

JEE-ADVANCE: TEST-9

TEST SERIES

PAPER-II

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).**
 - **Multiple correct answer type questions : Physics Section (II) (1 to 8) Chemistry Section II (21 to 28) and Mathematics Section II (41 to 48), 3 marks for each correct answer and -1 mark for incorrect answer.**
 - **Linked Comprehension type questions: Physics Section-II (9 to 16) (4 comprehensions, with 2 questions); Chemistry Section-II (29 to 36) (4 comprehension, with 2 questions); Mathematics Section- II (49 to 56) (3 comprehension, with 3 and 2 questions) 3 marks for each correct answer and -1 mark for incorrect answer.**
 - **Match the following: Physics Section-III (17 to 20); Chemistry Section-III (37 to 40) and Mathematics Section- IV (57 to 60) 3 marks for each correct answer and -1 mark for incorrect answer.**

Name of the Student : _____

Section : _____

Centre : _____

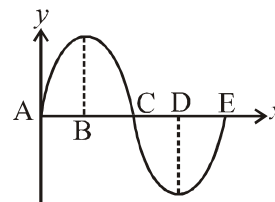
Invigilator's Signature : _____

SECTION- I: MULTIPLE CORRECT ANSWERS TYPE

This section contains 8 multiple choice questions numbered 1 to 8. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

1. Sound wave is travelling along positive x -direction. Displacement (y) of particles from their mean positions at position x is shown in figure. Choose the correct alternative (s) :

- (a) Particle located at E has its velocity in negative x -direction
- (b) Particle located at D has zero velocity
- (c) Particles located near C are under compression
- (d) none of these



2. At ordinary temperatures, the molecules of an ideal gas have only translational and rotational kinetic energies. At high temperatures they may also have vibrational energy. As a result of this at higher temperatures : (C_v = molar heat capacity at constant volume)

- (a) $C_v = 3/2 R$ for a monoatomic gas
- (b) $C_v = 5/2 R$ for a diatomic gas
- (c) $C_v < \frac{5}{2} R$ for a diatomic gas
- (d) $C_v > \frac{5}{2} R$ for a diatomic gas

3. There are three optical media 1, 2, and 3 with their refractive indices $\mu_1 > \mu_2 > \mu_3$. (TIR \rightarrow total internal reflection)

- (a) when a ray of light travels from 3 to 1 to TIR may take place
- (b) critical angle between 1 and 2 is less than the critical angle between 1 and 3
- (c) critical angle between 1 and 2 is more than the critical angle between 1 and 3
- (d) chances of TIR are more when ray of light travels from 1 to 3 as compare to the case when it travel from 1 to 2

4. The ground state and first excited state energies of hydrogen atom are -13.6 eV and -3.4 eV respectively. If potential energy in ground state is taken to be zero. Then

- (a) potential energy in the first excited state would be 20.4 eV
- (b) total energy in the first excited state would be 23.8 eV
- (c) kinetic energy in the first excited state would be 3.4 eV
- (d) none of these

5. The magnitude of the gravitational field at distances r_1 and r_2 from the centre of a uniform sphere of radius R and mass M are F_1 and F_2 respectively. Then
- (a) $\frac{F_1}{F_2} = \frac{r_1}{r_2}$ if $r_1 < R$ and $r_2 < R$ (b) $\frac{F_1}{F_2} = \frac{r_1^2}{r_2^2}$ if $r_1 > R$ and $r_2 > R$
- (c) $\frac{F_1}{F_2} = \frac{r_1}{r_2}$ if $r_1 > R$ and $r_2 > R$ (d) $\frac{F_1}{F_2} = \frac{r_1^2}{r_2^2}$ if $r_1 < R$ and $r_2 < R$
6. When an air bubble rises from the bottom of a deep lake to a point just below the water surface, the pressure of air inside the bubble
- (a) is greater than the pressure outside it (b) is less than the pressure outside it
- (c) increases as the bubble moves up (d) decreases as the bubble moves up
7. Let m_p be the mass of a proton, m_n the mass of a neutron, M_1 the mass of a $^{20}_{10}\text{Ne}$ nucleus and M_2 the mass of a $^{40}_{20}\text{Ca}$ nucleus. Then
- (a) $M_2 = 2M_1$ (b) $M_2 > 2M_1$ (c) $M_2 < 2M_1$ (d) $M_1 < 10(m_n + m_p)$
8. Two satellites s_1 & s_2 of equal masses revolve in the same sense around a heavy planet in coplanar circular orbit of radii R & $4R$
- (a) the ratio of period of revolution s_1 & s_2 is 1 : 8.
- (b) their velocities are in the ratio 2 : 1
- (c) their angular momentum about the planet are in the ratio 2 : 1
- (d) the ratio of angular velocities of s_2 w.r.t. s_1 when all three are in the same line is 9 : 5.

SECTION- II: PARAGRAPH TYPE

This Section contains **4 paragraphs** each describing theory, experiment, data etc. **Eight questions** relate to four paragraphs with two questions on each paragraph. Each question of a paragraph has **only one correct answer** amount the four choice (A), (B), (C) and (D).

Paragraph for Question 9 to 11

A charged particle (q, m) is released from origin with velocity $\vec{v} = v_0 \hat{i}$ in a uniform magnetic field

$$\vec{B} = \frac{B_0}{2} \hat{i} + \frac{\sqrt{3}B_0}{2} \hat{j}.$$

9. Pitch of the helical path described by the particle is
- (a) $\frac{2\pi m v_0}{B_0 q}$ (b) $\frac{\sqrt{3}\pi m v_0}{2B_0 q}$ (c) $\frac{\pi m v_0}{B_0 q}$ (d) $\frac{2\sqrt{3}\pi m v_0}{B_0 q}$

10. z -component of velocity is $\frac{\sqrt{3}v_0}{2}$ after time $t = \dots\dots\dots$

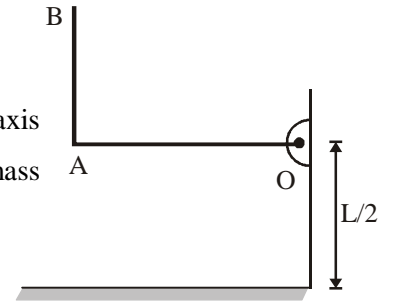
- (a) $\frac{2\pi m}{B_0 q}$ (b) $\frac{\pi m}{B_0 q}$ (c) $\frac{\pi m}{2B_0 q}$ (d) $\frac{2\pi m}{4B_0 q}$

11. Maximum z -coordinate of the particle is

- (a) $\frac{\sqrt{3}mv_0}{B_0 q}$ (b) $\frac{2\sqrt{3}mv_0}{B_0 q}$ (c) $\frac{2mv_0}{B_0 q}$ (d) $\frac{mv_0}{B_0 q}$

Paragraph for Question 12 to 14

An L shaped frame is free to rotate in a vertical plane about a horizontal axis passing through a smooth hinge O. Each side of the frame has a length L and mass m . Frame is let to fall with one side horizontal and the other vertical.



12. Angular acceleration of the frame just after it is allowed to fall is

- (a) $\frac{4g}{3L}$ (b) $\frac{9g}{8L}$ (c) $\frac{g}{2L}$ (d) $\frac{3g}{2L}$

13. With what speed the end A will strike the ground.

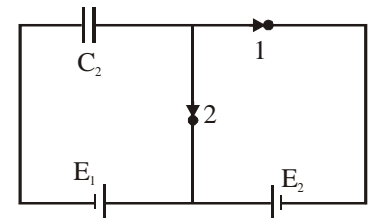
- (a) $1.1 \sqrt{gL}$ (b) $2 \sqrt{gL}$ (c) $3.2 \sqrt{gL}$ (d) \sqrt{gL}

14. What is moment of inertia of frame w.r.t. horizontal axis through O

- (a) $\frac{5}{6} ml^2$ (b) $\frac{5}{3} ml^2$ (c) $\frac{5}{4} ml^2$ (d) none of these

Paragraph for Question 15 to 16

In the circuit diagram shown, when switch is shifted from position 1 to position 2.



15. What is the charge drawn from battery E_1

- (a) $E_1 C$ (b) $E_2 C$ (c) $E_1^2/E_2 C$ (d) none of these

16. Heat generated in the circuit is

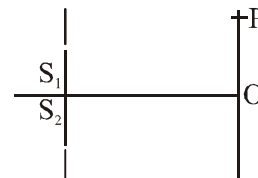
- (a) $1/2 E_1^2 C$. (b) $1/2 E_2^2 C$. (c) $1/4 E_2^2 C$. (d) none of these

SECTION- III: MATCHING LIST TYPE

This Section contains **4 multiple choice questions**. Each question has matching lists. The codes for lists have choice (A), (B), (C) and (D) out of which **ONLY ONE** may be correct.

- 17.** In the YDSE apparatus shown in figure Δx is the path difference between S_2P and S_1P . Now a glass slab is introduced in front of S_2 , then match the following :

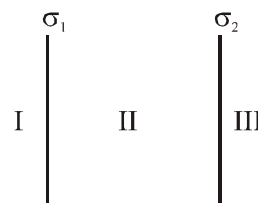
- | | | | |
|---|--|-----|----------------|
| A | Δx at P will | (p) | increase |
| B | fringe width will | (q) | shift downward |
| C | fringe pattern will | (r) | remain same |
| D | number of fringes between O and P will | (s) | shift upward |



- | | | | |
|-----|----------------------------|-----|----------------------------|
| (a) | A-(p), B-(r), C-(q), D-(r) | (b) | A-(q), B-(r), C-(p), D-(s) |
| (c) | A-(s), B-(r), C-(p), D-(q) | (d) | A-(r), B-(p), C-(p), D-(q) |

- 18.** Two parallel metallic plates have surface charge densities σ_1 and σ_2 as shown in figure. Match the following

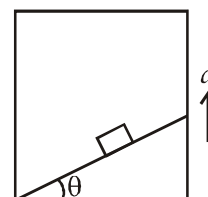
- | | | | |
|----|------------------------------|-----|---|
| A | If $\sigma_1 + \sigma_2 = 0$ | (p) | electric field in region III is towards right |
| B | If $\sigma_1 + \sigma_2 > 0$ | (q) | electric field in region I is zero |
| C | If $\sigma_1 + \sigma_2 < 0$ | (r) | electric field in region I is towards right |
| D. | If $\sigma_1 = \sigma_2$ | (s) | electric field in region II is zero. |



- | | | | |
|-----|----------------------------|-----|----------------------------|
| (a) | A-(q), B-(p), C-(p), D-(r) | (b) | A-(q), B-(p), C-(r), D-(s) |
| (c) | A-(r), B-(p), C-(s), D-(q) | (d) | A-(r), B-(p), C-(p), D-(q) |

- 19.** A block of mass m is stationary with respect to a rough wedge as shown in figure. Starting from rest in time t , ($m = 1 \text{ kg}$, $\theta = 30^\circ$, $a = 2 \text{ m/s}^2$, $t = 4\text{s}$) work done on block :

- | | | | |
|---|--------------------|-----|-------|
| A | By gravity | (p) | 144 J |
| B | By normal reaction | (q) | 32 J |
| C | By friction | (r) | 160 J |
| D | By all the forces | (s) | 48 J |



- | | | | |
|-----|----------------------------|-----|----------------------------|
| (a) | A-(q), B-(p), C-(p), D-(r) | (b) | A-(q), B-(r), C-(p), D-(s) |
| (c) | A-(s), B-(r), C-(p), D-(q) | (d) | A-(r), B-(p), C-(p), D-(q) |

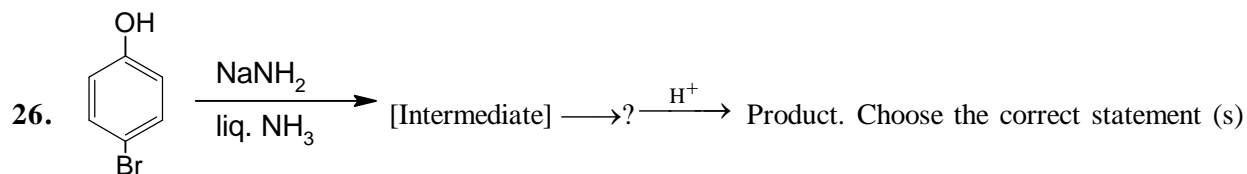
20. A Work done by all the forces. (p) Change in kinetic energy
 B Work done by all the forces except conservation force. (q) zero
 C Work done by all conservative force. (r) change in kinetic energy + change in potential energy.
 D Work done by centripetal force. (s) work done in one complete revolution is zero.
- (a) A-(q), B-(p),(r), C-(p), D-(r) (b) A-(q), B-(r), C-(p),(s), D-(s)
 (c) A-(s), B-(r),(s), C-(p), D-(q) (d) A-(q), B-(r), C-(s), D-(q),(s)

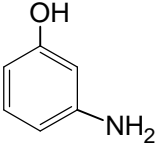
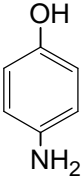
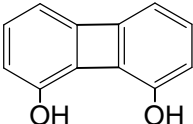
CHEMISTRY

SECTION- I: MULTIPLE CORRECT ANSWERS TYPE

This section contains 8 multiple choice questions numbered 21 to 28. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

21. In the depression of freezing point experiment, it is found that the
 (a) Vapour pressure of the solution is less than that of pure solvent.
 (b) Vapour pressure of the solution is more than that of pure solvent.
 (c) Only solute molecules solidify at the freezing point
 (d) Only solvent molecules solidify at the freezing point
22. Decrease in atomic number is observed during
 (a) α -emission (b) $_{-1}\beta^{\circ}$ emission (c) $_{+1}\beta^{\circ}$ emission (d) k-electron capture
23. A weak acid HA has a pH = 4. This can be confirmed as
 (a) $C = 10^{-3}$, $\alpha = 10\%$ (b) $C = 10^{-2}$, $K_a = 10^{-6}$
 (c) $[A^-] = 10^{-4}$ (d) $K_a = 10^{-2}$, $\alpha = 10\%$
24. Which of the following compound/compounds on heating donot/doesnot evolve Ammonia?
 (a) $(NH_4)_2Cr_2O_7$ (b) NH_4NO_2 (c) NH_4NO_3 (d) $(NH_4)_2SO_4$
25. Certain weak monobasic acid has $K_a = 10^{-4}$ M and also a weak monoacidic base has $K_b = 10^{-4}$ M. at $25^{\circ}C$ value of equilibrium constant when these react to given salt and water $18x$; The incorrect values are:
 (a) 10^{-6} (b) 10^{-14} (c) 10^4 (d) 10^6



- (a)  is formed (b) Intermediate formed is aromatic
- (c)  is formed involving non-aromatic intermediate
- (d)  is also formed

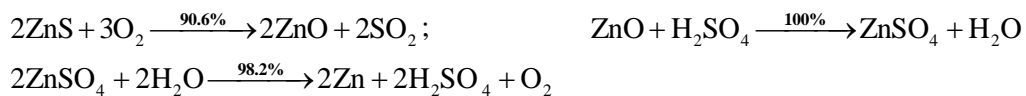
27. $3\text{HCHO} + \text{CH}_3\text{CHO} \xrightarrow{\text{NaOH}}$ A. A found can
- (a) reduce Tollen's reagent (b) give Cannizzaro reaction
- (c) react with Na (d) none of these
28. An oleum bottle labelled 109%. it means it contains:
- (a) 40% free SO_3 (b) 60% H_2SO_2
- (c) 9 gm. of water in 100 g of oleum (d) Labelling is wrong.

SECTION- II: PARAGRAPH TYPE

This Section contains **4 paragraphs** each describing theory, experiment, data etc. **Eight questions** relate to four paragraphs with two questions on each paragraph. Each question of a paragraph has **only one correct answer** among the four choice (A), (B), (C) and (D).

Paragraph for Question 29 to 31

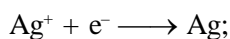
Extraction of Zn is possible from ZnS ore. Concentrated ore is heated to convert it to ZnO which is then treated with H_2SO_4 to produce ZnSO_4 . This is then subjected to electrolysis. Reactions are as follows:



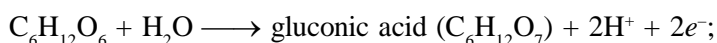
29. How much Zn would be obtained from an ore having 225 kg of ZnS? Efficiency of process is given above
[Zn = 65, S = 32, O = 16, H = 1]
- (a) 134 kg (b) 112 kg (c) 102 kg (d) 130 kg
30. How much current is required (with 100% efficiency) for electrolysis if it takes one month.
- (a) 10.2A (b) 15.4A (c) 17.0A (d) 154.0A
31. ZnO obtained from ZnS reacts with NaOH forming
- (a) Zn(OH)_2 (b) Na_2ZnO_2 (c) Zn_2O_3 (d) NaZn(OH)_4

Paragraph for Question 32 to 34

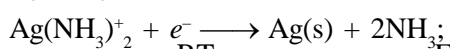
Tollen's reagent is used for the detection of aldehyde when a solution of AgNO_3 is added to glucose with NH_4OH , then gluconic acid is formed.



$$E^\circ_{\text{red}} = 0.8 \text{ V}$$



$$E^\circ_{\text{oxd}} = -0.05 \text{ V}$$



$$E^\circ_{\text{oxd}} = -0.337 \text{ V}$$

$$\left[\text{Use } 2.303 \times \frac{RT}{F} = -0.0591 \text{ and } \frac{3F}{RT} = 38.92 \text{ at } 298 \text{ K} \right]$$

32. The value of $\ln K$ for $2\text{Ag}^+ + \text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{O} \rightleftharpoons 2\text{Ag} + \text{C}_6\text{H}_{12}\text{O}_7 + 2\text{H}^+$ is
- (a) 59.44 (b) 29.19 (c) 66.2 (d) 116.4
33. If on addition of NH_3 , pH of solution rises to 11, then which of the electrode is affected by change in pH?
- (a) $E_{\text{oxidation}}$ increases over E° by 0.65 V (b) $E_{\text{reduction}}$ increases over E° by 0.65 V
(c) $E_{\text{oxidation}}$ decreases over E° by 0.65 V (d) $E_{\text{reduction}}$ decreases over E° by 0.65 V
34. For this reaction we prefer to add NH_3 , what is the reason?
- (a) $\text{Ag(NH}_3)_2^+$ is weaker oxidizing agent than Ag^+
(b) If we do not add NH_3 , then silver salt of gluconic acid is formed
(c) Gluconic acid is soluble in NH_3
(d) To increase oxidation potential of glucose.

Paragraph for Question 35 to 36

Lyophilic colloids are more stable than the lyophobic ones. Lyophilic colloids have solvation of particles along with the charge. This forms a protective layer around it and prevents it from forming associated colloid. Lyophilic colloids also protect lyophobic colloidal sols from coagulation by electrolytes. Thus the lyophilic sols are also known as protective colloids. Their protective power is measured in terms of Gold Number which is amount of protective colloid in mg that prevents the coagulation of 10 mL of a given gold sol when 1 mL of 10% NaCl is added to it.

35. 0.025g of starch prevents the coagulation of 10 mL of a gold sol when 1 ml of 10% NaCl is added to it. Gold number of starch sol is
 (a) 0.025 (b) 2.5×10^{-5} (c) 0.25 (d) 25
36. Presence of Electro Kinetic potential in Lyophobic sols can be assigned to
 (a) Double layer of charges (b) Presence of a polar dispersion medium
 (c) Ionic nature of dispersed phase (d) All of these

SECTION- III: MATCHING LIST TYPE

This Section contains **4 multiple choice questions**. Each question has matching lists. The codes for lists have choice (A), (B), (C) and (D) out of which **ONLY ONE** may be correct.

37. A. Pyrosulphurous acid (p) $\text{H}_2\text{S}_2\text{O}_7$
 B. Caro's Acid (q) $\text{H}_2\text{S}_2\text{O}_8$
 C. Marshall's Acid (r) H_2SO_5
 D. Pyrosulphuric acid (s) $\text{H}_2\text{S}_2\text{O}_5$
 (a) A-(s), B-(r), C-(q), D-(p) (b) A-(q), B-(r), C-(p), D-(s)
 (c) A-(s), B-(r), C-(p), D-(q) (d) A-(r), B-(p), C-(p), D-(q)
38. A. Hydroboration - Oxidation (p) Converts But-1-ene to Butan-2-ol
 B. Oxymercuration - Demercuration (q) Least substituted alkene is formed
 C. Hofmann's elimination reaction (r) Converts aldehydes and Ketones to alkanes
 D. Wolff Kishner Reaction (s) Converts But-1-ene to Butan-1-ol
 (a) A-(q), B-(p), C-(p), D-(r) (b) A-(s), B-(p), C-(q), D-(r)
 (c) A-(s), B-(r), C-(p), D-(q) (d) A-(r), B-(p), C-(p), D-(q)
39. A. Cassiterite (p) PbSO_4
 B. Philosopher's wool (q) PbCO_3
 C. Cerussite (r) ZnO
 D. Anglesite (s) SnO_2
 (a) A-(q), B-(p), C-(p), D-(r) (b) A-(q), B-(r), C-(p), D-(s)
 (c) A-(s), B-(r), C-(q), D-(p) (d) A-(r), B-(p), C-(p), D-(q)

40. A. ${}^9_4\text{Be} + {}^4_2\text{He} \longrightarrow {}^{12}_6\text{C} + {}^1_0n$ (p) Hydrogen bomb
 B. ${}^{24}_{12}\text{Mg} + {}^4_2\text{He} \longrightarrow {}^{27}_{14}\text{Si} + {}^1_0n$ (q) Radiolysis in Redox systems
 C. ${}^2_1\text{D} + {}^3_1\text{T} \longrightarrow {}^4_2\text{He} + {}^1_0n + 17.6 \text{ MeV}$ (r) Artificial transmutation
 D. $\text{BrO}_3^- + 3\text{I}^- \xrightarrow{\text{NaCl}} \text{Br}^- + \text{I}_2 + \text{IO}_3^-$ (s) Induced radio-activity
- (a) A-(q), B-(p), C-(p), D-(r),(s) (b) A-(q), B-(r), C-(p), D-(p),(s)
 (c) A-(s), B-(r), C-(p),(s), D-(q) (d) A-(p), B-(r), C-(s), D-(q),(s)

MATHEMATICS

SECTION- I: MULTIPLE CORRECT ANSWERS TYPE

This section contains 8 multiple choice questions numbered 41 to 48. Each question has 4 choice (A), (B), (C) and (D), out of which ONE OR MORE is/are correct

41. If $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ and $\vec{r} = \hat{j} - \hat{k} + \mu(2\hat{i} + 3\hat{j} + 4\hat{k})$ are two lines, then which is true
 (a) The lines are perpendicular (b) The lines are parallel
 (c) The distance between them is $\frac{9}{\sqrt{29}}$ (d) 2, 3 and 4 are direction ratios of the line.
42. The function $f(x) = |x| |x-1| + |x-2| + |x+1|$ is not differentiable at
 (a) $x = 1$ (b) $x = 0$ (c) $x = 2$ (d) $x = -1$
43. For the function $y = [x] \sin [x^2]$ where $[.] = g.i.f$, which of the following is true.
 (a) It is differentiable at $x = 0$ (b) It is not continuous at $x = 0$
 (c) It is differentiable at $x = 2$ (d) It is not differentiable at $x = 2$
44. Focus of a parabola is at (2, 3) and directrix is $2x - 3y = 0$, then which of the following lines is tangents to it
 (a) $y = x$ (b) $y = -x$ (c) $y = 2x$ (d) $y = 4x$
45. From any point P on the circle $x^2 + y^2 = 3$ tangents PA and PB are drawn to the curve $x^2 - 4y^2 = 4$ so that locus of mid point of the chord AB is $\lambda_1 (x^2 - 4y^2)^2 = \lambda_2 (x^2 + y^2)$, then
 (a) value of λ_1 is 3 (b) value of λ_1 is 4 (c) value of λ_2 is 16 (d) value of λ_2 is 4
46. Consider a function $f: \mathbb{R} \rightarrow \mathbb{R}$ such that $f(x + f(y)) = f(x) + y \forall x, y \in \mathbb{R}$, then which is true.
 (a) $f(x) = x$ is one of the functions satisfying given relation.
 (b) If $f(0) = 2$ then $f(2) = 2$.
 (c) $f(x) = c$ is one of the solution of given functional relation.
 (d) non of these

47. If \bar{a}, \bar{b} and \bar{c} are three unit vectors such that $|\bar{a} + \bar{b}|^2 + |\bar{b} + \bar{c}|^2 + |\bar{c} + \bar{a}|^2 = 3$, then which is true

- (a) $|\bar{a} - \bar{b}| = |\bar{b} - \bar{c}| = |\bar{c} - \bar{a}|$ (b) $\bar{a} + \bar{b} + \bar{c} = 0$
 (c) $\bar{a} \cdot \bar{b} = \bar{b} \cdot \bar{c} = \bar{c} \cdot \bar{a} = -\frac{1}{2}$ (d) $(\bar{a} + \bar{b}) \cdot \bar{c} = 1$

48. If $\int \frac{4e^{4x} - 4}{e^{4x} + e^{2x} + 1} dx = A \log(e^{2x} + e^{4x} + 1) + B \log\left(\frac{e^{2x} + e^{4x} + 1}{e^{4x}}\right) + C$, then

- (a) $A = 1$ (b) $B = 2$ (c) $A = 2$ (d) $B = 1$

SECTION- II: PARAGRAPH TYPE

This Section contains **3 paragraphs** each describing theory, experiment, data etc. **Eight questions** relate to four paragraphs with two questions on each paragraph. Each question of a paragraph has **only one correct answer** amount the four choice (A), (B), (C) and (D).

Paragraph for Question 49 to 51

For finding the reflection of a curve in a line or a plane, we have to find the locus of the image of general point lying on the given curve.

49. The locus of point of reflection of (0, 0) in the line rotating about (1, 0) is

- (a) $x^2 + y^2 - 2x + 2y = 0$ (b) $x^2 + y^2 - 2x - 2y = 0$
 (c) $x^2 + y^2 + 2x - 2y = 0$ (d) $x^2 + y^2 - 2x = 0$

50. Reflection of the curve $y^2 = x$ in the line $x - y + 1 = 0$ is

- (a) $x^2 + 2x + y - 2 = 0$ (b) $x^2 - 2x - y = 0$ (c) $x^2 - 2x - y + 1 = 0$ (d) $x^2 + 2x - y + 2 = 0$

51. The reflection of plane $x + y + z = 3$ in the plane $x + y = 2$ is

- (a) $-x + y + z = 1$ (b) $x + y + z = 1$ (c) $x + y - z = 1$ (d) $x - y + z = 0$

Paragraph for Question 52 to 54

If $f(x) = (x - \alpha)^n g(x)$, then $f(\alpha) = f'(\alpha) = f''(\alpha) = \dots = f^{n-1}(\alpha) = 0$. Here $f(x)$ and $g(x)$ are polynomials. For a polynomial $f(x)$ with rational coefficients.

52. If $f(x)$ is a polynomial of degree 4 and touches x -axis at $(\sqrt{3}, 0)$, then

- (a) sum of the roots of $f(x)$ is 0 (b) product of the roots of $f(x)$ is 9
 (c) sum of the product of the roots taken three at a time is 0
 (d) all of these

53. If $f(x)$ touches x -axis at only one point, then the point of touching is

- (a) always a rational number (b) may or may not be a rational number
 (c) never a rational number (d) none of these

54. If $f(x)$ is of degree 3 and touches x -axis, then

- (a) all the roots of $f(x)$ are rational (b) only one root is rational
 (c) both (a) and (b) may be possible (d) none of these

Paragraph for Question 55 to 56

$f: \mathbf{R} \rightarrow \mathbf{R}$, $y = f(x)$ is a function such that $y = |f(x)|$ is a continuous & differentiable function. Now answer the following questions.

55. If $f(x)$ is discontinuous at $x = a$, then
- (a) $\lim_{h \rightarrow 0} f(a - h) = \lim_{h \rightarrow 0} f(a + h) \neq f(a)$ (b) $\lim_{h \rightarrow 0^+} (f(a - h) + f(a + h)) \lim_{h \rightarrow 0} (f(a + h) + f(a)) = 0$
- (c) either $\lim_{h \rightarrow 0} f(a - h) = 0$ or $\lim_{h \rightarrow 0} f(a + h) = 0$ (d) none of these
56. If $f(x)$ is not differentiable at $x = a$, then
- (a) $f(x)$ must be discontinuous at $x = a$ (b) $f'(a^-)$ or $f'(a^+)$ is zero
- (c) $f(a)$ must be zero (d) none of these

SECTION- III: MATCHING LIST TYPE

This Section contains **4 multiple choice questions**. Each question has matching lists. The codes for lists have choice (A), (B), (C) and (D) out of which **ONLY ONE** may be correct.

57. f is a function from A to B where $A = \{1, 2, 3, \dots, m\}$ and $B = \{1, 2, 3, \dots, n\}$, $n > m$, match the following
- A. Total number of functions (p) ${}^n P_m$
- B. Number of one-one functions (q) 0
- C. Number of onto functions (r) n^m
- D. Number of bijective functions (s) $n^m - {}^n C_1(n-1)^m + {}^n C_2(n-2)^m - {}^n C_3(n-3)^m + \dots + (-1)^{n-1} {}^n C_{n-1}$
- (a) A-(r), B-(p), C-(s), D-(q) (b) A-(q), B-(r), C-(p), D-(s)
- (c) A-(s), B-(r), C-(p), D-(q) (d) A-(r), B-(p), C-(p), D-(q)
58. Match the following expansion with their number of terms
- A $(x_1 + x_2 + \dots + x_n)^3$ (p) infinite
- B $(x_1 + x_2 + x_3)^n$ (q) $\leq 2n + 1$
- C $(1 - x)^{-3}$, ($|x| < 1$) (r) ${}^{n+2} C_3$
- D $(1 + x + x^2)^n$ (s) ${}^{n+2} C_2$
- (a) A-(q), B-(p), C-(p), D-(r) (b) A-(r), B-(s), C-(p), D-(q)
- (c) A-(s), B-(r), C-(p), D-(q) (d) A-(r), B-(p), C-(p), D-(q)
59. For the plane $\mathbf{r} \cdot \mathbf{n} = q$ and the line $\mathbf{r} = \mathbf{a} + \lambda \mathbf{b}$,
- A. The line lies in the plane (p) $\mathbf{b} \cdot \mathbf{n} \neq 0$
- B. The line is parallel to the plane (q) $\mathbf{b} \times \mathbf{n} = \mathbf{0}$
- C. The line intersects the plane in one point (r) $\mathbf{b} \cdot \mathbf{n} = 0$, $\mathbf{a} \cdot \mathbf{n} = q$
- D. The line is perpendicular to the plane (s) $\mathbf{b} \cdot \mathbf{n} = 0$, $\mathbf{a} \cdot \mathbf{n} \neq q$
- (a) A-(q), B-(p), C-(p), D-(r) (b) A-(q), B-(r), C-(p), D-(s)
- (c) A-(r), B-(s), C-(p), D-(q) (d) A-(r), B-(p), C-(p), D-(q)
60. A. ${}^{50} C_{50} + {}^{51} C_{50} + \dots + {}^{60} C_{50} =$ (p) ${}^{50} C_{20}$
- B. ${}^{30} C_{20} {}^{31} C_{10} + {}^{30} C_{21} {}^{31} C_9 + \dots + {}^{30} C_{30} {}^{31} C_0 =$ (q) $-{}^{30} C_{15}$
- C. $({}^{30} C_0)^2 - ({}^{30} C_1)^2 + ({}^{30} C_2)^2 - \dots + ({}^{30} C_{30})^2 =$ (r) ${}^{61} C_{51}$
- D. ${}^{20} C_1 {}^{30} C_{11} + {}^{20} C_2 {}^{30} C_{12} + \dots + {}^{20} C_{20} {}^{30} C_{30} =$ (s) ${}^{61} C_{30}$
- (a) A-(r), B-(s), C-(q), D-(p) (b) A-(q), B-(r), C-(p), D-(s)
- (c) A-(s), B-(r), C-(p), D-(q) (d) A-(r), B-(p), C-(p), D-(q)



JEE-ADVANCE: TEST-9**ETP TEST SERIES****PAPER-I****Time : 3 hrs.****M.M.: 180****TEST CODE - A**

ANSWERS**Physics: Section I to II**

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

Chemistry: Section I to II

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

Mathematics: Section I to II

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

Section-III (PCM)

- | | | | | | |
|---------|---------|---------|---------|---------|---------|
| 1. (4) | 2. (0) | 3. (7) | 4. (3) | 5. (2) | 6. (3) |
| 7. (3) | 8. (3) | 9. (1) | 10. (5) | 11. (2) | 12. (2) |
| 13. (3) | 14. (3) | 15. (2) | | | |

JEE-ADVANCE: TEST-9

TEST SERIES

PAPER-II

Time : 3 hrs.

M.M.: 180

TEST CODE - A

ANSWERS

Physics: Section I to III

- | | | | | | |
|------------|------------|------------|------------|----------|----------|
| 1. (a,b,c) | 2. (a,d) | 3. (a,c,d) | 4. (a,b,c) | 5. (a,b) | 6. (a,d) |
| 7. (a,d) | 8. (a,b,d) | 9. (c) | 10. (c) | 11. (a) | 12. (b) |
| 13. (a) | 14. (b) | 15. (b) | 16. (b) | 17. (a) | 18. (b) |
| 19. (c) | 20. (d) | | | | |

Chemistry: Section I to III

- | | | | | | |
|-------------|-------------|-------------|-------------|-------------|-----------|
| 21. (a,d) | 22. (a,c,d) | 23. (a,b,c) | 24. (a,b,c) | 25. (a,b,c) | 26. (a,b) |
| 27. (a,b,c) | 28. (a,b) | 29. (a) | 30. (d) | 31. (b) | 32. (a) |
| 33. (a) | 34. (b) | 35. (d) | 36. (a) | 37. (a) | 38. (b) |
| 39. (c) | 40. (d) | | | | |

Mathematics: Section I to III

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|-------------|---------------|-----------|-----------|-----------|-----------|
| 41. (b,c,d) | 42. (a,b,c,d) | 43. (a,d) | 44. (a,b) | 45. (a,c) | 46. (a,b) |
| 47. (a,b,c) | 48. (a,d) | 49. (d) | 50. (d) | 51. (c) | 52. (d) |
| 53. (a) | 54. (a) | 55. (a) | 56. (a) | 57. (a) | 58. (b) |
| 59. (c) | 60. (a) | | | | |