

JEE-ADVANCE: TEST-14

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 : _____

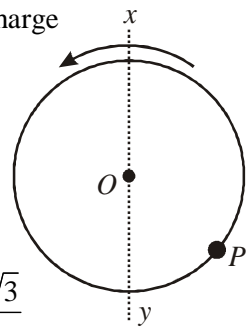
Section : _____

Centre : _____

Invigilator's Signature : _____

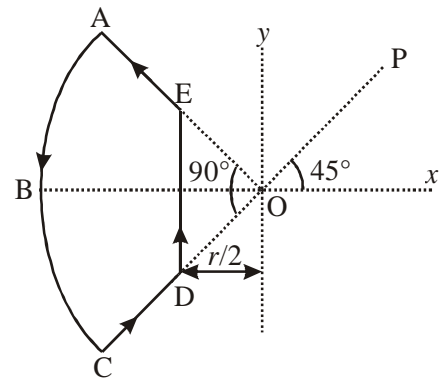
5. A particle is moving in a plane with a velocity given by $\vec{v} = 2\hat{i} + 3\pi \cos(3\pi t)\hat{j} + 2\hat{k}$. If the particle is at origin at $t = 0$, then the magnitude of displacement of the particle from origin at $t = 1$ sec will be
 (a) 1m (b) $2\sqrt{2}$ m (c) $\sqrt{3}$ m (d) $\sqrt{5}$ m
6. A bucket contains water filled upto a height = 15 cm. The bucket is tied to a rope which is passed over a frictionless light pulley and the other end of the rope is tied to a weight of mass which is half of that of the (bucket + water). The pressure at the bottom due to water column is
 (a) 0.5 k Pa (b) 1 k Pa (c) 5 k Pa (d) none of these
7. A student originally charges a fixed capacitor to have a potential energy of 1 J. If the student wishes to give the capacitor a potential energy of 4 J, then the student should
 (a) quadruple the potential difference across the capacitor but leave the charge unchanged
 (b) double the potential difference across the capacitor but leave the charge unchanged
 (c) double both the potential difference across the capacitor and the charge on it
 (d) leave the potential difference across the capacitor unchanged while doubling the charge

8. A small ring P is threaded on a smooth wire bent in the form of a circle of radius a and centre O. The wire is rotating with constant angular speed ω about a vertical diameter xy , while the ring remains at rest relative to the wire at a distance $a/2$ from xy . The value of ω^2 is



- (a) $\frac{2g}{a}$ (b) $\frac{g}{2a}$ (c) $\frac{2g}{a\sqrt{3}}$ (d) $\frac{g\sqrt{3}}{2a}$

9. A wire loop ABCDE carrying a current I is placed in x - y plane as shown in figure. A particle of mass m and charge q is projected from origin with velocity $\vec{v} = \frac{v_0}{\sqrt{2}}(\hat{i} + \hat{j})$ m/s. The instantaneous acceleration acts along (r = radius of circular arc ABC)



- (a) y -axis (b) OA
 (c) x -axis (d) OP
10. If the kinetic energy of a free electron doubles, its de-Broglie wavelength changes by the factor
 (a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$ (c) $\frac{1}{2}$ (d) 2

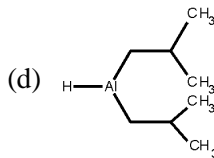
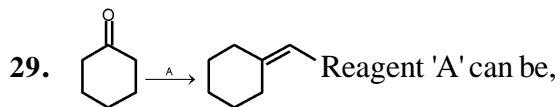
15. A beam of ultraviolet radiation having λ between 100 nm and 200 nm is incident on a sample of hydrogen atom. Assuming that atoms are in ground state which wavelengths will have low intensity in the transmitted beam?
- (a) 122 nm (b) 100 nm (c) 103 nm (d) 105 nm

CHEMISTRY

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. The temperature coefficient of a reaction is 2. The rate of this reaction, on raising the temperature by 25° shall increase by
- (a) 4 times (b) 8 times (c) 6 times (d) 5.65 times
17. The mass of glucose that would be dissolved in 50 g of water in order to produce the same lowering of vapour pressure as is produced by dissolving 1 g of urea in the same quantity of water is:
- (a) 1 g (b) 3 g (c) 6 g (d) 18 g
18. 10 moles of an ideal gas confined to a volume of 10 L is released into atmosphere at 300 K where the pressure is 1 bar. The work done by the gas is:
($R = 0.0083 \text{ L bar K}^{-1} \text{ mol}^{-1}$)
- (a) 249 L bar (b) 259 L bar (c) 239 L bar (d) 220 L bar
19. If values of ΔH_f° of ICl(g) , Cl(g) and I(g) are respectively 17.57, 121.34, 106.96 J mol^{-1} . The value of I-Cl (bond energy in J mol^{-1}) is:
- (a) 17.57 (b) 210.73 (c) 35.15 (d) 106.96
20. A certain substance 'A' tetramerises in water to the extent of 80%. A solution of 2.5 g of A in 100 g of water lowers the freezing point by 0.3°C . The molar mass of A is:
- (a) 122 (b) 31 (c) 244 (d) 62
21. Lowering of vapour pressure due to a solute in 1 molal aqueous at 100°C is:
- (a) 13.44 mm Hg (b) 14.12 mm Hg (c) 31.2 mm Hg (d) 35.2 mm Hg
22. Distance between octahedral & tetrahedral voids in FCC lattice would be
- (a) $a\sqrt{3}$ (b) $\frac{a\sqrt{3}}{2}$ (c) $\frac{a\sqrt{3}}{3}$ (d) $\frac{a\sqrt{3}}{4}$



30. Saturated hydrocarbon gas is evolved by carbide(s) is/are:



MATHEMATICS

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. The area bounded by the curves $y - 1 = |x|$, $y = 0$ and $|x| = \frac{1}{2}$, is equal to

(a) $\frac{3}{4}$ sq. units

(b) $\frac{3}{2}$ sq. units

(c) $\frac{5}{4}$ sq. units

(d) $\frac{5}{2}$ sq. units

32. The value of $\int_1^e \left(\left(\frac{1}{x} - x + x \ln x \right) \sin x \right) dx$, is

(a) $\sin e - \cos 1$

(b) $\cos e - \sin 1$

(c) $\sin e + \cos 1$

(d) $\cos e + \sin 1$

33. If $|b| > |a + c|$, then atleast one root of the equation $ax^4 + bx^3 + c = 0$ lies in the interval

(a) $(-2, 0)$

(b) $(-1, 2)$

(c) $(0, 2)$

(d) $(1, 3)$

34. $n \in \mathbb{N}$, $n > 1$ such that $8n + 1$ is a perfect square, then

(a) n must be odd

(b) n can't be perfect square

(c) n must be prime number

(d) $2n$ can't be a perfect square

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. Let $I = \int_0^{1/2} \left(\frac{1}{4} - x^2\right)^4 dx$, then

(a) $I = \int_0^{1/2} x^4(1-x)^4 dx$

(b) $I = \frac{1}{2} \int_0^1 x^4(1-x)^4 dx$

(c) $I = \int_0^{\pi/2} \sin^9 \theta \cos^9 \theta d\theta$

(d) $I = \frac{1}{1260}$

42. 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) $9x - 3y - 8 = 0$

43. The value of the integral $\int_0^{\pi/4} \frac{dx}{(a^2 \cos^2 x + b^2 \sin^2 x)}$ is

(a) $\frac{1}{ab} \tan^{-1} \left(\frac{b}{a}\right) (a > 0, b > 0)$

(b) $\frac{1}{ab} \tan^{-1} \left(\frac{b}{a}\right) (a < 0, b < 0)$

(c) $\frac{\pi}{4} (a=1, b=1)$

(d) None of these

44. Let $f(x) = \cos^2 x \cdot e^{\tan x}$, $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, then

(a) $f'(x)$ has a point of local minima at $x = \frac{\pi}{4}$

(b) $f'(x)$ has a point of local maxima in the interval $\left(-\frac{\pi}{4}, 0\right)$

(c) $f'(x)$ has exactly two points of local maxima/minima in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

(d) $f''(x)$ has no root in $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

5. Consider an excited hydrogen atom in state n moving with a velocity v ($v \ll c$). It emits a photon in the direction of its motion and changes in its state to a lower state m . The frequency ν of the emitted radiation is approximately

$$\nu_0 \left[x + \frac{v}{c} \right]. \text{ Find } x.$$

CHEMISTRY

6. The enthalpy of neutralisation of 0.4 M H_2SO_4 will be how many times the enthalpy of neutralisation of 0.1 M HCl ?
7. The number of intensive properties among the following is
Temperature, Pressure, Volume, Heat capacity, Density, pH of a solution, EMF of a cell, Entropy, Free energy, Enthalpy, Surface Tension, Viscosity, Boiling point.
8. When a current of x amperes from a 20.9 volt battery is used for .40 seconds to heat 100 gm H_2O , its temperature increased by 1°C . Heat capacity of H_2O is $4.18 \text{ JK}^{-1} \text{ gm}^{-1}$. If all the electrical energy is converted into thermal energy then what is the value of x ?
9. If 1-chloro-4-methylcyclohexane is treated with KOH (aq) both substitution ($\text{S}_{\text{N}}2$) and elimination (E^2) reactions takes place simultaneously in comparable amount. In total how many substitution plus elimination products are obtained?
10. Vapour pressure of a volatile liquid A is 60 torr at 27°C . Vapour pressure of another volatile liquid B is 42 torr at 27°C . How many moles of B should be added to 4 moles of A in order to bring down the vapour pressure of solution by 20% at 27°C ?

MATHEMATICS

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

JEE-ADVANCE: TEST-14

TEST SERIES

PAPER-I

Time : 3 hrs.

M.M.: 180

TEST CODE - A

ANSWERS

Physics: Section I to II

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

Chemistry: Section I to II

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

Mathematics: Section I to II

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

Section-III (PCM)

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