NEW STANDARD ACADEMY

Test Type : Unit Test # 01 04-08-2025

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 90 questions.
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) _____

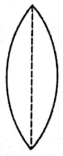
Date of Examintation _____

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

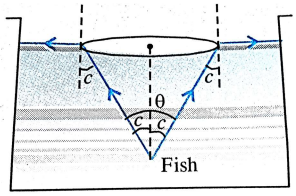
PHYSICS

SECTION-1

1. An object is placed at equal distance (symmetrically) from two mirrors . if the angle of inclination of mirrors is 40°, How many images will be formed?
   (a) 10 (b) 9
   (c) 8 (d) 10.10
2. Two mirrors inclined to each other produce five images for an object placed anywhere in between them . The angle between the mirrors is now reduced by 30°.How many images will be observed?
   (a) 11 (b) 12
   (c) 1.1 (d) 1.2
3. A plane mirror is rotated at an angular speed of 3 rad s^{-1}. Find the angular speed of light being reflected by it.
   (a) 0.6 rad s^{-1} (b) 6 rad s^{-1}
   (c) 6.6 rad s^{-1} (d) none of these
4. A concave mirror of focal length 20 cm is placed 60 cm from a wall. How far from the wall should an object be placed to form a real image on the wall?
   (a) 20 cm (b) 40 cm
   (c) 30 cm (d) 60 cm
5. A square of side 3.0 cm is placed 25 cm away from a concave mirror of focal length 10 cm. What is the area enclosed by the image of wire ? (the centre of the wire is on the axis of the mirror , with its two side normal to the axis)
   (a) 4 cm^2 (b) 8 cm^2
   (c) 16 cm^2 (d) 0.4 cm^2
6. If an object approaches towards aplane mirror with velocity V, then image approaches the object with velocity
   (a) V (b)1.5 V
   (c) 2v (d)3V
7. A ray of light is incident at an angle of 30° on one face of rectangular slab of thickness 8cm. Find the lateral shift produced if the refractive index of glass is 1.5.
   (a) 1.55 cm (b) 2.55 cm
   (c) 25.5 cm (d) 15.5 cm
8. A ray of light passes through a plane boundary separating two media having refractive indices $\mu_1 = \frac{3}{2}$ and $\mu_2 = \frac{4}{3}$. (i) If the ray travels from medium (1) to medium (2) at an angle of incidence 60°, what is the angle of refraction?
   (a) 50.3° (b) 60.3°
   (c) 77° (d) 55.3°
9. We combined a convex lens of focal length f_1 and concave lens of focal lengths f_2 and their combined focal length was F .The combination of these lenses will behave like a concave lens if
   (a) $f_1 > f_2$ (b) $f_1 < f_2$
   (c) $f_1 = f_2$ (d) $f_1 \leq f_2$
10. IN a plano –canvex lens the radius of curvature of the convex lens is 10 cm If the plane side is polished then the focal length will be (Refractive index =1.5)
    (a)10.5 cm (b) 10 cm
    (c) 5.5 cm (d) 5 cm
11. A ray of light of frequency 5×10^{14}Hz is passed through a liquid .The wavelength of light measured inside the liquid is found to be 450×10^{-9} m . Calculate the refractive index of the liquid.
    (a) 1.33 (b) 13.3
    (c) 0.332 (d) 2.33
12. An ink dot on the sheet of a paper is viewed from above a distance of 50 cm. By what distance would the ink dot appear to be raised if it is viewed through a glass slab of thickness 15 cm held parallel to the paper ? Given refractive index of glass = 1.5
    (a) 4cm (b) 5cm
    (c) 6cm (d) 7cm
13. A convex lens has a focal length f. It is cut into two part along the dotted line as shown in figure. The focal length of each part will be



    (a) $\frac{f}{2}$ (b) f
    (c) $\frac{3}{2}f$ (d) 2f
14. The refractive index of water is 4/3 . determine the angle of the cone within which the entire outside view will be confined for the fish under water



    (a) 67.2° (b) 77.2°
    (c) 87.2° (d) 97.2°
15. A point source of light is situated at the bottom of a tank filled wioth water upto the level of 80 cm. Find the area of the surface of water through which light from the source emerges out . Take refractive index = 1.33.
    (a) 90.9 cm (b) 60.9cm

(c) 30.9 cm (d) 60.9 cm

16. If an observer is walking away from the plane mirror with 6 m/sec. Then the velocity of the image with respect to observer will be
    (a) 6 m/sec (b) -6 m/sec
    (c) 12 m/sec (d) 3 m/sec
17. A ray of light is incident at 50° on the middle of one of the two mirrors arranged at an angle of 60° between them. The ray then touches the second mirror, get reflected back to the first mirror, making an angle of incidence of
    (a) 50° (b) 60°
    (c) 70° (d) 80°
18. All of the following statements are correct except
    (a) The magnification produced by a convex mirror is always less than one
    (b) A virtual, erect, same-sized image can be obtained using a plane mirror
    (c) A virtual, erect, magnified image can be formed using a concave mirror
    (d) A real, inverted, same-sized image can be formed using a convex mirror
19. An object of length 6 cm is placed on the principle axis of a concave mirror of focal length fat a distance of 4f. The length of the image will be
    (a) 2 cm (b) 12 cm
    (c) 4 cm (d) 1.2 cm
20. The focal length of a convex lens is 10 cm and its refractive index is 1.5 . If the radius of curvature of one surface is 7.5 cm , the radius of curvature of the second surface will be
    (a) 7.5 cm (b) 15.0 cm
    (c) 75 cm (d) 5.0 cm
21. What will be the height of image when an object of 2 mm is placed on the axis of a convex mirror at a distance 20 cm of radius of curvature 40 cm?
22. Image formed by a concave mirror of focal length 6 cm, is 3 times of the object, then the distance of object from mirror is
23. A concave mirror of focal length f (in air) is immersed in water ($\mu = 4/3$) . The focal length of the mirror in water will be
24. Radius of curvature of concave mirror is 40 cm and the size of image is twice as that of object, then the object distance is
25. A point object is placed at a distance of 10 cm and its real image is formed at a distance of 20 cm from a concave mir If the object is moved by 0.1 cm towards the mirror, the image will shift by about

CHEMISTRY

26. Nessler's reagent is:
    (a) K_2HgI_4 (b) K_2HgI_2 + KOH
    (c) K_2Hgl_4 + KOH (d) K_2Hgl_4 + Hg
27. Which of the following oxide is white but turns yellow on heating ?
    (a) AgO (b) FeO
    (c) ZnO (d) Ag_2O
28. Which of the following is a strong oxidising agent
    (a) Mn^{3+} (b) Zn^{2+}
    (c) Cr^{3+} (d) Sr^{3+}
29. Electronic configuration of a metal cation M^{2+} is 2, 8, 14. Number of unpaired electrons in neutral M atom are
    (a) 4 (b) 2
    (c) 5 (d) 1
30. Main oxidation state shown by lanthanides
    (a) +3 (b) +4
    (c) +2 (d) +1
31. How many ions are produced by $[Co(NH_3)_6]Cl_2$ in solution?
    (a) 6 (b) 4
    (c) 3 (d) 2
32. EDTA is a.....ligand:
    (a) Monodentate (b) Hexadentate
    (c) Bidentate (d) Tridentate
33. The EAN of platinum in potassium hexachloroplatinate (IV) is:
    (a) 46 (b) 86
    (c) 36 (d) 84
34. The correct IUPAC name of $Mn_3(CO)_{12}$ is:
    (a) Dodecacarbonylmanganate (0)
    (b) Dodecacarbonylmanganic (II)
    (c) Dodecacarbonyltrimanganese(0)
    (d) Manganic dodecacarbonyl (0)
35. IUPAC name of complex $K_3[Al(C_2O_4)_3]$ is:
    (a) Potassium alumino-oxalate
    (b) Potassium trioxalatoaluminate (III)
    (c) Potassium aluminium (III) oxalate
    (d) Potassium trioxalatoaluminate (VI)
36. Which of the following electronic configuration would be associated with the highest magnetic moment?
    (a) [Ar] $3d^6$ (b) [Ar] $3d^8$
    (c) [Ar] $3d^3$ (d) [Ar] $3d^7$
37. Choose the correct option having all the clements with d^{10}electronic configuration from the following:
    (a) ^{27}Co, ^{28}Ni, ^{26}Fe, ^{24}Cr
    (b) ^{29} Cu ,^{30}Zn,^{48}Cd,^{47}Ag
    (c) ^{46}Pd , 28 Ni, ^{26} Fe, ^{24} Cr
    (d) ^{28} Ni ^{24} Cr , ^{26} Fe, ^{29} Cu
38. $KMnO_4$ decomposes on heating at 513K to form O_2 along with
    (a) Mn and KO_2 (b)K_2MnO_4 and MnO_2
    (c) K_2MnO_4 and Mn (4) MnO_2 and K_2O_2

39. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A): In aqueous solutions Cr^{2+} is reducing while Mn^{3} is oxidising in nature.

Reason (R): Extra stability to half filled electronic configuration is observed than incompletely filled electronic configuration.

In the light of the above statements, choose the most appropriate answer from the options given below:

(a) (A) is true but (R) is false

(b) Both (A) and (R) are true and (R) is the correct explanation of (A)

(c) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(d) (A) is false but (R) is true

40. The number of element from the following that do not belong to lanthanoids is

Eu, Cm, Er, Tb, Yb and Lu

(a) 5 (b) 1

(c) 3 (d) 4

41. In which of the following complexes oxidation state of metal is zero?

(a) $[Pt(NH_3)_2Cl_2]$ (b) $[Cr(CO)_6]$

(c) $[Cr(NH_3)_3Cl_3]$ (d) $[Cr(en)_2Cl_2]$

42. Among the following which are ambidentate ligand?

(i) NO_2^- (ii) NO_3^-

(iii) $EDTA^{4-}$ (iv) $C_2O_4^{2-}$

(v) SCN^- (vi) $H_2NCH_2CH_2NH_2$

(a) (i) and (ii) (b) (iii) and (iv)

(c) (i) and (vi) (d) (i) and (v)

43. The IUPAC name of $[Ni(NH_3)_4][NiCl_4]$ is:

(a) tetrachloronickel(II) tetraamminenickel(II)

(b) tetraamminenickel(II) tetrachloronickel(II)

(c) tetraamminenickel(II) tetrachloronickelate(II)

(d) tetrachloronickel(II) tetraamminenickelate(II)

44. Which one of the following is expected to exhibit optical isomerism (en = ethylenediamine)

(a) cis-$[Pt(NH_3)_2Cl_2]$

(b) trans-$[Co(en)_2Cl_2]$

(c) trans-$[Pt(NH3)_2Cl_2]$

(d) cis-$[Co(en)_2Cl_2]$

45. Isomerisms exhibited by $[Cr(NH_3)_2(H_2O)_2Cl_2]^+$ are

(a) Coordinate , linkage

(b) Geometrical optical

(c) Coordinate geometrical

(d) Ionization linkage

Numerical value type

46. Among CrO ,Cr_2O_3 and CrO_3 the sum of spin – only magnetic moment values of basic and amphoteric oxides is _____ 10^{-2} BM (nearest integer).

47. Number of colourless lanthanoid ions among the following is_____.

Eu^{+3}, Lu^{+3}, $Nd^{3+}$$La^{3+}$,$Sm^{3+}$

48. What is the sum of oxidation number and coordination number of Cr in $CrCl_3.6NH_3$, is

49. Ethylenediamminetetraacetate ion is a polydentate ligand and negatively charged. The magnitude of negative charge is.

50. How many isomers are possible for the complex ion,$[Cr(NH_3)(OH)_2Cl_3]^{2-}$?

MATHS

51. If $\int \frac{dx}{1+sinx} = \tan\left(\frac{x}{2}+a\right)+b$, find the values of a and b.

(a) $\tan\left(\frac{x}{2}+\frac{\pi}{4}\right)+C$ (b)$\cot\left(\frac{x}{2}+\frac{\pi}{4}\right)+C$

(c) $\tan\left(\frac{x}{2}-\frac{\pi}{4}\right)+C$ (d) $\tan\left(\frac{x}{2}+\frac{\pi}{4}\right)-C$

52. $\int \frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}$ dx is equal to

(a) $2(\sin x + x\cos\alpha)+C$

(b) $2(\sin x - x\cos\alpha)+C$

(c) $2(\sin x + 2x\cos\alpha)+C$

(d) $2(\sin x - 2x\cos\alpha)+C$

53. $\int \cot x \log(\sin x)\, dx$ *is equal to*

(a) $\frac{1}{2}(\log(\sin x))^2 + C$

(b) $\log(\sin x) + C$

(c) $\frac{1}{2}(\log(\cos x))^2 + C$

(d) none of these

54. $\int e^x(1-cotx+cot^2x)dx$ *is equal to*

(a) e^x cosec x+C (b) - e^x cosec x+C

(c) e^x cot x+C (d) - e^x cot x+C

55. $\int(sin^4x - cos^4x)dx$ *is equal to*

(a) $\frac{1}{2}\,cos2x + C$ (b) - $\frac{1}{2}\,cos2x + C$

(c) $\frac{1}{2}\,sin2x + C$ (d) $-\frac{1}{2}\,sin2x + C$

56. $\int e^{3lo}\ \ (x^4+1)^{-1}dx$ *is equal to*

(a) $\frac{1}{4}\log(x^4+1)+c$ (b)- $\frac{1}{4}\log(x^4+1)+c$

(c)$\log(x^4+1)+c$ (d) none of these

57. $\int \frac{1+x+\sqrt{x+x^2}}{\sqrt{x}+\sqrt{1+x}}$ dx is equal to

(a) $\frac{1}{2}\sqrt{1+x}+C$ (b) $\frac{2}{3}(1+x)^{3/2}$+C

(c) $2(1+x)^{3/2}$+C (d) $\sqrt{1+x}+C$

58. $\int \frac{f'(x)}{f(x)\log((f(x))}dx$ is equal to

(a) $f(x)\log\big(f(x)\big)+C$

(b) log(log(f(x)))+C

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

(d) $\frac{1}{\log(\log(f(x)))}+c$

59. $\int e^{x\log a}e^{x}dx$ is equal to

(a) $\frac{a^x}{\log ae}+C$ (b) $\frac{e^x}{1+log}$

(c) $(ae)^x+C$ (d) $\frac{(ae)^x}{\log ae}+C$

60. $\int x^{51}(tan^{-1}x+cot^{-1}x)dx=$

(a) $\frac{x^{52}}{52}(tan^{-1}x+cot^{-1}x)+c$

(b) $\frac{x^{52}}{52}(tan^{-1}x-cot^{-1}x)+c$

(c) $\frac{\pi x^{52}}{104}+\frac{\pi}{2}+c$

(d) $\frac{x^{52}}{52}+\frac{\pi}{2}+c$

61. $\int\left(x+\frac{1}{x}\right)^{3/2}\left(\frac{x^2-1}{x^2}\right)dx$ *is equal to*

(a) $\frac{1}{3}\left(x+\frac{1}{x}\right)^{3}+c$

(b) $\frac{2}{5}\left(x+\frac{1}{x}\right)^{5/2}+c$

(c) $\frac{2}{3}\left(x+\frac{1}{x}\right)^{3/2}+c$

(d) $\frac{4}{3}\left(x+\frac{1}{x}\right)^{3/4}+c$

62. $\int\frac{x^2tan^{-1}x^3}{1+x^6}dx$ *is equal to*

(a) $\tan^{-1}(x^3)+c$ (b) $\frac{1}{6}\tan^{-1}(x^3)^2+c$

(c) $\frac{1}{2}\tan^{-1}(x^3)^2+c$ (d) $\frac{1}{2}\tan^{-1}(x^2)^3+c$

63. $\int\frac{dx}{\sin\sqrt{3\cos}}=$

(a) $\log tan\left(\frac{x}{2}+\frac{\pi}{2}\right)+c$

(b) $\frac{1}{2}\log tan\left(\frac{x}{2}+\frac{\pi}{6}\right)+c$

(c) $\log cot\left(\frac{x}{2}+\frac{\pi}{6}\right)+c$

(d) $\frac{1}{2}\log cot\left(\frac{x}{2}+\frac{\pi}{2}\right)+c$

64. $\int\frac{x-2}{x(2\log x-x)}dx=$

(a) log (2 log x-x)+c (b) $\log\left(\frac{1}{2\log x-x}\right)+c$

(c) log(x-2 log x) +c (d) $\log\left(\frac{1}{x-2\log x}\right)+c$

65. If $f(x)=\int\frac{x^2dx}{(1+x^2)(1+\sqrt{1+x^2}}$ and $f(0)=0$ then the value of f(1) will be

(a) log $(1+\sqrt{2})$ (b) log $(1+\sqrt{2})-\frac{\pi}{4}$

(c) log $(1+\sqrt{2})+\frac{\pi}{2}$ (d) None of these

66. The valur ofd $\int e^x(x^5+5x^4+1)$dx is equal to

(a) $e^x x^5+e^x+c$ (b) $e^x x^5+c$

(c) $5x^4e^x+c$ (d) $e^{x+1}x^5+c$

67. $\int\frac{sin^8x-cos^8x}{1-2si^2x\cos^2x}dx=$

(a) $(\sin 2x)/2+c$ (b) –(sin 2x)/2+c

(c) –(sinx)/2 + c (d) $-\sin^2x+c$

68. $\int\sin x.\cos x.\cos 2x.\cos 4x.cos8x\,dx$ *is equal to*

(a) $-\frac{1}{96}cos16x+c$ (b) $-\frac{1}{256}cos16x+c$

(c) $-\frac{1}{16}cos16x+c$ (d) None of these

69. If $\int\frac{\cos x-\sin x+1-x}{e^x+\sin x+x}dx=\log_e(f(x))+g(x)+c$ where C is the constant of integration and f(x) is positiove , Then f(x) + g(x) has the value equal to

(a) $e^x+\sin x+2x$ (b) $e^x+sin\,x$

(c) $e^x-\sin x$ (d) $e^x+sin\,x+x$

70. $\int\frac{In\left(\frac{x-1}{x+1}\right)}{x^2-1}dx$ *is equal to*

(a) $\frac{1}{2}\left(In\left(\frac{x-1}{x+1}\right)\right)^2+C$ (b) $\frac{1}{2}\left(In\left(\frac{x+1}{x-1}\right)\right)^2+C$

(c) $\frac{1}{4}\left(In\left(\frac{x-1}{x+1}\right)\right)^2+C$ (d) $\frac{1}{4}\left(In\left(\frac{x+1}{x-1}\right)\right)$

Numerical value type

71. If $\int\frac{\cos 4x}{\cot x-\tan x}$ dx = 4 cos 4x +b , then the value of |A| is_____

72. Let $f(x)=\int x^{sinx}(1+x\cos x.In\,x+\sin x)$ dx and $f\left(\frac{\pi}{2}\right)=\frac{\pi^2}{4}$. Then the value of $(f(\pi))is$____

73. If $\int\left[\left(\frac{x}{e}\right)^x+\left(\frac{e}{x}\right)^x\right]$In x dx= $A\left(\frac{x}{e}\right)^x+B\left(\frac{e}{x}\right)^x+C$, then the value of |AB| is _____.

74. Let $f(x)=\int\frac{(x^2+1)dx}{\sqrt[3]{x^3+3x+6}}$ and $\int(-1)=\frac{1}{\sqrt[3]{2}}$ .Then the value of $f(-2)$ *is*_____

75. If $\int\frac{2\cos x-\sin x+\lambda}{cosx+\sin x-2}dx$ =A In |cosx+sin x-2|+Bx+C, then the value of |AB| is_____