NEW STANDARD ACADEMY

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

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

PRE-MEDICAL :12th Undergoing/Pass Students

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

Important Instructions :

1. On the answer sheet, fill in the particulars on Side-1 and Side -2 carefully with blue/black ball point pen only.
2. The test The test is of 3 hours 20 minutes duration and this Test Booklet contains 200 questions. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
3. In this Test Paper, each subject will consist of two sections. Section A will consist of 35 questions (all questions are mandatory) and Section B will have15 questions. Candidate can choose to attempt any 10 question out of these 15 questions. In case if candidate attempts more than 10 questions, first 10 attempted questions will be considered for marking
4. In case of more than one option correct in any question, the best correct option will be considered as answer.
5. Use Blue/Black Ball Point Pen only for writing particulars on this page/marking responses.
6. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
7. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
8. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Form No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
9. Use of white fluid for correction is not permissible on the Answer Sheet.

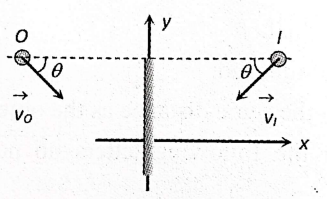
Name of the Candidate(In Capitals) _____

Date of Examintation _____

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

(PHYSICS)

1. A plane mirror is approaching you at 10cm/s. You can see your image in it. At what speed will your image approach
   (a) 10cm/ s (b) 5 cm / s
   (c) 20 cm/s (d) 15 cm/s
2. If an object approaches towards a plane mirror with velocity V, then image approaches the object with velocity
   (a) V (b)1.5 V
   (c) 2v (d)3V
3. A car is moving towards a plane mirror at a speed of 30 m/s. Then the relative speed of its image with respect to the car will be
   (a) 30 m/s (b) 60 m/s
   (c) 15 m/s (d) 45 m/s
4. An object is approaching a plane mirror at 5 cm/s . A stationary observer sees the image. At what speed will the image approach the stationary observer?
   (a) 5 cm/s (b) 20 cm/ s
   (c) 10 cm/s (d) 15cm/s
5. If an object moves towards a plane mirror with a speed v_0 at an angle θ to the perpendicular of the plane mirror , then find the relative between the object and the image.



   (a) v (b) 2 v
   (c) 2 v cosθ (d) 2 v $sin\theta$
6. A person runs with a speed u towards a bicycle moving away from him with speed v. The person approaches his image in the mirror fixed at the rear of bicycle with a speed of
   (a) u-v (b) u-$2v$
   (c) 2u-v (d) 2(u-v)
7. Two mirrors are place perpendicular to each other. A ray strikes the first mirror and after reflection from the first mirror it falls on the second mirror . The ray after reflection from second mirror will emerge
   (a) perpendicular to the original ray
   (b) parallel to the original ray
   (c) at 45°to the original ray
   (d) at 60° to the original ray
8. Two mirrors are inclined at an angle θ as shown in the figure. Light ray is incident parallel to one of the mirrors. The ray will start retracing its path after third reflection if

   (a) θ = 45° (b) θ =30°
   (c) θ = 60° (d) all of these
9. An object is placed between two plane mirrors set at 60° to each other. The maximum number of images seen will be
   (a) 2 (b) 3
   (c) 5 (d) 6
10. A person is in a room whose ceiling and two adjacent walls are mirrors. How many images are formed?
    (a) 5 (b) 6
    (c) 7 (d) 8
11. The number of images observable between two parallel plane mirrors is
    (a) 2 (b) 4
    (c) 11 (d) infinite
12. An object is placed symmetrically between the two plane mirrors inclined at an angle of 30°, then the total number of images formed is
    (a) 12 (b) 2
    (c) 11 (d) infinite
13. If an object is placed unsymmetrically between two plane mirrors, inclined at the angle of 60°, then the total number of images formed is
    (a) 5 (b) 4
    (c) 2 (d) infinite
14. If an object is placed unsymmetrically between two plane mirrors, inclined at an angle of 72°, then the total number of images formed is
    (a) 5 (b) 4
    (c) 2 (d) Infinity
15. Images of an object placed between two plane mirrors whose reflecting surfaces make an angle of 90° with one another lie on
    (a) a straight line
    (b) a zig-zag curve
    (c) a circle
    (d) an ellipse
16. At what angle must two plane mirrors be placed so that incident and resulting reflected rays are always parallel to each each other?
    (a) 0° (b) 60°
    (c) 180° (d) none

17. The refractive index of water is 4/3 and that of glass is 3/2. If the speed of light in glass is 2×10^8m/s, the speed of light in water will be
(a) 1×10^8m/s (b) $(9/4)\times 10^8$m/s
(c) $(8/3)\times 10^8$m/s (d) 4×10^8m/s

18. Light travels through a glass of thickness t and refractive index n. If c is the velocity of light in vacuum ,the time taken by light to travel through the glass is
(a) t/nc (b) ntc
(c) nt/c (d) tc/n

19. Light of frequency 5×10^{14}Hz is travelling in a medium of refractive index1.5. What is its wavelength?($c=3\times10^8$ ms^{-1})
(a) 9000Å (b) 6000Å
(c) 4500Å (d) 4000Å

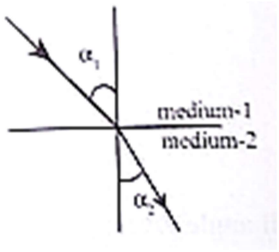
20. A ray of light is incident on the surface of separation of a medium at an angle of 45° and is refracted in the medium at an angle of 30°. What will be the speed of light in the medium?
(a) 1.96×10^8 m s^{-1} (b) 2.12×10^{11} m^{-1}
(c) 3.18×10^8 m s^{-1} (d) 3.33×10^8 m s^{-1}

21. The optical path of a monochromatic light is same if it goes through 4.0 cm of glass or 4.5 cm of water. If the refractive index of glass is 1.53, the refractive index of the water is
(a) 1.30 (b) 1.36
(c) 1.42 (d) 1.46

22. The refractive index of water, glass and diamond are 1.33, 1.50 and 2.40, respectively. The relative index of refraction of diamond relative to water and of glass relative to diamond, respectively, are nearly
(a) 1.80 and 0.625 (b) 0.554 and 0.625
(c) 1.80 and 1.6 (d) 0.554 and 1.6

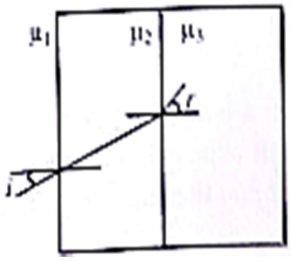
23. An electromagnetic radiation of frequency n. wavelengthλ, travelling with velocity v in air, enters a glass slab of refractive index μ. The frequency, wavelength and velocity of light in the glass slab will. respectively, be
(a) $\frac{n}{\mu},\frac{\lambda}{\mu}$ and $\frac{v}{\mu}$ (b) n,$\frac{\lambda}{\mu}$ and $\frac{v}{\mu}$
(c) $n,\mu\lambda$ and $\frac{v}{\mu}$ (d) $\frac{2n}{\mu},\frac{\lambda}{\mu}$ and v

24. A beam of light propagates through a medium-1 and falls onto another medium-2 at an angle α_1 as shown. After that it propagates in medium-2 at an angle α_2 as shown. The wavelength of light in medium-1 is λ. What is the wavelength of light in medium-2?



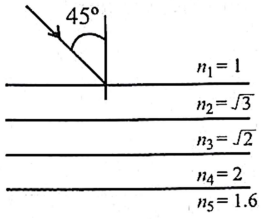
(a) $\frac{sin\alpha_1}{sin\alpha_2}\lambda_1$ (b) $\frac{sin\alpha_2}{sin\alpha_1}\lambda_1$
(c) $\frac{cos\alpha_1}{cos\alpha_2}\lambda_1$ (d) $\frac{cos\alpha_2}{cos\alpha_1}\lambda_1$

25. In the figure shown,$\frac{\sin i}{\sin r}$ is equal to



(a) $\frac{\mu_2^2}{\mu_3\mu_1}$ (b) $\frac{\mu_3}{\mu_1}$
(c) $\frac{\mu_3\mu_1}{\mu_2^2}$ (d) none of these

26. In the figure shown the angle made by the light ray with the normal in the medium of refractive index $\sqrt{2}$ is



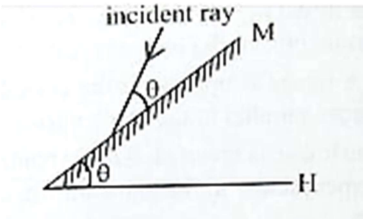
(a) 30° (b) 60°
(c) 90° (d) none of these

27. The images of clouds and trees in water are always less bright than in reality
(a) because water is forming the image dirty
(b) because there is an optical illusion due to which the image appears to be less bright
(c) because only a portion of the incident light is reflected and quite a large portion goes in water
(d) because air above the surface of water contains a lot of moisture

28. When a clock is viewed in a mirror, the needles exhibit a time which appears to be 8.20. Then the actual time will be
(a) 4.40 (b) 3.40
(c) 8.20 (d) 3.20

29. A ray of light making an angle 10° with the horizontal is incident on a plane mirror making an angle θ with the horizontal. What should be the value of θso that the reflected ray goes vertically upwards?
(a) 20° (b) 30°
(c) 40° (d) 45°

30. A mirror is inclined at an angle of $\theta°$ with the horizontal. If a ray of light is incident at glassing angle $\theta°$, then the reflected ray makes _____angle with the horizontal.



(a) $\theta°$ (b) 2 $\theta°$
(c) $\frac{\theta°}{2}$ (d) None of these

31. Two plane mirrors A and B are parallel to each other and spaced 20 cm apart. An object is kept in between them at 15 cm from A. Out of the following, at which point image is not formed in mirror A (distance measured from mirror A)?
(a) 15 cm (b) 25 cm
(c) 45 cm (d) 55 cm

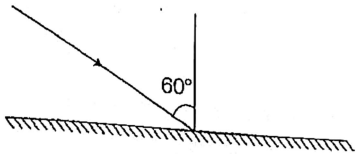
32. When a small plane mirror is placed horizontally on level ground at a distance of 60 m from the foot of a tower, the top of the tower and its image in the mirror subtend an angle of 90°at the eye, where eye is placed at the mirror itself. The height of the tower is
(a) 30 m (b) 60 m
(c) 90 m (d) 120 m

33. An object is initially at a distance of 100 cm from a plane mirror. If the mirror approaches the object at a speed of 5 cm/s, then after 6 s the distance between the object and its image will be
(a) 60 cm (b) 140 cm
(c) 170 cm (d) 150 cm

34. A person is standing in front of a plane mirror. If the mirror recedes with velocity v, the relative separation of person and his image per second is
(a) 0 (b) v
(c) 2 v (d) v/2

35. Two plane mirrors are inclined to one another at an angle of 60°. A ray is incident on mirror M, at an angle i. The reflected ray from mirror M, is parallel to mirror M_1. The angle of incidence i is
(a) 20° (b) 10°
(c) 30° (d) 40°

36. On a plane mirror a ray of light is incident at an angle of 60°. To make the reflected ray vertical, at what angle with vertical must a plane mirror be placed?



(a) 30° (b) 45°
(c) 60° (d) 150°

37. Two plane mirrors are inclined to one another at an angle of 40°. A point object is placed symmetrically in between them. The number of images formed due to reflection at both mirrors is
(a) infinite (b) 9
(c) 8 (d) 6

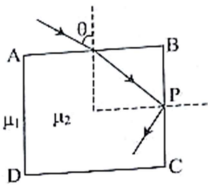
38. An object of length 5cm is placed at a distance 1m from a concave mirror. If radius of curvature of mirror is 20 cm, size of image will be
(a) 0.11 cm (b) 0.50 cm
(c) 0.55 cm (d) 0.60 cm

39. A point source of light is placed 4 m below the surface of water of $\mu = \frac{5}{3}$. The minimum diameter of a disc, which should be placed over the source, on the surface of water to cut off all light coming out of water, is
(a) 1 m (b) 6 m
(c) 4 m (d) 3 m

40. The critical angle for total internal reflection of light going from medium I to medium II is given by the relation tan i_c = 5/9 The refractive index of the I medium with respect to the medium II is
(a) 1.8 (b) 1.6
(c) $\sqrt{156}$ / 5 (4) $\sqrt{106}$ / 5

41. If a ray of light is incident at an angle α on the boundary separating two transparent media, it is transmitted. If the angle of incidence is increased very slightly, the ray gets reflected in the same medium. The difference between angles of deviation in the two cases will be close to
(a) 2α (b) 90° - α
(c) 180° - α (d) 180 - 2 α

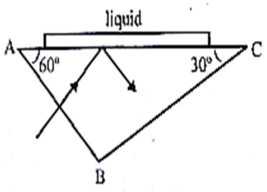
42. A cube of side a made of a material of refractive index μ_2 is immersed in a liquid of refractive index μ_1. A ray is incident on face AB at an angle θ as shown. Total internal reflection just takes place at point P on face BC. Then find the value of θ.



(a) $\sin\theta = \frac{\mu_2}{\mu_1}$
(b) $\sin\theta = \sqrt{\left[\left(\frac{\mu_2}{\mu_1}\right)^2 - 1\right]}$
(c) $\sin\theta = \sqrt{\left(\frac{\mu_1}{\mu_2}\right)^2 - 1}$
(d) $\sin\theta = \sqrt{\left(\frac{\mu_2}{\mu_1}\right)^2 - 1}$

43. A ray of light travelling in glass ($\mu_g = 3/2$) is incident on a glass air surface at the critical angle. If a thin layer of water ($\mu_w = 4/3$) is now poured on the glass air surface, at what angle will the ray of light emerge into air at the water air surface?
(a) 60° (b) 30°
(c) 45° (d) 90°

44. On the hypotenuse of a right angled prism of refractive index 1.5, a layer of liquid is placed as shown. A ray of light falls normally on the face AB. What should be the maximum value of refractive index of liquid, so that it gets totally reflected at face AC?



(a) 1.3 (b) 1.47
(c) 1.02 (d) 1.23

45. A ray of light undergoes deviation of 30° when incident on an equilateral prism of refractive index $\sqrt{2}$. The angle made by the inside the prism with the base of the prism is
(a) 15° (b) 0°
(c) 45° (d) 30°

CHEMISTRY

46. Nessler's reagent is:
(a) K_2HgI_4 (b) $K_2HgI_2 + KOH$
(c) $K_2Hgl_4 + KOH$ (d) $K_2Hgl_4 + Hg$

47. Which of the following oxide is white but turns yellow on heating ?
(a) AgO (b) FeO
(c) ZnO (d) Ag_2O

48. Which of the following is a strong oxidising agent ?
(a) Mn^{3+} (b) Zn^{2+}
(c) Cr^{3+} (d) Sr^{3+}

49. 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

50. Main oxidation state shown by lanthanides
(a) +3 (b) +4
(c) +2 (d) +1

51. How many ions are produced by $[Co(NH_3)_6]Cl_2$ in solution?
(a) 6 (b) 4
(c) 3 (d) 2

52. EDTA is a.....ligand:
(a) Monodentate (b) Hexadentate
(c) Bidentate (d) Tridentate

53. The EAN of platinum in potassium hexachloroplatinate (IV) is:
(a) 46 (b) 86
(c) 36 (d) 84

54. The correct IUPAC name of $Mn_3(CO)_{12}$ is:
(a) Dodecacarbonylmanganate (0)
(b) Dodecacarbonylmanganic (II)
(c) Dodecacarbonyltrimanganese(0)
(d) Manganic dodecacarbonyl (0)

55. 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)

56. The correct order of ionic radii of Y^{3+}, La^{3+}, Eu^{3+} and Lu^{3+} is
(a) $Y^{3+} < La^{3+} < Eu^{3+} < Lu^{3+}$
(b) $Y^{3+} < Lu^{3+} < Eu^{3+} < La^{3+}$
(c) $Lu^{3+} < Eu^{3+} < La^{3+} < Y^{3+}$
(d) $La^{3+} < Eu^{3+} < Lu^{3+} < Y^{3+}$

57. Four successive members of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionisation enthalpy?
(a) Vanadium (Z = 23)
(b) Chromium (Z = 24)
(c) Manganese (Z = 25)
(d) Iron (Z = 26)

58. Magnetic moment 2.83 BM is shown by which of the following ions?
(a) Ti^{3+} (b) Ni^{2+}
(c) Cr^{3+} (4) Mn^{2+}

59. Reason of lanthanide contraction
(a) Negligible screening effect of f-orbitals
(b) Increasing nuclear charge
(c) Decreasing nuclear charge
(d) Decreasing screening effect

60. Because of lanthanoid contraction, which of the following pairs of elements have nearly same atomic radii ? (Number in the parenthesis are atomic numbers)
(a) Zr(40) and Hf(72) (b) Zr(40) and Ta(73)
(c) Ti(22) and Zr(40) (d) Zr(40) and Nb(41)

61. Gadolinium belong to 4*f* series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?
(a) [Xe] $4f^7\ 5d^1\ 6s^2$ (b) [Xe] $4f^6\ 5d^2\ 6s^2$
(c) [Xe] $4f^8\ 5d^2$ (d) [Xe] $4f^9\ 6s^1$

62. Which of the correct order of increasing energy of the listed orbitals in the atoms of titanium? (At. no. Z = 22)
(a) 3s 3p 3d 4s (b) 3s 3p 4s 3d
(c) 3s 4s 3p 3d (d) 4s 3s 3p 3d

63. Which one of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution?
(a) Green $Cr_2(SO_4)_3$ is formed
(b) The solutions turns blue
(c) The solutions is decolourized
(d) SO_2 is reduced

64. Name the gas that can readily decolourise acidified $KMnO_4$ solution.
(a) SO_2 (2) NO_2
(c) P_2O_5 (4) CO_2

65. Which of the following reactions are disproportionation reaction?
(1) $2Cu^{+} \rightarrow Cu^{2+} + Cu^{0}$
(2) $3MnO_4^{2-} + 4H^{+} \rightarrow 2MnO_4^{-} + MnO_2 + 2H_2O$
(3) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$
(4) $2MnO_4^{-} + 3Mn^{2+} + 2H_2O \rightarrow 5MnO_2 + 4H^{\oplus}$
Select the correct option from the following:
(a) (1) and (2) only (b) (1), (2) and (3)
(c) (1), (3) and (4) (d) (1) and (4) only

66. The calculated spin only magnetic moment of Cr^{2+} ions is
(a) 2.84 BM (b) 3.87 BM
(c) 4.90 BM (d) 5.92 BM

67. Identify the incorrect statement from the following
(a) The overall decrease in atomic and ionic radu from lanthanum to lutetium is called lanthanoid contraction
(b) Zirconium and Hafnium have identical radi of 160 pm and 159 pm, respectively as a consequence of lanthanoid contraction
(c) Lanthanoids reveal only +3 oxidation state
(d) The lanthanoid ions other than the f type and the f type are all paramagnetic

68. Match the following aspects with the respective metal

Aspects	**Metal**
(a) The metal which reveals a maximum number of oxidation states	(i) Scandium
(b) The metal although placed in 3d block is considered not as a transition element	(ii) Copper
(c) The metal which does not exhibit variable oxidation states	(iii)manganese
(d) The metal which in +1 oxidation state in aqueous solution undergoes disproportionation	(iv) Zinc

Select the correct option
(a) (a)-(ii) (b)-(iv) (c)-(i) (d)-(iii)
(b) (a)-(i) (b)-(iv) (c)-(ii) (d)-(iii)
(c) (a)-(iii) (b)-(iv) (c)-(i) (d)-(ii)
(d) (a)-(iii) (b)-(i) (c)-(iv) (d)-(ii)

69. The incorrect statement among the following is
(a) Actinoid contraction is greater for element to element than Lanthanoid contraction.
(b) Most of the trivalent Lanthanoid ions are colourless in the solid state.
(c) Lanthanoids are good conductors of heat and electricity
(d) Actinoids are highly reactive metals, especially when finely divided.

70. Gadolinium has a low value of third ionisation enthalpy because of
(a) High electronegativity
(b) High basic character
(c) Small size
(d) High exchange enthalpy

71. The coordination number and oxidation number of the central metal ion in the complex $[Pt(en)_2]^{+2}$ are
(a) CN .=2 , O. N .= +2
(b) C .N.=6, O. N .= +4
(c) CN = 4, O.N = + 4
(d) C .N.= 4,O.N .= +2

72. The oxidation state of Ag in Tollen's reagent is
(a) 0 (b) +1
(c) +1.5 (d) +2

73. The charge on iron in $[Fc(CN)_6]^{3-}$ is
(a) -6 (b) +3
(c) -3 (d) +6

74. To form a coordination bond, one needs a ligand. Which of the following species cannot be a ligand?
(i) NH_4^{+} (ii) NO^{+}
(iii) $C_2H_5\ddot{N}$
(a) (i) only (b) (i) and (ii) only
(c) (i) and (iii) only (d) (i), (ii) and (iii) only

75. $K_3[Fe(CN)]$ is
(A) Potassium hexacyno ferrate(II)
(B) Potassium hexacyno ferrate(III)
(C) Potassium ferri-cyanide
(D) Hexacyanoferrate(III) potassium
Correct answer is
(a) Only (A) and (B)
(b) Only (B) and (C)
(c) Only (A) and (C)
(d) Only (B) and (D)

76. The formula of the complex tris (ethylenediamine) cobalt(III) sulphate is
(a) $[Co(en)_2 SO_4]$ (b)$[Co(en)_2SO_4]$
(c) $[Co(en)_3]SO_4$ (d) $[Co(en)_3]_2(SO_4)_3$

77. Give the IUPAC name of the complex compound $[Co(NH_3)_4(H_2O)Br](NO_3)_2$
    (a) Bromoaquotetraaminecobalt (III) nitrate
    (b) Bromoaquotetraaminocobalt(III) nitrate
    (c) Bromoaquatetraamminecobalet(III) nitrate
    (d) Tetraammineaquabromocobalt(III) nitrate
78. Name of the compound $Na_2[Fe(CN)_5NO^+]$ is
    (a) Sodium pentacyanonitrosonium (II)
    (b) Sodium nitroprusside
    (c) Sodium nitrosoferrocyanide
    (d) Both (1) and (2)
79. Which of the following has least conductivity in aqueous solution?
    (a) $Co(NH_3)_4Cl_3$ (b) $Co(NH_3)_3Cl_3$
    (c) $Co(NH_3)_5Cl_3$ (d) $Co(NH_3)_6Cl_3$
80. What number of moles of $BaSO_4$ precipitates when reagent $[Cu(NH_3)_4]SO_4$ is treated with excess of $BaCl_2$?
    (1) 2 (b) 0
    (c) 1 (d) None of these
81. The two compounds sulphato pentaamminecobalt(III) bromide and sulphato pentaamminecobalt (III) chloride represent
    (a) Linkage isomerism
    (b) Ionisation isomerism
    (c) Coordination isomerism
    (d) No isomerism
82. The kind of isomerism exhibited by $[Rh(en)_2Cl_2][Rh(en)Cl_4]$ and $[Rh(en)_3][RhCl_6]$ is
    (a) Linkage (b) Coordination
    (c) Ligand (d) Ionisation
83. Which of the following does/do not exhibit optical isomerism?
    (a) Tetrahedral complexes
    (b) Square planar complexes
    (c) Octahedral complexes
    (d) Polynuclear complexes
84. The compound $[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_4Cl_2]Cl.2H_2O$ respresent
    (a) Linkage isomerism
    (b) Hydration isomerism
    (c) Ligand isomerism
    (d) None of these

READ THE STATEMENTS CAREFULLY TO MARK THE CORRECT OPTION OUT OF THE OPTIONS GIVEN BELOW

(a) If both statements are true and Reason is the correct explanation of Assertion.
(b) If both statements are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If Assertion is false but Reason is true.

85. Theoretically,the number of geometrical isomers expected for octahedral complex[Mabcdef] is
    (a) zero (b) 30
    (c) 15 (d) 9
86. **Assertion:** $K_2SO_4 . Al_2(SO_4)_3.24H_2O$ is a complex compound.
    Reason: It ionises in water to give individual ions.
87. **Assertion:** In the complex $K_2[PtCl_6]$ C.N. of Pt is 6.
    Reason: In the given complexcoordinate bonds are formed between Pt and chloro ligands.
88. **Assertion:** Zn^{2+} is diamagnetic
    Reason: The electrons are lost from 4s orbital to form Zn^{2+}
89. **Assertion:** The free gaseous Cr atom has six unpaired electrons.
    Reason: Half-filled s-orbital has greater stability.
90. **Assertion:** $Na_2Cr_2O_7$ is not a primary standard in volumetric analysis.
    Reason: $Na_2Cr_2O_7$ is hygroscopic in nature.

BIOLOGY

91. The enzyme used to combine two fragments of DNA is
    (a) DNA ligase (b) Restriction enzyme
    (c) Alkaline phosphatase
    (d) Both (a) and (b)
92. Reverse transcriptase is an enzyme used to synthesise complementary DNA (cDNA) by using mRNA as a template. It was discovered by
    (a) Har Govind Khorana
    (b) Temin and Baltimore
    (c) A. Kornberg (d) Paul Berg
93. The specific DNA sequence where EcoRI cuts is
    (a) GGATCC (b) GAATTC
    (c) GATTC (d) GTTAAG
94. Which of the following is correctly matched?
    (a) pBR322-Enzyme
    (b) Ligase-Molecular glue
    (c) Agrobacterium-Production of insulin
    (d) EcoRI-Plasmid vector
95. Which of the following is not a vector-less method of gene -transfer?
    (a) Electroporation (b) Microinjection
    (c) Biolistic method (d) Agrobacterium
96. An ideal cloning vector should have
    (a) Restriction sites (b) Selectable marker
    (c) Origin of replication
    (d) All of these

97. The DNA fragments separated on agarose gel can be visualised after staining with
(a) Aniline blue
(b) Ethidium bromide
(c) Bromophenol blue
(d) Acetocarmine

98. In genetic engineering, the probe refers to
(a) A radioactively labelled single-stranded DNA
(b) A radioactively labelled protein
(c) A radioactively labelled double-stranded DNA
(d) A radioactively labelled double-stranded RNA

99. Which of the following is incorrect with respect to plasmids?
(a) It is a circular DNA.
(b) It carries antibiotic-resistance gene.
(c) It has the ability of autonomous replication.
(d) Its DNA is as long as chromosomal DNA.

100. The breakage of DNA fragment and inserting it into another DNA molecule, this technique is related to
(a) Gene splicing (b) Gene cloning
(c) Gene typing (d) DNA fingerprinting

101. Which of the following is not a characteristic feature of the pBR322 vector?
(a) It has two antibiotic-resistance genes: tet and amp.
(b) It was the first artificial cloning vector constructed in 1997 by Boliver and Rodriguez.
(c) The ampicillin-resistance gene has restriction sites for Bam Hl and Sal 1.
(d) The restriction site for Pvull is present in the replication of plasmid (rop) gene.

102. In genetic engineering, recombinant DNA means
(a) DNA with piece of RNA
(b) DNA which takes part in recombination
(c) DNA with a piece of foreign DNA
(d) DNA not associated with recombination

103. Which of the following is a cloning vector?
(a) Cosmid (b) Phagemid
(c) Plasmids (d) All of these

104. Which of the following statement is incorrect about gel electrophoresis?
(a) The most commonly used matrix is agarose.
(b) DNA fragments move towards cathode under electric field.
(c) DNA fragments are separated according totheir size.
(d) Bright orange bands are seen after staining DNA with ethidium bromide.

105. Gene cloning means
(a) Producing new genotype
(b) Producing genetically modified organisms
(c) Obtaining identical copies of a particular DNA molecule and preserve the genotype
(d) Replacing the mutated gene with normal genes

106. In the first artificial cloning vector pBR322, letters B and R represent
(a) Strains of bacteria from which the plasmid was obtained.
(b) Names of countries Bolivia and Russia who collaborated in constructing the plasmid.
(c) Names of laboratory where the plasmid was constructed.
(d) Names of scientists Bolivar and Rodriguez who constructed the plasmid.

107. Bacterial resistance to antibiotics is a generic trait carried in the bacterial
(a) Chromosome (b) Plasmid
(c) Centromere (d) Cytoplasm

108. The application of PCR technique is
(a) To harvest stem cells
(b) To replicate specific DNA sequence
(c) To replicate RNA sequence
(d) To obtain recombinant protein for commercial use

109. The primers used in the PCR technique should be
(a) Formed of polypeptide
(b) Polynucleotide chain tagged with radioisotope
(c) Complementary to the 3'-end sequence of the DNA segment to be amplified
(d) Complementary to the 5'-end sequence of the DNA segment to be amplified

110. Agarose extracted from sea weeds is used in
(a) PCR (b) Gel electrophoresis
(c) Electroporation (d) Biolistics

111. Elution means
(a) Isolating DNA from the chosen organisms
(b) Transfer of DNA on nitrocellulose membrane
(c) Binding of probe with specific sequences
(d) Cutting and extraction of DNA bands from the agarose gel

112. Stirred tank bioreactors are designed for
(a) Addition of preservatives to the product
(b) Purification of product
(c) Availability of oxygen throughout the process
(d) Ensuring anaerobic conditions in the culture vessel

113. Bioreactors can be thought of as vessels in which

(a) Raw materials are biologically converted into specific products
(b) Small volumes of cultures are processed
(c) DNA amplification takes place
(d) Transformants are distinguished due to blue-white selection

114. Which of the following is not a component of downstream processing?
(a) Separation (b) Purification
(c) Preservation (d) Expression

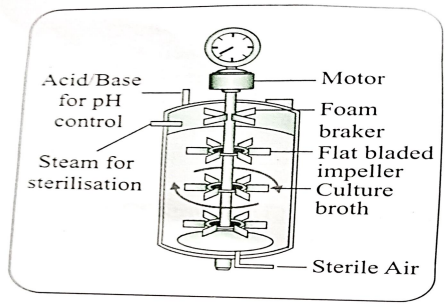
115. The blotting technique used for separation of DNA is called
(a) Northern blotting (b) Western blotting
(c) Southern blotting (d) Eastern blotting

116. Match the tissues /Molecules mentioned in column I with those of the degrading enzyme,es mentioned in column II and select the correct option.

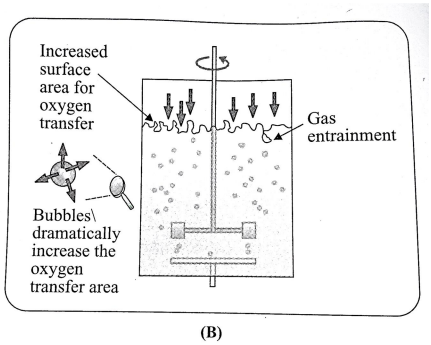
column I	column II
A Cell wall	(i) Pectinase
B RNA	(ii) Protease
C Histone	(iii) Cellulase
D Pectin	(iv) Ribonuclease

(a)A-(ii),B-(i),C-(iii), D- (iv)
(b)A-(i),B-(ii),C-(iv), D- (iii)
(c)A-(iii),B-(vi),C-(i), D- (ii)
(d)A-(iii),B-(iv),C-(ii), D- (i)

117. Identify the diagrams A and B.



(A)



(B)

(a) A-Sparged tank bioreactor, B-Stirred tank bioreactor
(b) A-Stirred tank bioreactor, B-Sparged tank bioreactor
(c) A-Stirred tank bioreactor, B-PCR machine
(d) A-Electrophoresis chamber. B-Sparged tank bioreactor

118. The utilization of Taq polymerase in PCR serves the purpose of
(a) Ensuring no temperature changes throughout the process
(b) Fast amplification of sample DNA at denaturing temperature
(c) Application of PCR as earliest technique of detection
(d) Synthesis of a sequence of complementary DNA which does not require proofreading

119. The process of formation of microspores
(I) From pollen mother cell through____A____ formed___ B___
(II) Microspore are arranged in___C___
(III) Microspore changes into the__D___
A to D in the above statements are
(a) A-Pollen grains,B-Microspore tetrad, C-Microsporogenesis, D-Meiosis
(b) A-Microspore tetrad,B- Microsporogenesis, C-Meiosis, D-Pollen grains
(c) A-Microsporogenesis, B-Microspore tetrad, C-Pollen grain, D-Meiosis
(d) A-Meiosis, B-Microspore, C-Microspore tetrad,D-Pollen grains

120. Arrange the following in a sequence of stages of microsporogenesis:
(I) Microspore tetrads
(II) Microspore mother cell
(III) Sporogenous tissue
(IV) Microspores dissociate from each other
(V) Release of pollen grains
The correct sequence of stages is
(a) (III), (V), (I), (II), (IV)
(b) (TV), (III), (1), (V). (11)
(c) (II), (I), (V), (III), (IV)
(d) (III), (II), (I), (IV), (V)

121. In angiosperms microspores are
(a) Well-developed male gametophyte
(b) Partially developed male gametophyte
(c) Partially developed male sporophyte
(d) Well-developed sporophyte

122. In palynology, we study which of the following?
(a) Megaspore mother cells
(b) Megaspores
(c) Microspores
(d) Microspore mother cells

123. Pollen grains
(A) Represent gametophytic phase of plant
(B) Can cause severe allergies like asthma and bronchitis
(C) Are rich in nutrient
(D)Are used as food supplements

(E) Are available in from of table and syrups in market of western countries
(a) Only (A) is correct
(b) All are correct
(c) All are wrong
(d) Only (A) ,(B) and (C) are correct

124. The end product(s) of sexual reproduction is/are
(a) Seeds (b) Fruits
(c) Cotyledons (d) Both seeds and fruits

125. Cells of the tapetum possess
(a) Dense cytoplasm and generally have more than one nucleus
(b) Light cytoplasm and always have more than one nucleus
(c) Dense cytoplasm and always have one nucleus
(d) Light cytoplasm and generally have more than one nucleus

126. Read the following statements and choose the correct option
(a) The megaspores, as they are formed, are arranged in a cluster of four cells the microspore tetrad
(b) Sporopollenin is absent in germ pores.
(c) The vegetative cell is smaller but has abundant food reserve
(d) Pollen grains from different species show the same architecture.

127. It is possible to store pollen grains of a large number of species for years in liquid nitrogen at
(a) 196 °C (b) 196 K
(c)-196 °F (d) -196 °C

128. How many pollen grains would be formed from 32 pollen mother cells?
(a) 32 (b) 64
(c) 128 (d) 256

129. From among the sets of terms given below, identify those that are associated with the gynoecium
(a) Stigma, ovule, embryo sac, placenta
(b) Thalamus, pistil, style, ovule
(c) Ovule, ovary, embryo sac, tapetum
(d) Ovule, stamen, ovary, embryo sac

130. In a fertilized embryo sac, the haploid, diploid and trip structure, are respectively
(a) Synergid, zygote and primary endosperm nucleus
(b) Synergid, antipodal and polar nuclei
(c) Antipodal, synergid and primary endosperm nucleus
(d) Synergid, polar nuclei and zygote

131. The structure formed by outer integument in a seed is called
(a)Aril (b) Tegmen
(c) Testa (d) Perisperm

132. The ovule is a small structure attached to the placenta by means of a stalk called
(a) Hilum (b) Integument
(c) Funicle (d) Filament

133. What will be the ploidy of the cells of the nucellus, MMC, the functional megaspore and the female gametophyte?
(a) n, n, 2n and 2n respectively
(b) 2n, 2n, 2n and n respectively
(c) n, 2n, n and n respectively
(d) 2n, 2n, n and n respectively

134. The floral characters of entomophilous flowers are
(I) Fragrance
(II) Rich in nectar
(III) Small-sized individual flowers
(IV) Coloured flowers
(V) Sticky pollen grains
(a) (II), (III), (V)
(b) (I), (II), (IV), (V)
(c) (I), (III), (V)
(d) (III), IV, (V)

135. Which of the following is regarded as best contrivances for self-pollination?
(a) Homogamy (b) Cleistogamy
(c) Pollen prepotency (d) Dicliny

136. Self-incompatibility is
(a) The production of unisexual flowers
(b) A genetic mechanism which prevents self-pollen from fertilizing the ovules
(c) An ecological mechanism which prevents self-pollen from fertilizing the ovules
(d) Production of male and female flowers on different plants

137. Cleistogamy is advantageous because of
(a) Vivipary
(b) More vigorous offspring
(c) Higher genetic variability
(d) No dependence on pollinators

138. Majority of insect-pollinated flowers are
(a) Small, colourful, fragrant, and rich in nectar
(b) Large, colourless, fragrant but poor in nectar
(c) Small, colourless, fragrant, and poor in nectar
(d) Large, colourful, fragrant, and rich in nectar

139. In hybridization, emasculation and bagging are useful respectively to avoid
(a) Self-pollination and unwanted cross pollination
(b) Unwanted cross pollination and autogamy
(c) Male sterility and autogamy

(d) Autogamy and male sterility

140. Double fertilization means
(1) Fusion of the nucleus of the male gamete with the egg nucleus
(2) Fusion of two polar nuclei
(3) Fusion of the sperm nucleus with the secondary nucleus
(4) Fusion of one sperm nucleus with egg nucleus and fusion of the other sperm nucleus with secondary nucleus

141. Total nuclei involved in double fertilization are
(a) Five (b) Three
(c) Two (d) Four

142. Type of fertilization found in fruit bearing plants is
(a) Zooidogamy (b) Isogamy
(c) Anisogamy (d) Siphonogamy

143. In an embryo sac, the cells that degenerate after fertilization are
(a) Synergids and primary endosperm cell
(b) Synergids and antipodals
(c) Antipodals and primary endosperm cell
(d) Egg and antipodals

144. Endosperm:
(a) Is a triploid in all seed producers
(b) Is a post-fertilization tissue in all phanerogams
(c) Provides nourishment to growing embryo in both dicots and monocots
(d) Is always found in mature seeds

145. Milky water of green coconut is
(a) Liquid nucellus
(b) Liquid of female gametophyte
(c) Liquid endosperm
(d) Liquid chalaza

146. Match the following column and choose the correct option

Column I	Column II
1. Epicotyl	a. Cylindrical portion below the level of cotyledons
2. Hypocotyl	b. Above the level of cotyledons
3. Radicle	C Root tip
4. Plumule	d. Stem tip

(a) 1-b,2-a, 3c,4-d
(b) 1-a, 2-b, 3-c, 4-d
(c) 1-b, 2-a, 3-d, 4-c
(d) 1-a, 2-b, 3-d, 4-c

147. In a flowering plant, if a zygote contains 42 chromosomes, then what will be number of chromosomes in its endosperm?
(a) 42 (b) 21
(c) 63 (d) 84

IN EACH OF THE FOLLOWING QUESTION, A STATEMENT OF ASSERTION IS FOLLOWED BY A CORRESPONDING STATEMENT OF REASON. MARK THE CORRECT ANSWER AS PER THE INSTRUCTIONS GIVEN BELOW.
(1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(3) If Assertion is true but Reason is false.
(4) If both Assertion and Reason are false.

148. **Assertion:** Unisexual plants have separate male and female flowers.
Reason: Both monoecious and dioecious plants have unisexual flowers.

149. **Assertion:** Pollen grains are well preserved as fossils.
Reason: Hard outer layer of pollen grain called exine is made up of sporopollenin.

150. **Assertion:** Sporopollenin of pollen grains comes from tapetal cells.
Reason: Tapetal cells release enzymes for the synthesis of sporopollenin.

151. **Assertion:** Pollen grains are discharged at 2-3-celled.
Reason: Pollen grains undergo two meiotic divisions.

152. Polygonum type of embryo sac/typical female gametophyte of angiosperms is
(a) 7 celled, 7-nucleate
(b) 7 celled, 8-nucleate
(c) 8 celled, 7-nucleate
(d) 8 celled, 8-nucleate

153. Number of male gametes formed by 16 microspore mother cells is
(a) 128 (b) 64
(c) 32 (d) 16

154. In which type, pollination is autogamous?
(a) Chasmogamy (b) Geitonogamy
(c) Cleistogamy (d) Xenogamy

155. Nucellar polyembryony is reported in species of
(a) Triticum (b) Brassica
(c) Citrus (d) Gossypium

156. In angiosperms, functional megaspore develops into
(a) Endosperm (b) Embryo sac
(c) Ovule (d) Pollen sac

157. Cleistogamy does not require anthesis because
(a) No pollination agent is required
(b) It assures heterozygosity
(c) It allows xenogamy
(d) It favours insect pollination

158. Coconut water and edible part of coconut represent
(a) Endosperm (b) Embryo
(c) Endocarp (d) Mesocarp

159. What is the function of germ pore?
(a) Emergence of radicle
(b) Emergence of pollen tube
(c) Release of male gametes
(d) Absorption of water for seed germination

160. Sporopollenin is formed by polymerisation of
(a) Fat and phenols (b) Fats and esters
(c) Fats and esters
(d) Carotenoid and esters

161. Commonly the pollen tube enters the ovule through
(a) Hilum (b) Chalaza
(c) Funicle (d) Micropyle

162. Development of an embryo sac from a nucellar cell is
(a) Diplospory (b) Apospory
(c) Apogamy
(d) Adventive embryony

163. Double fertilisation results in formation of
(a) Seed (b) Fruit
(c) Megaspore (d) Endosperm

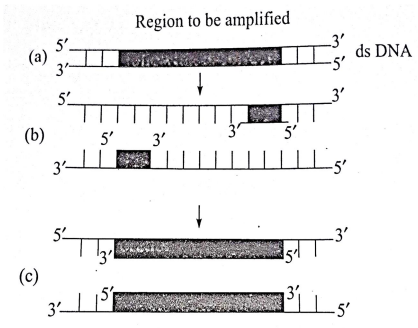
164. Which is correct?
(a) Sporopollenin is made up of inorganic materials
(b) Sporopollenin can withstand high temperature as well as strong acids and alkalis
(c) Sporopollenin can withstand high temperature but not strong acids
(d) Sporopollenin can be degraded by enzymes

165. Non –albuminous seed is produced is
(a) Pea (b) Maize
(c) Castor (d) Wheat

166. Which is used in gene cloning?
(a) Lomasomes (b) Mesosomes
(b) Plasmids (d) Nucleotides

167. Agarose extracted from sea weeds finds use in
(a) PCR (b) Gel electrophoresis
(c) Spectrophotometry (d) Tissue culture

168. In the three steps (a, b, c) of polymerase chain reaction,
select the correct step.



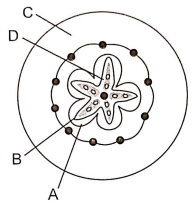
(a) c-extension in presence of heat stable DNApolymerase
(b) a-annealing with two sets of primers
(c) b-denaturation at high temperature
(d) a denaturation at 50°C

169. During amplification of gene using PCR, Taq polymerase is used between
(a) Denaturation and annealing
(b) Annealing and extension
(c) Annealing and amplification
(d) None of the above

170. The terms 'microinjection', 'biolistics' and 'disarmed pathogen vector are related to
(a) Bioterrorism (b) Biosafety
(c) Integrated pest management
(d) Recombinant DNA technology

171. Bioreactor is a vessel/device in which
(a) Chemical process involving microorganisms is carried out
(b) Chemical process involving radioactivesubstance is carried out
(c) Potentially hazardous microbes are handled
(d) Electrochemical processes are carried out

172. Which part of the fruit ,labelled in the given figure makes it a false fruit?



(a) C → Thalamus (b) D→ Seed
(c) A→ Mesocarp (d) B→ Endocarp

173. Isolation of DNA from a fungal cell involves the use of enzyme
(a) Chitinase (b) Lysozyme
(c) Eco RI (d) Hind II.

174. Stirred-tank bioreactors have been designed for
(a) Availability of oxygen throughout the process
(b). Ensuring anaerobic conditions in the culture vessel
(c) Purification of product
(d) Addition of preservatives to the product.

175. Which of the following is not a component of downstream processing?
(a) Preservation (b) Expression
(c) Separation (d) Purification

176. Which of the following restriction enzymes produces blunt ends?
(a) Xho I (b) Hind III
(c) Sal I (d) Eco RV

177. A gene whose expression helps to identify transformed cell is known as
(a) Vector (b) Plasmid

(c) Structural gene (d) Selectable marker

178. Which one of the following equipments is essentially required for growing microbes on a large scale, for industrial production of enzymes?
(a) Sludge digester (b) Industrial oven
(c) Bioreactor (d) BOD incubator

179. DNA precipitation out of a mixture of biomolecules can be achieved by treatment with
(a) Chilled ethanol
(b) Methanol at room temperature
(c) Chilled chloroform
(d) Isopropanol

180. The sequence that controls the copy number of the linked DNA in the vector, is termed
(a) Selectable marker
(b) Ori site
(c) Palindromic sequence
(d) Recognition site