

JEE-ADVANCE: TEST-16

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 3 parts: Physics Section (I), (II) and (III); Chemistry Section (I), (II) and (III) & Mathematics Section (I), (II) and (III).**
 - **Single Choice: Physics Section (I) (1 to 10) Chemistry Section I (16 to 25) and Mathematics Section I (31 to 40), 2 marks for each correct answer and no negative marking for incorrect answer.**
 - **Multiple correct answer type questions : Physics Section (II) (11 to 15) Chemistry Section II (26 to 30) and Mathematics Section II (41 to 45), 4 marks for each correct answer and -1 mark for incorrect answer.**
 - **Integer Type: Physics Section-III (1 to 5); Chemistry Section-III (6 to 10) and Mathematics Section- III (11 to 15), for each question you will be awarded 4 marks if you darken the bubble corresponding to the correct answer and zero mark if no bubbles are darkened. In all other cases, minus one (-1) mark will be awarded.**

Name of the Student : _____

Section : _____

Centre : _____

Invigilator's Signature : _____

PHYSICS

SECTION- I: STRAIGHT OBJECTIVE 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 ONLY-ONE is correct

1. On a smooth horizontal floor of a truck, a block of mass m rests while being attached to its front by a spring of spring constant K . At time $t = 0$, the truck begins to move with constant acceleration a . The kinetic energy of the block at equilibrium position is

(a) $\frac{m^2 a^2}{3k}$ (b) $\frac{3m^2 a^2}{k}$ (c) $\frac{2m^2 a^2}{k}$ (d) $\frac{m^2 a^2}{2k}$

2. A string, 120 cm in length, sustains a standing wave with points of a string at which the displacement amplitude is equal to 3.5 mm being separated by 15.0 cm. To which overtone do these oscillations correspond?

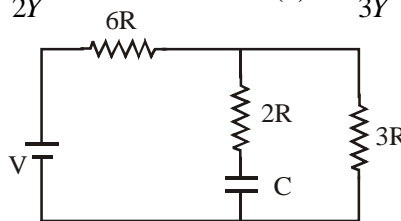
- (a) First (b) Second (c) Third (d) Fourth

3. A thin ring of radius R is made of a material of density ρ and Young's modulus Y . The ring is rotated in its own plane about its centre with angular velocity ω . The small increase in its radius is

(a) $\frac{\rho \omega^2 R^3}{Y}$ (b) $\frac{2\rho \omega^2 R^3}{3Y}$ (c) $\frac{3\rho \omega^2 R^3}{2Y}$ (d) $\frac{\rho \omega^2 R^3}{3Y}$

4. In the diagram shown, the time constant of the circuit is

(a) $4RC$ (b) $\frac{13RC}{4}$
 (c) $3RC$ (d) $\frac{4RC}{3}$



5. An α -particle is fired from origin with velocity $\vec{v} = v_o \hat{j} + v_o \hat{k}$ in a uniform magnetic field $B_o \hat{j}$. Which will not be the subsequent motion of α -particle?

- (a) Its z -coordinate can never be negative
 (b) Its x -coordinate can never be positive
 (c) Its x and z coordinate cannot be zero at the same time
 (d) Its y -coordinate will be proportional to its time of flight

6. A capacitor of capacitance C has charge q_o . It is connected to a resistance R and identical capacitor. The charge flowing through the resistance during a time interval Δt , is

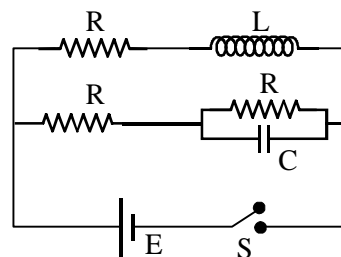
(a) $\frac{q_o}{2} \left[1 - e^{-\frac{2}{CR} \Delta t} \right]$ (b) $\frac{q_o}{2}$ (c) $q_o \left[1 - e^{-\frac{\Delta t}{CR}} \right]$ (d) q_o

7. On a smooth horizontal surface, a body of mass m_0 is placed. The mass of the body is decreasing exponentially with decay constant λ . Mass is ejected with a constant relative velocity u . If the body is at rest initially, then its velocity after time t , is

- (a) $u t$ (b) $u\lambda t$ (c) $\frac{ut}{\lambda}$ (d) data insufficient

8. The switch is closed at $t = 0$. The ratio of current (through battery) at time $t = 0$ to that at $t = \infty$ is

- (a) $2/3$ (b) $3/2$
(c) 2 (d) none of these



9. A conducting sphere of radius R carrying charge Q lies inside an uncharged conducting shell of radius $2R$. If they are joined by a metal wire, the amount of heat that will be produced is

- (a) $\frac{1}{4\pi\epsilon_0} \cdot \frac{Q^2}{4R}$ (b) $\frac{1}{4\pi\epsilon_0} \cdot \frac{Q^2}{2R}$ (c) $\frac{1}{4\pi\epsilon_0} \cdot \frac{Q^2}{R}$ (d) $\frac{2}{4\pi\epsilon_0} \cdot \frac{Q^2}{3R}$

10. A rocket is projected vertically from the surface of a planet of radius R with speed equal to the half of the escape velocity from that planet. If 20% of initial energy is lost due to atmospheric resistance, the distance covered by rocket before returning towards planet is

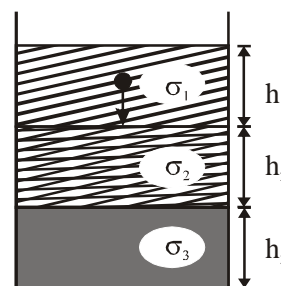
- (a) $\frac{R}{2}$ (b) $\frac{5R}{6}$ (c) $\frac{2R}{3}$ (d) $\frac{3R}{4}$

SECTION- II: MULTIPLE CORRECT ANSWERS TYPE

This section contains 5 multiple choice questions numbered 11 to 15. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

11. A ball of radius r and density ρ is moving in a liquid of density σ_1 with terminal velocity. Now, it enters another liquid of density σ_2 and then in a liquid of density σ_3 . The velocity of the ball remains same in all the three liquids. (Given $\sigma_3 > \sigma_2 > \sigma_1$). If n_1, n_2 and n_3 are their coefficients of viscosity, then which of the following is always true?

- (a) $n_3 > n_2 > n_1$ (b) $\frac{n_1}{n_3} > \frac{n_3}{n_2}$
(c) $\frac{n_2\sigma_1 - \sigma_2n_1}{n_3\sigma_1 - \sigma_3n_1} = \frac{n_2 - n_1}{n_3 - n_1}$ (d) $\frac{\sigma_1}{h_1} = \frac{\sigma_2}{h_2} = \frac{\sigma_3}{h_3}$



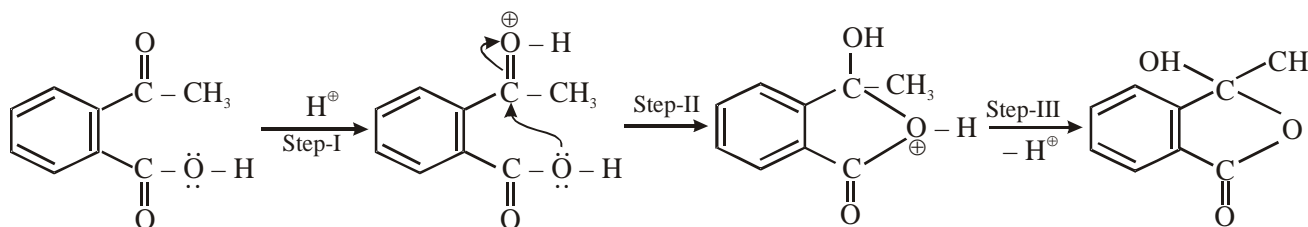
12. Which of the following statements is/are correct?
- Magnetic field inside an infinitely long solenoid is constant.
 - Magnetic field inside a long cylindrical conductor carrying current parallel to its axis is $\propto r$.
 - Magnetic field inside a long pipe carrying current parallel to its length is zero.
 - Magnetic field outside a long current wire is $\propto (1/r^2)$.
13. A man pushes against a rigid vertical wall. Choose the correct alternative(s).
- The man can never exert a force on the wall which exceeds his weight.
 - Whatever force the force man exerts on the wall, the wall exerts equal force on the man.
 - The maximum force, which the man can exert on the wall, is the maximum frictional force which exists between his feet and floor.
 - The man can never be in equilibrium.
14. From the following equations pick out the possible nuclear reactions
- ${}_6\text{C}^{12} + {}_1\text{H}^1 \rightarrow {}_7\text{N}^{13} + 2\text{MeV}$
 - ${}_6\text{C}^{13} + {}_1\text{H}^1 \rightarrow {}_6\text{C}^{14} + 4.3 \text{ MeV}$
 - ${}_7\text{N}^{14} + {}_1\text{H}^1 \rightarrow {}_8\text{O}^{15} + 7.3 \text{ MeV}$
 - ${}_{92}\text{U}^{235} + {}_0\text{n}^1 \rightarrow {}_{54}\text{Xe}^{140} + {}_{38}\text{Sr}^{96} + {}_0\text{n}^1 + \gamma + 200 \text{ MeV}$
15. A solid sphere of mass m and radius R is placed on a smooth horizontal surface. A sudden blow is given horizontally to the sphere at height $4R/5$ above the centre line. If I is the impulse of the blow, then
- minimum time after which highest point B will touch the ground is $\frac{\pi Rm}{I}$
 - minimum time after which highest point B will touch the ground is $\pi Rm/2I$
 - displacement of centre of mass during this time interval is πR
 - displacement of centre of mass during this time interval is $\pi R/2$

SECTION- I: STRAIGHT OBJECTIVE TYPE

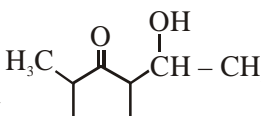
This section contains 10 multiple choice questions numbered 16 to 25. Each question has 4 choice (A), (B), (C) and (D), out of which ONLY-ONE is correct

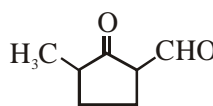
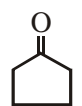
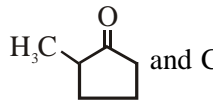
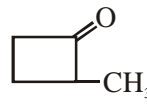
16. During electrolysis of an aqueous solution of CuSO_4 using copper electrodes, if 2.5 g of Cu is deposited at cathode, then at anode
- (a) 890 ml of Cl_2 at STP is liberated (b) 445 ml of O_2 at STP is liberated
- (c) 2.5 g of copper is deposited (d) a decrease of 2.5 g of mass takes place

17. Consider the mechanism of the given reaction



Which of these statements are correct?

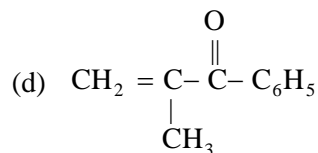
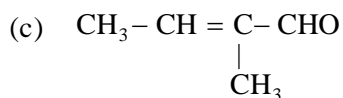
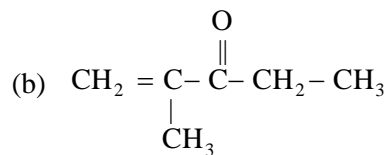
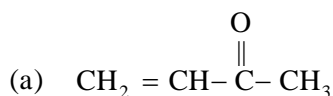
- (a) First step is protonation reaction which is reversible
- (b) Second step is nucleophilic addition reaction which is rate determining step
- (c) Product of the reaction is ester
- (d) all of these
18. In the given reaction $A + B \xrightarrow{\text{dil. base}}$  (A) and (B) will be

- (a)  and $\text{CH}_3 - \text{CHO}$ (b)  and $\text{CH}_3 - \text{CH}_2 - \text{CHO}$
- (c)  and $\text{CH}_3 - \text{CHO}$ (d)  and $\text{CH}_3 - \text{CH}_2 - \text{CHO}$

19. For the cell $\text{Pt}|\text{H}_2(0.4 \text{ atm})|\text{H}^+(\text{pH} = 1) \parallel \text{H}^+(\text{pH} = 2)|\text{H}_2(0.1 \text{ atm})|\text{Pt}$
- The measured potential at 25°C is

- (a) -0.1 V (b) -0.5 (c) -0.041 (d) none of these

20. Which of the following compounds can be prepared using aldol condensation?



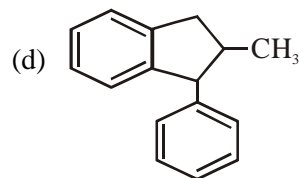
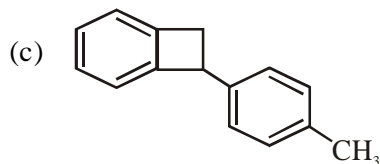
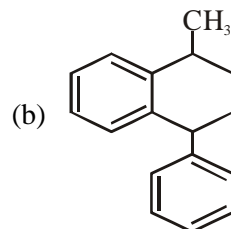
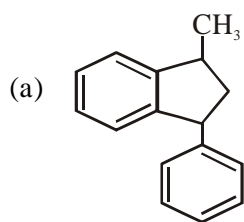
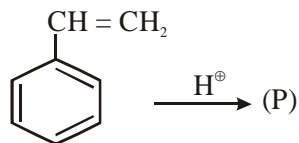
21. In the given reaction $\text{CH}_3 - \text{CHO} \xrightarrow{\text{CH}_3\text{MgBr}} \xrightarrow{\text{HOH}/\text{H}^+} [\text{X}]$. [X] will be

- (a) 1°-alcohol (b) 2°-alcohol (c) 3°-alcohol (d) open chain ether

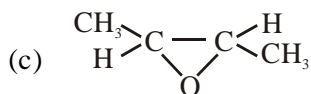
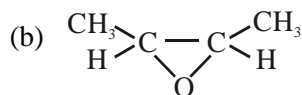
22. The equilibrium $\text{SO}_2\text{Cl}_2(\text{g}) \rightleftharpoons \text{SO}_2(\text{g}) + \text{Cl}_2(\text{g})$ is attained at 25°C in a closed rigid container and an inert gas, helium is introduced. Which of the following statement/s is/are correct.

- (a) concentrations of SO_2 , Cl_2 and SO_2Cl_2 do not change
 (b) more chlorine is formed
 (c) concentration of SO_2 is reduced
 (d) more SO_2Cl_2 is formed

23. Identify the final product of the following reaction



24. In the given reaction sequence $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow{\text{Na/NH}_3(l)} \xrightarrow{\text{C}_6\text{H}_5\text{COOH}} [\text{X}]$. [X] will be



25. When an electron makes a transition from $(n + 1)$ state to n state, the frequency of emitted radiations is related to n according to $(n \gg 1)$

(a) $\nu \propto n^{-3}$

(b) $\nu \propto n^2$

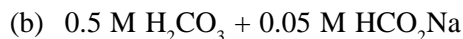
(c) $\nu \propto n^3$

(d) $\nu \propto n^{2/3}$

SECTION- II: MULTIPLE CORRECT ANSWERS TYPE

This section contains 5 multiple choice questions numbered 26 to 30. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

26. In which of the following pairs of solutions, there will be no effect upon the pH on dilution?



27. Which of the following condition/s is/are correct for a binary solution in which the solute as well as the solvent are liquid?

(a) C_6H_6 and $\text{C}_6\text{H}_5\text{CH}_3$ $\Delta H_{\text{solution}} = 0$; $\Delta V_{\text{solution}} = 0$

(b) CH_3COCH_3 and CHCl_3 $\Delta H_{\text{solution}} < 0$; $\Delta V_{\text{solution}} < 0$

(c) H_2O and HCl $\Delta H_{\text{solution}} > 0$; $\Delta V_{\text{solution}} < 0$

(d) H_2O and $\text{C}_2\text{H}_5\text{OH}$ $\Delta H_{\text{solution}} > 0$; $\Delta V_{\text{solution}} > 0$

28. The borax bead test can be used to detect the presence of

(a) Al

(b) Cr

(c) Fe

(d) Co

29. Which elements exhibit inert pair effect

(a) B

(b) Al

(c) Tl

(d) Ga

30. Which of the following do not react with Fehling's solution?

(a) Benzaldehyde

(b) Acetaldehyde

(c) Glucose

(d) Acetophenone

SECTION- I: STRAIGHT OBJECTIVE TYPE

This section contains 10 multiple choice questions numbered 31 to 40. Each question has 4 choice (A), (B), (C) and (D), out of which ONLY-ONE is correct

- 31.** If z is a complex number, then the area enclosed by $|z - 1| + |z + 1| = 4$ is
 (a) π (b) $2\sqrt{3}\pi$ (c) 3π (d) 2π
- 32.** The number of all rational terms in the expansion of $(3^{1/5} + 2^{1/3})^{15}$ is
 (a) 4 (b) 2 (c) 3 (d) 5
- 33.** The number of distinct real solutions of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is
 (a) 0 (b) 2 (c) 1 (d) 3
- 34.** The number of ways in which an examiner can assign 20 marks to 6 questions (no negative marks, marks are awarded in integers) if each question is of 10 marks is
 (a) ${}^{24}C_{20} - {}^{13}C_9$ (b) ${}^{24}C_{20} - {}^{13}C_{10}$ (c) ${}^{25}C_5 - 6 \times {}^{14}C_5$ (d) none of these
- 35.** A regular polygon of nine sides, each of length 2 is inscribed in a circle, the radius of the circle is
 (a) $\sec \pi/9$ (b) $\sin \pi/9$ (c) $\operatorname{cosec} \pi/9$ (d) $\tan \pi/9$
- 36.** Let $P = (0, 0)$, $Q = (2, 0)$ and $R = (1, \sqrt{3})$ be three points. Then the equation of the bisector of the angle PQR is
 (a) $\frac{\sqrt{3}}{2}x + y = 0$ (b) $x + \sqrt{3}y = 0$ (c) $\sqrt{3}y = x - 2$ (d) $\sqrt{3}y = x + 2$
- 37.** If the chord through points $\pi/3$ and $\pi/6$ on an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ intersects the major axis at a distance k from the centre then $\frac{k - a}{k + a}$ equals
 (a) 2 (b) $2 + \sqrt{3}$ (c) $2 - \sqrt{3}$ (d) 1
- 38.** The integer n for which $\lim_{x \rightarrow 0} \frac{(\cos x - 1)(\cos x - e^x)}{x^n}$ is finite non zero number is
 (a) 1 (b) 2 (c) 3 (d) 4

39. If $f(x) = \begin{cases} x^3, & \text{when } x \text{ is rational} \\ x^2, & \text{when } x \text{ is irrational} \end{cases}$, then
- (a) $f(x)$ is continuous at only one point (b) $f(x)$ is continuous at only two points
(c) $f(x)$ is discontinuous at only one point (d) $f(x)$ is discontinuous at only two points.
40. The value of $\int_1^{e^{37}} \frac{\pi \sin(\pi \ln x)}{x} dx$ is
- (a) 1 (b) 2 (c) 4 (d) -2

SECTION- II: MULTIPLE CORRECT ANSWERS TYPE

This section contains 5 multiple choice questions numbered 41 to 45. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

41. If $f(x)$ is such that $\int_{n-1}^n f(x) dx = n^2 - n$, then which of the following is correct
- (a) $f(1) = 2$ (b) $f(1) = 1$ (c) $f(2) = 8$ (d) $f(2) = 4$
42. If P (2, 3, 1) is a point and $L \equiv x - y - z - 2 = 0$ is a plane, then
- (a) distance of P from the plane is $\frac{4}{\sqrt{3}}$ (b) origin and P lie on the same side of the plane
(c) Foot of perpendicular is $\left(\frac{10}{3}, \frac{5}{3}, \frac{-1}{3}\right)$ (d) Image of point P by the plane $\left(\frac{10}{3}, \frac{5}{3}, \frac{-1}{3}\right)$
43. Let \hat{b} and $\hat{c} = 3\hat{i} - 4\hat{j}$ be two vectors perpendicular to each other in the xy -plane. All vectors in the same plane having projection 1 and 2 along \hat{b} and \hat{c} respectively, is/are given by
- (a) $2\hat{i} + \hat{j}$ (b) $\frac{2\hat{i} + 11\hat{j}}{5}$ (c) $2\hat{i} - \hat{j}$ (d) $\frac{-2\hat{i} + 11\hat{j}}{5}$
44. Let E and f be two independent events. The probability that both E and F happen is $1/12$ and the probability that at least one of them happens is $1/2$ then
- (a) $P(E) = \frac{1}{3}, P(F) = \frac{1}{4}$ (b) $P(E) = \frac{1}{2}, P(F) = \frac{1}{6}$
(c) $P(E) = \frac{1}{6}, P(F) = \frac{1}{2}$ (d) $P(E) = \frac{1}{4}, P(F) = \frac{1}{3}$

45. If n and m are +ve integers which of the following is/are an integer

(a) $\frac{(mn)!}{(m!(n!)^m)}$

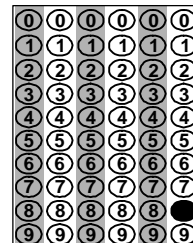
(b) $\frac{(n^2)!}{(n!)^{n+1}}$

(c) $\frac{n \times (n+1) \times (n+2) \times \dots \times (n+r-1)}{(r+1)!}$

(d) $\frac{m!+n!}{(m+n)!}$

SECTION- III: INTEGER ANSWER TYPE

This section contains 15 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. The appropriate bubbles corresponding to the answers to these questions have to be darkened as illustrated in the following example: If answer of question number (1) is 8, then the correct darkening of bubbles will look like the following.



PHYSICS

- A container has a liquid of variable density $\rho = \rho_o \left[4 - \frac{3h}{h_o} \right]$ upto height h_o , ρ_o is constant and h is measured from bottom of the container. A solid block of small dimension, whose density is $\frac{5}{2}\rho_o$ and mass m , is released from bottom of the tank. The frequency of small oscillations is $\frac{1}{2\pi} \sqrt{\frac{ng}{5h_o}}$. If g is acceleration due to gravity, find the value of n .
- Pressure P , volume V and temperature T for a certain material are related by $P = \frac{\alpha T - \beta T^2}{V}$, where α & β are constant. If pressure remains constant and temperature changes from T_1 to T_2 , then work done by the material is $\alpha(T_2 - T_1) - \beta(T_2^n - T_1^n)$. Find the value of n .
- A point electric dipole with a moemnt $\frac{1}{P}$ is placed in external uniform electric field $\frac{1}{E_o}$ with $\frac{1}{P} \parallel \frac{1}{E_o}$. In this case one of the equipotential surfaces enclosing the dipoles forms a sphere. The radius of sphere is $\left(\frac{P}{4\pi \epsilon E_o} \right)^{1/n}$. Find the value of n .

4. A particle of mass m moves along a circular orbit in a centro symmetrical potential field $U(r) = \frac{kr^2}{2}$ when k is constant and r is the radius. Using the Bohr's quantization conditions, the permissible orbital radii of the particle is given by $\left[\frac{n^2 h^2 m}{4\pi^2 m} \right]^{1/x}$. Find the value of x .
5. A particle is projected with velocity $(3\hat{i} + 4\hat{j})$ m/sec in magnetic field $4\hat{k}$ Tesla. Its time period is T . If same particle is projected with velocity $(2\hat{i} + 6\hat{j})$ m/sec in same magnetic field its time period becomes nT . Find n .

CHEMISTRY

6. 0.0125 mol of sucrose is dissolved in 100 gm of water and it under go partial inversion according to following equation
- $$C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$
- If elevation in boiling point of solution is 0.104°C calculate $1/10^{\text{th}}$ of the mole percentage of sugar inverted ($K_{\text{bH}_2\text{O}} = 0.52$)
7. The standard oxidation potential of Ni/Ni^{2+} electrode is 0.236 V. If this is combined with a hydrogen electrode in acid solution, at what pH of the solution will the measured e.m.f. be zero at 25°C ? Assume $[\text{Ni}^{2+}] = 1\text{M}$ and $P_{\text{H}_2} = 1\text{ atm}$.
8. Reaction of Br_2 with Na_2CO_3 in aqueous solution gives sodium bromide and sodium bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is
9. The total number of alkenes possible by dehydrobromination of 3-bromo-3-cyclopentylhexane using alcoholic KOH is
10. A container having 3 moles of gas occupies 60 litres at pressure P and T . If 0.1 mole of gas are introduced at same P and T , what will be the change in volume?

MATHEMATICS

11. Find the maximum number of points with rational co-ordinates on a circle whose can be is $(\sqrt{7}, 0)$.
12. If $f(x) = \frac{1}{x-1}$ then find the total number of points of discontinuity of $f(f(f(x)))$

13. Find the shortest distance between z -axis and the line $\frac{x-5}{-1} = \frac{y+2}{0} = \frac{z-0}{1}$.
14. Find the number of solutions of the equation $\tan^2 x - \sec^{10} x + 1 = 0$ in $(0, 10)$
15. If $a_1, a_2, a_3, \dots, a_{10}$ be in AP and h_1, h_2, \dots, h_{10} be in HP if $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then the value of $a_4 h_7$ is...

JEE-ADVANCE: TEST-16

TEST SERIES

PAPER-I

Time : 3 hrs.

M.M.: 180

TEST CODE - A

ANSWERS

Physics: Section I to II

- | | | | | | |
|-----------|-----------|-----------|---------|-----------|-------------|
| 1. (d) | 2. (c) | 3. (a) | 4. (a) | 5. (a) | 6. (a) |
| 7. (b) | 8. (b) | 9. (a) | 10. (c) | 11. (b,c) | 12. (a,b,c) |
| 13. (b,c) | 14. (a,c) | 15. (b,d) | | | |

Chemistry: Section I to II

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|-------------|-----------|-----------|---------|-----------|-------------|
| 16. (d) | 17. (d) | 18. (c) | 19. (c) | 20. (c) | 21. (b) |
| 22. (a) | 23. (a) | 24. (c) | 25. (a) | 26. (a,c) | 27. (a,b,d) |
| 28. (b,c,d) | 29. (c,d) | 30. (a,d) | | | |

Mathematics: Section I to II

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|-----------|-----------|-----------|---------|-----------|-------------|
| 31. (b) | 32. (b) | 33. (c) | 34. (c) | 35. (c) | 36. (c) |
| 37. (d) | 38. (c) | 39. (b) | 40. (b) | 41. (b,d) | 42. (a,b,c) |
| 43. (c,d) | 44. (a,d) | 45. (a,b) | | | |

Section-III (PCM)

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|---------|---------|---------|---------|---------|---------|
| 1. (6) | 2. (2) | 3. (3) | 4. (4) | 5. (1) | 6. (6) |
| 7. (4) | 8. (5) | 9. (5) | 10. (2) | 11. (2) | 12. (3) |
| 13. (2) | 14. (3) | 15. (6) | | | |