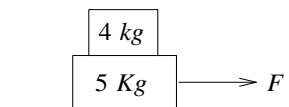
23. Width of a river is 60 m. A swimmer wants to cross the river such that he reaches from A to B directly. Point B is 45 m ahead of line AC (perpendicular to river). Assume speed of river and speed of swimmer as equal. Swimmer must try to swim at angle θ with line AC. Value of θ is



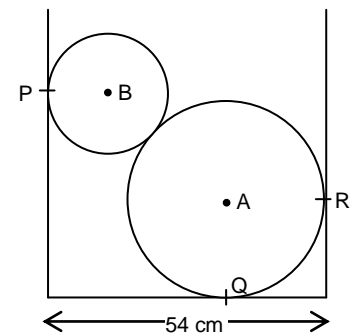
- (A) 37° (B) 53° (C) 30° (D) 16°

24. The coefficient of friction between 4 kg and 5 kg blocks is 0.2 and between 5 kg block and ground is 0.1 respectively. Choose the correct statements.

- (A) Minimum force needed to cause system to move on ground is 17 N
 (B) When force $F = 4N$, static friction at all surfaces is 4 N to keep system at rest.
 (C) Maximum acceleration of 4 kg block is 2 m/s^2
 (D) Slipping between 4 kg and 5 kg block starts when F is 17 N.



25. Two steel balls A and B are placed inside a right circular cylinder of diameter 54 cm making contacts at point P, Q and R as shown. The radius $r_A = 12 \text{ cm}$ and $r_B = 18 \text{ cm}$. The masses are $m_A = 60\text{kg}$ and $m_B = 15 \text{ kg}$. The forces exerted by the floor at the point Q and the wall at R are respectively (taking $g = 10 \text{ m/s}^2$) (all the surfaces are smooth)



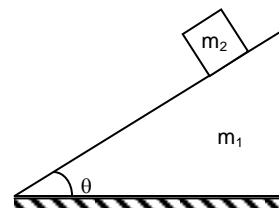
- (A) 600N, 150N (B) 750N, 100N
 (C) 600N, 120N (D) 750N, 200N

26. A particle is moving with velocity $\vec{v} = k(\hat{y}i + \hat{x}j)$ where k is a constant. The trajectory equation of the particle is

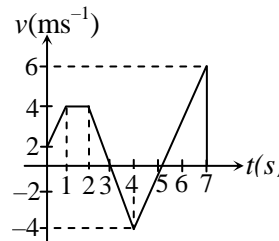
- (A) $y = x^2 + \text{constant}$ (B) $y^2 = x + \text{constant}$
 (C) $xy = \text{constant}$ (D) $y^2 = x^2 + \text{constant}$

space for rough work

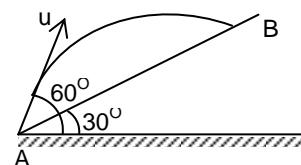
27. In the given figure, the mass m_2 starts with velocity u and moves with constant velocity v on the inclined surface. During motion the normal reaction R between the horizontal surface and fixed triangular block of mass m_1 is R . Then during the motion
- (A) $R = m_1g$ (B) $R < (m_1 + m_2)g$
 (C) $R > (m_1 + m_2)g$ (D) $R = m_2g$



28. The velocity-time curve of a body is shown in figure. The average speed of the body in first seven second is
- (A) 1 ms^{-1} (B) 2 ms^{-1}
 (C) $\frac{11}{7} \text{ ms}^{-1}$ (D) $\frac{19}{7} \text{ ms}^{-1}$



29. A person walking at the rate of 3 km/hr , the rain appears to fall vertically when he increase his to speed 6 km/hr it appears to meet him at angle of 45° with vertical. The speed of rain is
- (A) $3\sqrt{2} \text{ km/hr}$ (B) $\frac{3}{\sqrt{2}} \text{ km/hr}$ (C) $6\sqrt{2} \text{ km/hr}$ (D) $2\sqrt{3} \text{ km/hr}$
30. The time taken by the projectile to reach from A to B is t . Then the distance AB is equal to
- (A) $\frac{ut}{\sqrt{3}}$ (B) $\frac{\sqrt{3} ut}{2}$
 (C) $\sqrt{3} ut$ (D) $2 ut$

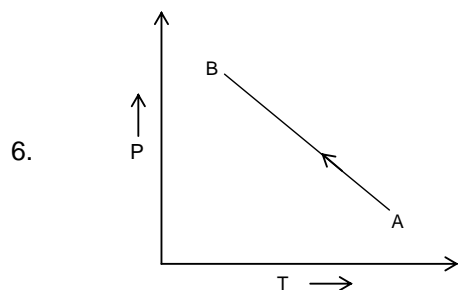


Section – II (Chemistry)

1. $\text{P}_4\text{O}_{10} + 12 \text{HNO}_3 \longrightarrow 6\text{N}_2\text{O}_5 + 4\text{H}_3\text{PO}_4$
 Choose the correct statement.
 (A) It is a redox reaction
 (B) If one mole each of P_4O_{10} and HNO_3 react completely, six moles of N_2O_5 is formed
 (C) 28.4 g of P_4O_{10} can completely react with 75.6 g of HNO_3
 (D) 800 mL of 2 M HNO_3 solution can absorb a maximum of one mole of P_4O_{10}
2. The energy of which of the following change can be calculated by using Bohr's theory?
 (A) $\text{He} \rightarrow \text{He}^+$ (B) $\text{Li}^{2+} \rightarrow \text{Li}^{3+}$ (C) $\text{Be}^{2+} \rightarrow \text{Be}^{3+}$ (D) $\text{H} \rightarrow \text{H}^-$
3. X and Y are two representative elements of second and third period of the periodic table respectively. Which of the following property of X will be higher than that of Y, if both are placed in the same group?
 (A) Electronegativity (B) Atomic radius
 (C) Shielding effect to valence electron (D) Nuclear charge

space for rough work

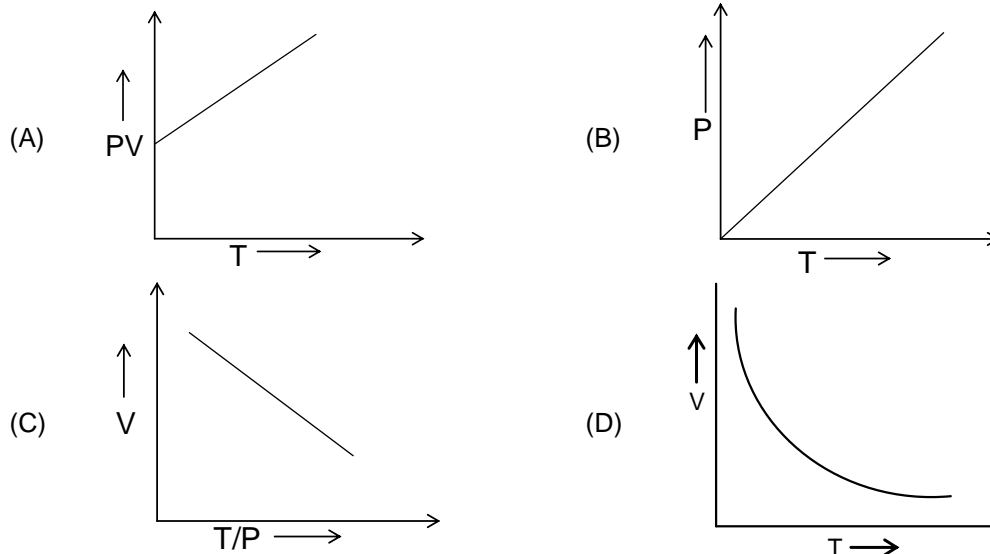
4. The incorrect statement regarding the structure of PCl_5 molecule is:
 (A) Phosphorus undergoes sp^3d hybridization
 (B) The axial P–Cl(a) bonds are longer than the equatorial P–Cl(e) bonds
 (C) In solid state it contains ion-pairs
 (D) It's bond angle is only 120°
5. One mole of a compound contains two moles of hydrogen atom, 64 g of sulphur and certain amount of dioxygen that measures 89.6 L at NTP. What is the empirical formula of the compound?
 (A) H_2SO_4 (B) HS_2O_2 (C) HSO_4 (D) $\text{H}_2\text{S}_2\text{O}$



- Which of the following property of an ideal gas increases along the direction $A \rightarrow B$ in the above graph?
 (A) Expansion (B) Kinetic energy
 (C) Deviation from ideal behaviour (D) R.M.S. velocity
7. Which change is not observed when powders of KO_2 is kept under air?
 (A) The yellow colour disappear
 (B) A gas is evolved
 (C) One of the products will show paramagnetic behaviour
 (D) Disproportionation reaction will take place
8. The heaviest isotope of hydrogen is:
 (A) a β -ray emitter
 (B) used to make hard water
 (C) used in hydrogen torch for welding of scarp metals
 (D) used for making H_2O_2
9. Which of the following electronic transition in hydrogen atom results in a visible line in the spectrum?
 (A) $n = 3 \rightarrow n = 1$ (B) $n = 3 \rightarrow n = 2$ (C) $n = 4 \rightarrow n = 3$ (D) $n = 4 \rightarrow n = 1$
10. Which of the following two molecules have same structure and same dipole moment?
 (A) SO_2 and NO_2 (B) BeCl_2 and CO_2 (C) BF_3 and NF_3 (D) H_2O and NH_3
11. Which of the following atom has the highest value of first ionization enthalpy?
 (A) Na (B) Mg (C) Al (D) K

space for rough work

12. At high pressure the Vander Waal's equation reduces to $PV = RT + Pb$. The correct graph for this reduced equation is:



13. Which of the following substance react with NaOH in a disproportionation reaction?
 (A) HCl (B) Cl_2 (C) Al (D) CO_2

14. H_2O_2 cannot oxidize
 (A) KNO_2 (B) K_2S (C) K_2CO_3 (D) KI

15. The radial wave functions (R_n, ℓ) of 3s orbital of hydrogen atom is given as $\left[a_0 = 0.529 \text{ \AA} \right]$

$$R_{3,0} = \frac{2}{81\sqrt{3}} \left(\frac{Z}{a_0} \right)^3 (27 - 18u + 2u^2) e^{-u/3} \left[u = \frac{Zr}{a_0} \right]$$

The nodes of this orbital is/are observed at about:

- (A) 2 \AA and 3.5 \AA from the nucleus (B) 1 \AA and 3.75 \AA from the nucleus
 (C) 4 \AA and 4.9 \AA from the nucleus (D) 3 \AA and 5 \AA from the nucleus
16. The successive ionization energies of representative elements in eV unit are given below.

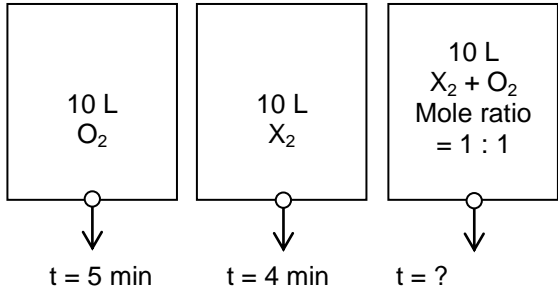
Atoms	I.E ₁	I.E ₂	I.E ₃	I.E ₄
X	3.8	4.9	801.2	1028.6
Y	5.9	8.6	11.2	915.6

The correct statements regarding X and Y

- (A) The chloride of X is more ionic than that of Y
 (B) 'X' contains more electrons in the outermost orbit than 'Y'
 (C) the oxide of Y may be amphoteric if it is placed in the second period
 (D) The compound formed between X and Y is X_2Y_3

space for rough work

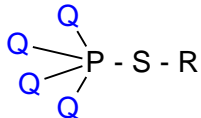
17. Which of the following species can gain electron easily?
 (A) O_2 (B) O_2^- (C) O (D) O^-
18. What is the equivalent mass of CO_2 in the following reaction?
 $MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow Mn^{2+} + CO_2 + H_2O$
 (A) 44 (B) 22 (C) 11 (D) 5.5

19. 
 In the above arrangement, O_2 takes 5 min to effuse completely and X_2 take 4 min for complete effusion. In how much time both X_2 and O_2 (molar ratio 1:1) will completely effuse from the third container?
 (A) 3.6 min (B) 4.52 min (C) 6.9 min (D) 2.8 min

20. $Na_2O_2 \xrightarrow{\text{Heat}} P + Q$
 $\downarrow T$
 $\xrightarrow{T} R + H_2O_2$
 $\downarrow \text{Heat}$
 $T + O_2$
- What should be 'R' in the above reaction?
 (A) Na_2O (B) Na (C) $NaOH$ (D) NaO_2

21. Which is most reactive towards hydrogen?
 (A) F_2 (B) Cl_2 (C) Br_2 (D) I_2
22. Which of the following orbital has angular node which are not planar?
 (A) $3d_{xy}$ (B) $3p_x$ (C) $3p_x$ (D) $3d_{z^2}$

23. The electronegativity order of four representative elements is given as:
 $P > Q > R > S$.
 If the elements form a covalent compound PQ_4SR having structure

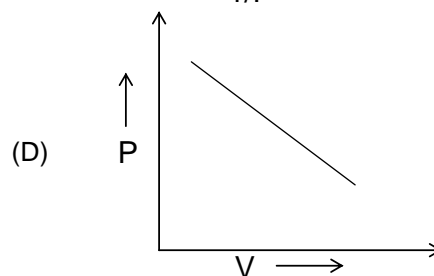
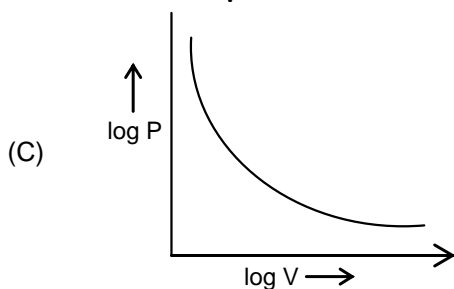
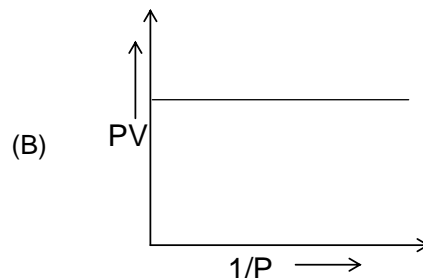
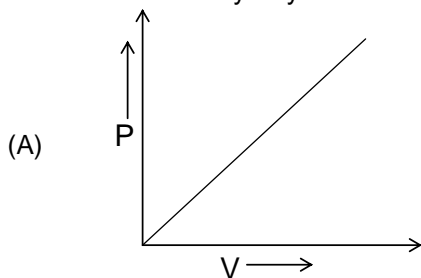


which ions are most favorably formed if it dissociates in water?

- (A) PQ_4^- and SR^+ (B) PQ_4^- and SR^- (C) $[PSR^+]$ and Q^- (D) PQ_4^- and PS^+

space for rough work

24. What is the oxidation number of Br in NaBrO_3 ?
 (A) -3 (B) +5 (C) -1 (D) +3
25. How many $p\pi - p\pi$ and $d\pi - p\pi$ covalent bonds present in SO_3 molecule is
 (A) 1 (B) 2 (C) 3 (D) Zero
26. Which curve satisfy Boyle's law?



27. In which solvent addition of NaH does not produce any gas?
 (A) H_2O (B) CH_3OH (alcohol) (C) CH_3OCH_3 (ether) (D) D_2O
28. Which of the following salts of metals are most likely to be crystallized from their aqueous solution as hydrated salts?
 (A) Oxides (B) Sulphates (C) Nitrides (D) Carbides
29. What volume of 2 M aqueous solution of acidified KMnO_4 can completely react with 56 g of Fe^{2+} ion?

$$\text{MnO}_4^- + \text{Fe}^{2+} + \text{H}^+ \longrightarrow \text{Mn}^{2+} + \text{Fe}^{2+} + \text{H}_2\text{O}$$
 (A) 500 mL (B) 200 mL (C) 100 mL (D) 400 mL
30. What is the hybridization of boron in BO_3^{3-} ?
 (A) sp^3 (B) sp^2 (C) sp (D) sp^3d

space for rough work

Section – III (Mathematics)

1. The number of real solutions of the equation $|x|^2 - 3|x| + 2 = 0$ are:
 (A) 1 (B) 2 (C) 3 (D) 4
2. If $\log 2, \log(2^n - 1)$ and $\log(2^n + 3)$ are in AP, then $n =$
 (A) $\frac{5}{2}$ (B) $\log_2 5$ (C) $\log_3 5$ (D) $\frac{3}{2}$
3. The length of the diameter of the circle which touches $x -$ axis at the point $(1, 0)$ and passes through the point $(2, 3)$ is:
 (A) $\frac{6}{5}$ (B) $\frac{5}{3}$ (C) $\frac{10}{3}$ (D) $\frac{3}{5}$
4. If the two circles $2x^2 + 2y^2 - 3x + 6y + k = 0$ and $x^2 + y^2 - 4x + 10y + 16 = 0$ cut orthogonally, then the value of k is:
 (A) 41 (B) 14 (C) 4 (D) 0
5. The equation of the image of the circle $(x - 3)^2 + (y - 2)^2 = 1$ by the mirror $x + y = 19$ is:
 (A) $(x - 14)^2 + (y - 13)^2 = 1$ (B) $(x - 15)^2 + (y - 14)^2 = 1$
 (C) $(x - 16)^2 + (y - 15)^2 = 1$ (D) $(x - 17)^2 + (y - 16)^2 = 1$
6. The value of $7\log_{10} \frac{16}{15} + 5\log_{10} \frac{25}{24} + 3\log_{10} \frac{81}{80}$ is
 (A) $\log_{10} 2$ (B) $\log_{10} 3$ (C) $\log_{10} 5$ (D) 0
7. The numerical value of $\tan 20^\circ \cdot \tan 80^\circ \cdot \cot 50^\circ$ is equal to
 (A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) $2\sqrt{3}$ (D) $\frac{1}{2\sqrt{3}}$
8. If $3a - 2b + 5c = 0$, family of straight lines $ax + by + c = 0$ are always concurrent at a point whose co-ordinate is:
 (A) $\left(\frac{3}{5}, \frac{2}{5}\right)$ (B) $\left(-\frac{3}{5}, \frac{2}{5}\right)$ (C) $\left(\frac{3}{5}, -\frac{2}{5}\right)$ (D) $\left(-\frac{3}{5}, -\frac{2}{5}\right)$

space for rough work

9. The diagonal AC and BD of rhombus intersect at (5, 6). If $A = (3, 2)$, then equation of diagonal BD is:
 (A) $y - x = 1$ (B) $2y - x = 17$ (C) $y - 2x + 4 = 0$ (D) $2y + x = 17$
10. The equation $x^2 + kxy + y^2 - 5x - 7y + 6 = 0$ represents a pair of straight lines, then k is:
 (A) $\frac{5}{3}$ (B) $\frac{10}{3}$ (C) $\frac{3}{2}$ (D) None of these
11. The equation of the line bisecting the obtuse angle between $y - x = 2$ and $2y + x = 5$ is:
 (A) $\frac{y - x - 2}{\sqrt{2}} = \frac{2y - x - 5}{\sqrt{5}}$ (B) $\frac{y - x - 2}{\sqrt{2}} = \frac{-2y - x + 5}{\sqrt{5}}$
 (C) $\frac{y - x - 2}{\sqrt{2}} = \frac{2y + x - 5}{\sqrt{5}}$ (D) none of these
12. Total number of common tangents of $x^2 + y^2 - 2x - 4y = 0$ and $x^2 + y^2 - 8y - 4 = 0$, is equal to :
 (A) 1 (B) 2 (C) 4 (D) 3
13. The solution set of $\frac{x^2 - 3x + 4}{x + 1} > 1, x \in \mathbb{R}$, is:
 (A) $(3, +\infty)$ (B) $(-1, 1) \cup (3, +\infty)$
 (C) $[-1, 1] \cup [3, +\infty)$ (D) none of these
14. The set of all real x satisfying $x|x| \geq x^2$ is
 (A) all $x \in \mathbb{R}$ (B) $x \in (0, \infty)$
 (C) $x \in [0, \infty)$ (D) $x \in (-\infty, 0]$
15. $\cos 1^\circ \cdot \cos 2^\circ \cdot \cos 3^\circ \dots \cos 179^\circ =$
 (A) 0 (B) 1 (C) 2 (D) $\frac{1}{2}$
16. If $0 < x < \pi$ and $\cos x + \sin x = \frac{1}{2}$, then $\tan x$ is:
 (A) $\frac{(1 - \sqrt{7})}{4}$ (B) $\frac{(4 - \sqrt{7})}{3}$ (C) $-\frac{(4 + \sqrt{7})}{3}$ (D) $\frac{(1 + \sqrt{7})}{4}$

space for rough work

17. If the point (a^2, a) and $(3, -2)$ lie on opposite side of the line $x + y + 1 = 0$ then a belongs to the interval
 (A) $(-\infty, 1)$ (B) $(1, \infty)$ (C) $(0, 1)$ (D) none of these
18. The set of solution $|x^2 + x| = x^2 + x$ is given by
 (A) $(-\infty, -1)$ (B) $[0, \infty)$ (C) $[-1, 0]$ (D) $(-\infty, -1] \cup [0, \infty)$
19. Maximum value of the expression $2\sin x + 4\cos x + 3$ is
 (A) $2\sqrt{5} + 3$ (B) $2\sqrt{5} - 3$ (C) $\sqrt{5} + 3$ (D) none of these
20. The equation of the circle whose two diameters are the lines $x + y = 4$ and $x - y = 2$ and which passes through $(4, 6)$ is
 (A) $x^2 + y^2 - 6x - 2y - 16 = 0$ (B) $x^2 + y^2 - 6x - 2y = 15$
 (C) $x^2 + y^2 = 40$ (D) $5(x^2 + y^2) - 4x = 16$
21. The equation of the circle with centre at the x-axis and touching the line $3x + 4y - 11 = 0$ at the point $(1, 2)$ is
 (A) $x^2 + y^2 - x - 4 = 0$ (B) $x^2 + y^2 + 2x - 7 = 0$ (C) $x^2 + y^2 + x - 6 = 0$ (D) None of these.
22. The locus of the mid-point of a chord of the circle $x^2 + y^2 = 16$ which subtends a right angle at the origin is
 (A) $x^2 + y^2 = 8$ (B) $x^2 + y^2 = 4$ (C) $x^2 + y^2 = 16$ (D) None of these .
23. $\int \left(x^2 + \frac{1}{x} + 5\sqrt{x} \right) dx =$
 (A) $x^3 + x^2 + \frac{5}{\sqrt{x}} + c$ (B) $\frac{x^3}{3} + \ln x + \frac{10}{3}x^{3/2} + c$
 (C) $\frac{x^3}{3} + \frac{x^2}{2} + \frac{10}{3}x^{3/2} + c$ (D) $\frac{x^3}{3} + \ln x + 10\sqrt{x} + c$
24. If $x = 2 \ln \cot t$ and $y = \tan t + \cot t$, the value of $\frac{dy}{dx}$ is
 (A) $\cot 2t$ (B) $\tan 2t$ (C) $\cos 2t$ (D) $\sec 2t$
25. A rod of length 4 cm slides over coordinate axes then locus of middle point of rod.
 (A) $x^2 + y^2 = 1$ (B) $x^2 + y^2 = 4$ (C) $x^2 + y^2 = 2$ (D) $x^2 + y^2 = 3$

space for rough work

26. Angle between two circles $x^2 + y^2 = 1$ and $(x-1)^2 + y^2 = 1$ is
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{2}$
27. If $A + B + C = 180^\circ$ then $\sin^2 A + \sin^2 B + \sin^2 C =$
(A) $1 + \cos A \cos B \cos C$ (B) $2 + 2 \cos A \cos B \cos C$
(C) $2 - 2 \cos A \cos B \cos C$ (D) None of these
28. Value of $\cos \frac{\pi}{7} \cos \frac{2\pi}{7} \cos \frac{4\pi}{7}$ be
(A) $\frac{1}{8}$ (B) $\frac{-1}{16}$ (C) $\frac{1}{16}$ (D) $\frac{-1}{8}$
29. If $\sin \alpha = \frac{1}{2}$, $\cos \beta = \frac{1}{3}$ and $0 < \alpha, \beta < \frac{\pi}{2}$, then $\alpha + \beta$ lies in the interval
(A) $(60^\circ, 90^\circ)$ (B) $(90^\circ, 120^\circ)$
(C) $(120^\circ, 300^\circ)$ (D) $(150^\circ, 180^\circ)$
30. $\lim_{x \rightarrow 0} \frac{\sin(-x)}{x}$
(A) 0 (B) 1 (C) -1 (D) does not exist

space for rough work

FIITJEE - JEE (Mains)

Batches: Two Yr CRP C-XI
PHYSICS, CHEMISTRY & MATHEMATICS
PHASE - I

CODE: 123038

Answer Key

SECTION - I
(PHYSICS)

1.	D	2.	B	3.	B	4.	B
5.	A	6.	C	7.	D	8.	C
9.	B	10.	D	11.	A	12.	C
13.	B	14.	C	15.	C	16.	C
17.	B	18.	B	19.	C	20.	A
21.	Marks to all	22.	C	23.	D	24.	C
25.	D	26.	D	27.	B	28.	D
29.	A	30.	A				

SECTION - II
(CHEMISTRY)

1.	C	2.	B	3.	A	4.	D
5.	C	6.	C	7.	D	8.	A
9.	B	10.	B	11.	B	12.	B
13.	B	14.	C	15.	B	16.	A
17.	C	18.	A	19.	B	20.	C
21.	A	22.	D	23.	A	24.	B
25.	C	26.	B	27.	C	28.	B
29.	C	30.	B				

SECTION - II
(MATHEMATICS)

1.	D	2.	B	3.	C	4.	C
5.	D	6.	A	7.	A	8.	C
9.	D	10.	B	11.	C	12.	A
13.	B	14.	C	15.	A	16.	C
17.	D	18.	D	19.	A	20.	A
21.	C	22.	A	23.	B	24.	A
25.	B	26.	C	27.	B	28.	D
29.	B	30.	C				