NEW STANDARD ACADEMY

Test Type : Unit Test # 02 11-08-2025

Do not open this Test Booklet until you are asked to do so.

JEE(MAIN): 12th Undergoing/Pass Students

Read carefully the Instructions on the Back Cover of this Test Booklet.

Important Instructions :

1. Immediately fill in the form number on this page of the Test Booklet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.
2. The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/Answer Sheet.
3. The Test Booklet consists of 45question
4. There are three parts in the question paper 1,2,3 consisting of Physics, Chemistry and Mathematics having 30 questions in each subject and each subject having Two sections. (i) Section-I contains 20 multiple choice questions with only one correct option. Marking scheme : +4 for correct answer, 0 if not attempted and –1 in all other cases. (ii) Section-II contains 10 Numerical Value Type questions. Attempt any 5 questions. First 5 attempted questions will be considered for marking. Marking scheme : +4 for correct answer, 0 if not attempted and –1 in all other cases.
5. Use Blue/Black Ball Point Pen only for writting particulars/marking responses on Side –1 and Side–2 of the Answer Sheet. Use of pencil is strictly prohibited.
6. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electronic device etc, except the Identity Card inside the examination hall/room.
7. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
8. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Room/ Hall. However, the candidate are allowed to take away this Test Booklet with them.

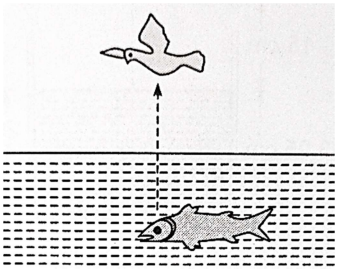
Name of the Candidate(In Capitals) _____

Date of Examintation _____

Candidate`s Signature: _____ Invigilator`s Signature: _____

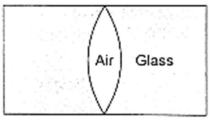
PHYSICS

1. An object is placed at distance of 2f from a concave mirror of focal length f. Light reflected from the mirror falls on a plane mirror. The distance of the plane mirror from the concave mirror equals f. The distance of the final image (due to reflection at both concave and plane mirror) from the concave mirror is
   (a) f (b) f/2
   (c) 2f (d) zero
2. A fish rising vertically up towards the surface of water with speed 3ms $^{-1}$ observes a bird diving vertically down towards it with speed 9ms $^{-1}$ The actual velocity of bird is: Given : [Given : $\mu = 4/3$]



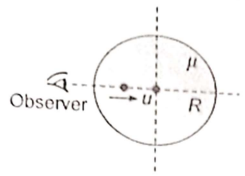
   (a) 4.5m s^{-1} (b) 5.4ms^{-1}
   (c) 3ms^{-1} (d) 3.4ms^{-1}
3. A convex lens of power + 6 D is placed in contact with a concave lens of power - 4 D. What is the nature and focal length of the combination?
   (a) Concave, 25 cm (b) Convex, 50 cm
   (c) Concave, 20 cm (d) Convex, 100 cm
4. If the central portion of a convex lens is wrapped in black paper as shown in the figure

   (a) No image
   (b) A virtual enlarged image
   (c) A real enlarged image
   (d) A real smaller image
5. A convex lens is made up of three different materials as shown in the figure. For a point object placed on its Saxis, the number of images formed are
   (1) 1 (b) 5
   (c) 4 (d) 3
6. An object is placed 12 cm to the left of a converging lens of focal length 8 cm. Another converging lens of 6 cm focal length is placed at a distance of 30 cm to the right of the first lens. The second lens will produce
7. n the figure, an air lens of radii of curvature 10 cm ($R_1 = R_2 = 10$cm) is cut in a cylinder of glass($\mu = 1.5$) The focal length and the nature of the lens is



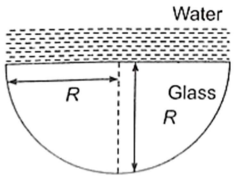
   (a)15 cm, concave (b) 15 cm , convex
   (c) ∞ neither concave nor convex
   (d) 0, concave
8. The refracting angle of a prism is A and refractive index 8 of material of prism is cot A/2 The angle of minimum deviation is
   (a) 90° - A (2) 180° - 2A
   (c) 180° - 3A (4) 180° + 2A
9. The radius of curvature of a convex lens is 40 cm, for each surface. Its refractive index is 1.5. Its focal length is
   (a) 40 cm (b) 20 cm
   (c) 80 cm (d) 30 cm
10. The image formed by a convex mirror of focal length 30 cm is a quarter of the size of the object. The distance of the object from the mirror is
    (a) 30 cm (b) 90 cm
    (c) 120 cm (d) 60 cm
11. A ray of light is incident on a transparent glass slab of refractive index 1.62. The reflected and the refracted rays are mutually perpendicular. The angle of incidence is
    (a) 58.3° (b) 50°
    (c) 35° (d) 30°
12. The wavelength of sodium light in air is 5890 Å. The velocity of light in air is 3×10^8 ms^{-1} The wavelength of light in a glass of refractive index 1.6 would be close to
    (a) 5890 Å (b) 3681 Å
    (c) 9424 Å (d) 15078 Å
13. Refractive index of air is 1.0003. The correct thickness of air column which will have one more wavelength of yellow light (6000 Å) than in the same thickness in vacuum is
    (a) 2 mm (b) 2 cm
    (c) 2 m (d) 2 km

14. Consider a sphere of radius R made of glass of refractive index μ. A small object moves along the diameter with a constant velocity u. Find the velocity of the image as seen by an observer outside when the object passes through centre.



(a) u (b) μu
(c) u/μ (d) zero

15. A ray of light traveling in glass $\mu = \frac{3}{2}$ is incident on a horizontal glass air surface at the critical angle θc. If a thin layer of water $\left(\mu = \frac{4}{3}\right)$ is now poured on the glass air surface, the angle at which the ray emerges into air at the water-air surface is



(a) 60° (b) 45°
(c) 90° (d) 180°

CHEMISTRY

16. IUPAC name of $[Co(ONO)(NH_3)_5]Cl_2$ is
(a) pentaamminenitrocobalt (III) chloride
(b) pentaamminenitrito-o-cobalt (III) chloride
(c) pentaamminenitrosocobalt (III) chloride
(d) pentaammineoxo-nitrocobalt (III) chloride

17. How many isomers are possible in $[Co(en)_2Cl_2]$
(a) 2 (b) 4
(c) 6 (d) 1

18. $[Pt(NH_3)_4]Cl_2$ is
(a) Square planar (b) Tetrahedral
(c) Pyramidal (d) Pentagonal

19. A tetrahedral complex ion is formed due to hybridization
(a) $s p^2$ (b) $s p^3$
(c) dsp^2 (4) $d^2 s p^3$

20. The coordination and oxidation number of X in the compound $[X(SO_4)(NH_3)_5]Cl$ will be
(a) 6 and 4 (b) 10 and 3
(c) 2 and 6 (d) 6 and 3

21. The oxidation state of Fe in $K_4[Fe(CN)_6]$ is
(a) +2 (b) -2
(c) +3 (d) +4

22. The number of moles of AgCl precipitate when excess of $AgNO_3$ is added to one mole of $[Cr(NH_3)_4Cl_2]Cl$ is
(a) Zero (b) 1.0
(c) 2.0 (d) 3.0

23. The number of unpaired electron in nickel carbonyl is
(a) zero (b) one
(c) four (d) five

24. Among the following ions which one has the highest paramagnetism?
(a) $[Cr(H_2O)_6]^{3+}$ (2) $[Fe(H_2O)_6]^{2+}$
(c) $[Cu(H_2O)_6]^{2+}$ (4) $[Zn(H_2O)_6]^{2+}$

25. Which of the following sequence is correct regarding field strength of ligands as per spectrochemical series?
(a) $SCN^- < F^- < CN^- < CO$
(b) $F^- < SCN^- < CN^- - < CO$
(c) $CN^- < F^- < CO < SCN^-$
(d) $SCN^- < CO < F^- < CN^-$

26. $K_2[OsCl_5N]$ is named as:
(a) Potassium pentachloroazoosmate (VI)
(b) Potassium pentachloronitridoosmate (VI)
(c) Potassium pentachloroazidoosmate (VI)
(d) Potassium pentachloronitroniumosmate (II)

27. Which of the following compounds shows optical isomerism?
(a) $[Cu(NH_3)_4]^{2+}$ (b) $[ZnCl_4]^{2-}$
(c) $[Cr(C_2O_4)_3]^{3-}$ (4) $[Co(CN)_6]^{3-}$

28. Cuprammonium ion $[Cu(NH_3)_4]^{2+}$ is
(a) tetrahedral (b) square planar
(c) triangular bipyramid
(d) octahedral

29. Which of the following compounds will exhibit highest magnetic moment?
(a) $[Ti(NH_3)_6]^{3+}$ (b) $[Cr(NH_3)_6]^{3+}$
(c) $[Co(NH_3)_6]^{3+}$ (d) $[Zn(NH_3)_6]^{2+}$

30. Consider the following two complex ions: $[CoF_6]^{3-}$ and $[Co(C_2O_4)_3]^3$. Which of the following statement(s) is/are false?
(A) Both are octahedral
(B) $[Co(C_2O_4)_3]^{3-}$ is diamagnetic while $[CoF_6]^{3-}$ is paramagnetic
(C) Both are outer orbital complexes
(D) In both the complexes the central metal is in the same oxidation state
(a) (B) and (C) (b) (B), (C) and (D)
(c) (C) only (d) (C) and (D)

MATHS

31. The integral $\int \frac{(x^8 - x^2)dx}{(x^{12} + 3x^6 + 1)ta^{-1}\left(x^3 + \frac{1}{x^3}\right)}$ is equal
(a) $\log_e \left(\left|tan^{-1}\left(x^3 + \frac{1}{x^3}\right)\right|\right)^{1/3} + C$

(b) $\log_e\left(\left|tan^{-1}\left(x^3+\frac{1}{x^3}\right)\right|\right)^{1/2}+C$

(c) $\log_e\left(\left|tan^{-1}\left(x^3+\frac{1}{x^3}\right)\right|\right)+c$

(d) $\log_e\left(\left|tan^{-1}\left(x^3+\frac{1}{x^3}\right)\right|\right)^3+C$

32. $\int\frac{x^2-1}{(x^4+3x^2+1)tan^{-1}\left(x+\frac{1}{x}\right)}\,dx =$

(a) $\tan^{-1}\left(x+\frac{1}{x}\right)$ +C

(b) $\left(x+\frac{1}{x}\right)tan^{-1}\left(x+\frac{1}{x}\right)$+c

(c) In $\left|tan^{-1}\left(x+\frac{1}{x}\right)\right|+C$

(d) $\frac{1}{2}\,In\left|\left(x+\frac{1}{x}\right)\right|$ +C

33. $\int\frac{x+x^{\frac{2}{3}}+x^{\frac{1}{6}}}{x\left(1+x^{\frac{1}{3}}\right)}\,dx$ equals

(a) $\frac{3x^{\frac{2}{3}}}{4}+6\tan^{-1}\left(x^{\frac{1}{6}}\right)+C$

(b) $\frac{3x^{\frac{2}{3}}}{2}+6\tan^{-1}\left(x^{\frac{1}{6}}\right)+C$

(c) $\frac{3x^{\frac{2}{3}}}{10}+6\tan^{-1}\left(x^{\frac{1}{6}}\right)+C$

(d) $\frac{3x^{\frac{2}{3}}}{5}+6\tan^{-1}\left(x^{\frac{1}{6}}\right)+C$

34. $\int\frac{1}{x}In\left(\frac{x}{e^x}\right)dx =$

(a) $\frac{1}{2}e^x-In\,x+c$

$(b)\,\frac{1}{2}In\,x-e^x+c$

(c) $\frac{1}{2}(In\,x)^2-\,x+c$

(d) $\frac{e^x}{2x}+C$

35. $\int\frac{\{f(x).\varphi'(x)-f'(x).\varphi(x)\}}{f(x).\varphi(x)}\{log\phi(x)-logf(x)\}dx$ *is* equal to

(a) $\log\frac{\varphi(x)}{f(x)}+k$

(b) $\frac{1}{2}\left\{log\frac{\varphi(x)}{f(x)}\right\}^2+k$

(c) $\frac{\varphi(x)}{f(x)}\,log\frac{\varphi(x)}{f(x)}+k$

(d) None of these

36. For any three positive real numbers a, b and $9(25a^2 + b^2) + 25(c^2 - 3ac) = 15b(3a + c)$. Then

(a) a, b and c are in G.P.

(b) b, c and a are in G.P.

(c) b, c and a are in A.P.

(d) a, b and c are in A.P.

37. If $a_1, a_2, a_3, ...,a_n$ are in A.P. and $a_1 + a_4 + a_7 + \ldots + a_{16} = 114$ then $a_1 + a_6 + a_{11} + a_{16}$ is equal to

(a) 64 (b) 38

(c) 76 (d) 98

38. If $3^{2\sin 2\alpha - 1}$, 14 and $3^{4 - 2\sin 2\alpha}$ are the first three terms of an A.P. for some α, then the sixth term of this A.P. is

(a) 66 (b) 65

(c) 81 (d) 78

39. For three positive integers p, q, r, $x^{pq^2} = y^{qr} = z^{p^2r}$ and r = pq + 1 such that 3, $3\log_y(x)$ $3\log_z(y)$ 7 log_x(z) are in A.P. with common difference 1/2 Then r - p - q equal to

(a) 6 (b) 2

(c) 12 (d) -6

40. Let A={ 1, 6, 11, 16 ,...} and B={ 9, 16, 23, 30 ,...}be the sets consisting of the first 2025 terms of two arithmetic progressions. Then n (A ∪ B) is

(a) 3761 (b) 3814

(c) 4027 (d) 4003

41. Let $a_1, a_2, ...,a_n$ be a given A. P. whose common difference is an integer and $S_n = a_1 + a_2 + ...+a_n$ If $a_1 = 1$, $a_n = 300$ and $15 \le n \le 50$ then the ordered pair (S_{n-4}, a_{n-4}) is equal to

(a) (2480, 249) (b) (2490,249)

(c) (2490,248) (d) (2480,248)

42. The number of 4-digit numbers which are neither multiple of 7 nor multiple of 3 is____

43. If $\int\frac{\left(1+\frac{1}{x}\right)dx}{\sqrt{1+xe^x}}=log\left|\frac{g(x)-1}{g(x)+1}\right|+C, then$ $[g^2(1)]$ is equal to (where[.] denotes the greatest integer function)_____

44. If $\log_3 2$, $\log_3(2^x - 5)$, $\log_3\left(2^x-\frac{7}{2}\right)$ are in an arithmetic progression, then the value of x is equal to_____

45. Let $a_1 = 8$ $a_2, a_3, ..., a_n$, be an A.P. If the sum of its first four terms is 50 and the sum of its last four terms is 170, then the product of its middle two terms is____