

JEE-ADVANCE: TEST-5

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 : _____

4. A convex lens made of glass ($\mu_g = 3/2$) has focal length f in air. The image of an object placed in front of it is inverted, real and magnified. Now the whole arrangement is immersed in water ($\mu_w = 4/3$) without changing the distance between object and lens. Then
- (a) the new focal length will become $4f$ (b) the new focal length will become $(f/4)$
(c) new image will be virtual and magnified (d) new image will be real inverted and smaller in size
5. A convex lens made of glass ($\mu_g = 3/2$) has focal length f in air. The image of an object placed in front of it is inverted real and magnified. Now the whole arrangement is immersed in water ($\mu_w = 4/3$) without changing the distance between object and lens. Then
- (a) the new focal length will become $4f$ (b) the new focal length will become $f/4$
(c) new image will be virtual and magnified (d) new image will be real inverted and smaller in size.
6. A galvanometer has resistance 1Ω . Maximum deflection current through it is 0.1 A
- (a) To measure a current of 1 A a resistance of $(1/10)W$ is put in parallel with galvanometer
(b) To measure a current of 1 A a resistance of $(1/9)W$ is put in parallel with galvanometer
(c) To measure a potential difference of 10 V a resistance of $99 W$ is put in series with galvanometer
(d) To measure a potential difference of 10 V a resistance of $100 W$ is put in series with galvanometer.
7. A transverse sinusoidal wave of amplitude a , wavelength λ and frequency f is travelling on a stretched string. The maximum speed of any point on the string is $v/10$, where v is the speed of propagation of the wave. If $a = 10^{-3} \text{ m}$ and $v = 10 \text{ m/s}$, then λ and f are given by:
- (a) $\lambda = 2\pi \times 10^{-2} \text{ m}$ (b) $\lambda = 10^{-3} \text{ m}$ (c) $f = \frac{10^3}{2\pi} \text{ Hz}$ (d) $f = 10^4 \text{ Hz}$
8. The magnitudes of the gravitational field at distance 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) $\frac{F_1}{F_2} = \frac{r_2^2}{r_1^2}$, if $r_1 > R$ and $r_2 > R$
(c) $\frac{F_1}{F_2} = \frac{r_1^3}{r_2^3}$, 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 $r_2 > R$

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 15 to 16

A particle is moving along x -axis. Its initial velocity is 40 m/s along positive x -axis and an acceleration of 10 m/s^2 along negative x -axis. Particle starts from $x = 10 \text{ m}$.

15. Velocity of particle is zero at second.
 (a) 6 (b) 4 (c) 8 (d) 2
16. Maximum x -coordinate of particle (in positive direction) is m
 (a) 90 (b) 60 (c) 120 (d) 30

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. With regard to motion of an electron in the atom and using Bohr's theory of atom, match Column-I with Column-II

Column-I

Column-II

- | | |
|--|--|
| A. Total energy of electron | (p) Directly proportional to n |
| B. Angular momentum of electron | (q) Negative |
| C. Potential energy of electron | (r) Directly proportional to $1/n$ |
| D. Linear momentum of electron | (s) Directly proportional to $1/n^2$ |
| (a) A-(q),(s); B-(p); C-(q),(s); D-(r) | (b) A-(r),(s); B-(p); C-(q),(s); D-(q) |
| (c) A-(p),(q); B-(q); C-(r),(s); D-(p) | (d) A-(q),(r); B-(s); C-(p),(q); D-(s) |

18. Consider a situation (p) that two sound waves, $y_1 = (0.2 \text{ m}) \sin 504\pi(t - x/300)$ and $y_2 = (0.6 \text{ m}) \sin 496\pi(t - x/300)$ are superimposed. Consider another situation (q) that two sound waves, $y_1 = (0.4 \text{ m}) \sin 504\pi(t - x/300)$ and $y_2 = (0.4 \text{ m}) \sin 504\pi(t + x/300)$, are superimposed. Match Column-I with Column-II

- | | |
|---|--|
| A. In situation (p) | (p) Stationary waves are formed |
| B. In situation (q) | (q) There will be the phenomenon of 'Beats' |
| C. When two waves of same frequency and amplitude and travelling in opposite directions superimpose | (r) Amplitude of the resultant wave will vary periodically with position |
| D. If the intensity of sound alternately increases and decreases periodically as a result of superposition of waves of slightly different frequencies | (s) Amplitude of the resultant wave will vary periodically with time |
| (a) A-(r),(s); B-(p),(s); C-(p),(r); D-(q),(r) | (b) A-(q),(s); B-(p),(r); C-(p),(r); D-(q),(s) |
| (c) A-(p),(r); B-(q),(s); C-(r),(s); D-(p),(q) | (d) A-(p),(q); B-(r),(s); C-(p),(r); D-(r),(s) |

22. Which of the following statement(s) is/are correct ?
- The halides of Be are electron deficient and are polymeric with halogen bridges.
 - BeF_2 is very soluble in water owing to high solvation energy of Be^{2+} but fluorides of other alkaline earth metals are almost insoluble.
 - CaO , SrO and BaO react exothermically with water forming soluble hydroxides.
 - The bicarbonates of alkaline earth metals are only stable in solutions.
23. Which of the following cannot be used as dehydrating agents for ammonia?
- Conc. H_2SO_4
 - anhydrous CaCl_2
 - P_4O_{10}
 - CaO
24. $[\text{Fe}(\text{en})_2(\text{H}_2\text{O})_2]^{+2} + \text{en} \rightarrow \text{complex}(x)$. The correct statement about the complex(x) is
- it is a low spin complex
 - it is diamagnetic
 - it shows geometrical isomerism
 - it is outer orbital complex
25. $\text{MCO}_{3(s)} \rightleftharpoons \text{MO}_{(s)} + \text{CO}_{2(g)}$, the equilibrium pressure of CO_2 at 127°C and 147°C are 0.14 and 0.35 bar respectively.
- The enthalpy of the reaction is nearly +64 kJ/mole
 - increase in temperature decreases the yield of CO_2 gas at equilibrium
 - it is endothermic reaction
 - on addition of MCO_3 at equilibrium, the equilibrium shifts towards right
26. White phosphorous (P_4) has
- six P-P single bonds
 - covalency of phosphorus, 5
 - four lone pairs of electrons
 - $\text{P}\hat{\text{P}}\text{P}$ angle is 60°
27. A solution of colourless salt H boiling with excess NaOH produces a non-inflammable gas. The gas evolution ceases after sometime. Upon addition Zn dust to the same solution, the gas evolution restarts. The colourless salt(s) (H) is/are
- NH_4NO_3
 - NH_4NO_2
 - NH_4Cl
 - $(\text{NH}_4)_2\text{SO}_4$
28. Which of the following statements are correct?
- Fe^{3+} gives brown colour with $\text{K}_3\text{Fe}(\text{CN})_6$
 - Fe^{2+} gives blue ppt. with $\text{K}_3\text{Fe}(\text{CN})_6$
 - Fe^{3+} gives red colour with KCNS
 - Fe^{2+} gives brown colour with NH_4CNS

Paragraph for Question 33 to 34

An unknown solid mixture contains any two of the following CaCO_3 ; BaCl_2 ; AgNO_3 ; ZnSO_4 and NaOH . The mixture is completely soluble in water and the solution gives pink color with phenolphthalein. When dilute HCl is gradually added to the above solution, a precipitate is produced which with further addition of the acid dissolves.

33. What is/are present in the solid ?
- (a) AgNO_3 and NaOH (b) BaCl_2 and Na_2SO_4
(c) ZnSO_4 and NaOH (d) CaCO_3 and AgNO_3
34. In a separate analysis, the aqueous solution of the mixture (as mentioned in the passage) gives white precipitate with K_2SO_4 , then what is/are present in the mixture ?
- (a) CaCO_3 (b) BaCl_2 and AgNO_3 (c) BaCl_2 only (d) AgNO_3 only

Paragraph for Question 35 to 36

9 mL of a gaseous mixture consisting of a gaseous compound A and just sufficient amount of oxygen required for complete combustion, yielded on burning, 4 mL of CO_2 , 6 mL of water vapour and 2 mL of N_2 , all volumes measured at the same temperature and pressure; Compound "A" contains Carbon, Hydrogen and Nitrogen.

35. How many volumes of oxygen are required for complete combustion,
- (a) 7 ml (b) 9 ml (c) 11 ml (d) none of these
36. What is the molecular formula of the compound A?
- (a) $\text{C}_5\text{H}_{12}\text{N}_2$ (b) $\text{C}_2\text{H}_6\text{N}_2$ (c) $\text{C}_3\text{H}_8\text{N}_2$ (d) $\text{C}_4\text{H}_{10}\text{N}_2$

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. Internal energy of gas (p) $3/2 RT$
B. Translational K.E. of gas molecules (q) $5/2 RT$
C. Temperature at which no intermolecular attraction (r) -273°C
D. Lowest possible temperature at which gas molecules have no heat. (s) $3.716 \text{ kJ at } 298 \text{ K}$
- (a) A-(p),(q),(s); B-(p),(s); C-(r); D-(r) (b) A-(p),(q),(r),(s); B-(q),(r); C-(r); D-(q)
(c) A-(q),(r),(s); B-(p),(q); C-(s); D-(r) (d) none of these

40. Column-I
(Compounds)

- A. HCOOH
B. H₂S
C. HClO₄
D. Al(MnO₄)₃

Column-II
(Oxidation state of each element in compound)

- (p) +1
(q) -2
(r) +2
(s) +3
(t) +7

- (a) A-(p),(q),(r); B-(p),(q); C-(p),(q),(t); D-(q),(s),(t)
(b) A-(p),(q),(r),(s); B-(q),(s); C-(p),(q),(s),(t); D-(q),(r),(s)
(c) A-(p),(q),(s),(t); B-(p),(q),(s),(t); C-(p),(s),(t); D-(r),(s)
(d) none of these

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

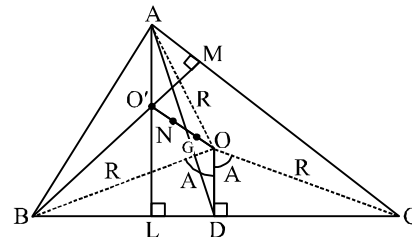
41. If $1, \omega, \omega^2, \dots, \omega^{n-1}$ are the n , n^{th} roots of unity, then $(2-\omega)(2-\omega^2) \dots (2-\omega^{n-1})$ equals
 (a) $2^n - 1$ (b) ${}^n C_1 + {}^n C_2 + \dots + {}^n C_n$
 (c) $[{}^{2n} C_0 + {}^{2n+1} C_1 + {}^{2n+1} C_2 + \dots + {}^{2n+1} C_n]^{1/2} - 1$ (d) $2^n + 1$
42. If a, b, c are rational and no two of them are equal, then the equations $(b-c)x^2 + (c-a)x + (a-b) = 0$ and $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$
 (a) have rational roots (b) will be such that at least one has rational roots
 (c) have exactly one root common (d) have at least one root common
43. The sum of n terms of the series $\frac{1}{1.2.3.4} + \frac{1}{2.3.4.5} + \frac{1}{3.4.5.6} + \dots$ is
 (a) $\frac{n(n^2 + 6n + 11)}{18(n+1)(n+2)(n+3)}$ (b) $\frac{n^3 + 6}{18(n+1)(n+2)(n+3)}$
 (c) $\frac{1}{18} - \frac{1}{3(n+1)(n+2)(n+3)}$ (d) $\frac{1}{6} - \frac{1}{2(n+1)(n+2)(n+3)}$

50. Let P be a variable point on the ellipse with foci is S and S' . If Δ be the area of triangle PSS' , then the maximum value of Δ is

- (a) $\sqrt{7}$ sq. unit (b) $2\sqrt{7}$ sq. unit (c) $3\sqrt{7}$ sq. unit (d) $4\sqrt{7}$ sq. unit

Paragraph for Question 51 to 52

Let O, N, G and O' are the circumcentre, nine point centre, centroid and orthocentre of a ΔABC respectively. AL and BM are perpendiculars from A and B on sides BC and CA respectively. Let AD be the median and OD is perpendicular to side BC . Let R be the circum radius of ΔABC , then $OA = OB = OC = R$.



Now, in ΔOBD , $OD = R \cos A$, in ΔABM , $AO' = AM \sec(90^\circ - C)$ ($\angle O'AM = 90^\circ - C$)
 $= AM \operatorname{cosec} C = \frac{C \cos A}{\sin C}$
 $= 2R \cos A$

$\therefore AO' = 2OD$
 If S be any point in the plane of ΔABC and AP is the diameter of the circum circle.

On the basis of above information, answer the following questions:

51. $\vec{OA} + \vec{OB} + \vec{OC}$ is equal to

- (a) $\vec{OO'}$ (b) $2\vec{O'O}$ (c) $2\vec{AO}$ (d) \vec{ON}

52. $\vec{O'A} + \vec{O'B} + \vec{O'C}$ is equal to

- (a) $\vec{OO'}$ (b) $2\vec{O'O}$ (c) $2\vec{AO'}$ (d) $2\vec{O'N}$

Paragraph for Question 53 to 54

Consider $(1 + x + x^2)^{2n} = \sum_{r=0}^{4n} a_r x^r$ where $a_0, a_1, a_2, \dots, a_{4n}$ are real number and n is a positive integer.

53. The value of $\sum_{r=0}^{n-1} a_{2r}$ is

- (a) $\frac{9^n - 2a_{2n} - 1}{4}$ (b) $\frac{9^n + 2a_{2n} + 1}{4}$ (c) $\frac{9^n - 2a_{2n} + 1}{4}$ (d) $\frac{9^n + 2a_{2n} - 1}{4}$

54. The value of $\sum_{r=1}^n a_{2r-1}$ is

- (a) $\left(\frac{9^n - 1}{2}\right)$ (b) $\left(\frac{3^{2n} - 1}{4}\right)$ (c) $\left(\frac{3^{2n} + 1}{4}\right)$ (d) $\left(\frac{9^n + 1}{2}\right)$

58. Let V_r denote the sum of the first r terms of an A.P. whose first term is $2r - 1$ and common difference is 2.

$$P_r = V_{r+1} - V_r$$

$$Q_r = P_1 + P_2 + \dots + P_r$$

$$S_r = V_r - P_r$$

$$T_r = S_{r+1} - S_r$$

Match the expression in Column I with corresponding properties conditions in Column II.

Column I

A. $x_r = P_r \forall r \geq 1$

B. $x_r = Q_r \forall r \geq 1$

C. $x_r = S_r \forall r \geq 1$

D. $x_r = T_r \forall r \geq 1$

(a) A-(p); B-(q); C-(q); D-(p)

(c) A-(s), B-(r), C-(p), D-(q)

Column II

(p) x_r is linear in r

(q) x_r is quadratic in r

(r) x_r is cubic in r

(s) x_r is independent of r

(b) A-(q), B-(r), C-(p), D-(s)

(d) A-(r), B-(p), C-(p), D-(q)

59. Match the equation in Column I with the properties in Column II

Column I

A. $a, b, c \in \mathbf{R}$ are such that $a + b + c = 0$.

Equation is $3ax^2 + 2bx + c = 0$

B. $a, b, c \in \mathbf{R}$ are such that $2a + 3b + 6c = 0$.

Equation is $ax^2 + bx + c = 0$

C. $a, b, c \in \mathbf{R}$ are such that $(a + c)^2 < b^2$.

Equation is $ax^2 + bx + c = 0$

D. $a, b, c \in \mathbf{R}$ are such that $1 + \frac{|b|}{a} + \frac{c}{a} < 0$.

Equation $ax^2 + bx + c = 0$

Column II

(p) real roots

(q) discriminant > 0

(r) at least one root in $(0, 1)$

(s) a root in $(-\infty, -1)$ or a root in $(1, \infty)$

(a) A-(q),(s); B-(p),(r); C-(p),(q),(s); D-(p),(r),(s)

(b) A-(p),(q),(r); B-(p),(q),(r); C-(p),(q); D-(p),(q),(s)

(c) A-(p),(q),(r),(s); B-(q),(s); C-(p),(s); D-(p)

(d) A-(p),(r); B-(r); C-(p),(q),(r),(s); D-(p),(q),(r)

JEE-ADVANCE: TEST-5

TEST SERIES

PAPER-II

Time : 3 hrs.

M.M.: 180

TEST CODE - A

ANSWERS

Physics: Section I to III

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

Chemistry: Section I to III

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

Mathematics: Section I to III

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