28/04/2023

Phase-I
CODE-B

Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

FINAL TEST SERIES for NEET-2023

MM : 720 **Test-I2** **Time : 3 Hrs. 20 Mins.**

Mock Test for NEET (Complete Syllabus of Class XI & XII)

Instructions for Paper (ΣXXVIIIIVT12β):

(i) There are two sections in each subject, i.e. Section-A & Section-B. You have to attempt all 35 questions from Section-A & only 10 questions from Section-B out of 15.

(ii) Each question carries 4 marks. For every wrong response 1 mark shall be deducted from the total score. Unanswered / unattempted questions will be given no marks.

(iii) Use blue/black ballpoint pen only to darken the appropriate circle.

(iv) Mark should be dark and completely fill the circle.

(v) Dark only one circle for each entry.

(vi) Dark the circle in the space provided only.

(vii) Rough work must not be done on the Answer sheet and do not use white-fluid or any other rubbing material on the Answer sheet. (ΣXXVIIIIVT12β)

PHYSICS

Choose the correct answer :

SECTION - A

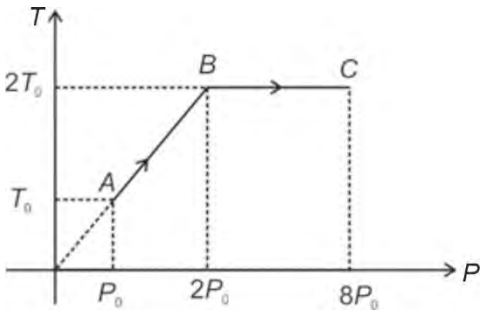
1. The count rate observed from a radioactive source at t second was N_0 and at $4t$ second it was $\frac{N_0}{16}$. The count rate observed at $\frac{11}{2}t$ second will be

(1) $\frac{N_0}{48}$ (2) $\frac{N_0}{32}$

(3) $\frac{N_0}{64}$ (4) $\frac{N_0}{128}$

Space for Rough Work

2. Three mole of an ideal gas is taken through the process *ABC* as shown in the figure. The total work done by the gas is



(1) $2\,RT_0 \ln 2$ (2) $4\,RT_0 \ln 2$

(3) $-12\,RT_0 \ln 2$ (4) $-4\,RT_0 \ln 2$

3. A particle of mass 10 g is executing SHM according to the equation $y = 4 \sin (4t + \pi/3)$, having time period *T*. Kinetic energy of the particle at $t = T/4$, will be

(1) 9.6 unit (2) 0.48 unit

(3) 1.92 unit (4) 0.96 unit

4. An organ pipe '*X*' open at one end vibrating in its first overtone, is in resonance with another organ pipe '*Y*' open at both end vibrating in its third overtone. These pipes have lengths l_1 and l_2 respectively, then $\frac{l_1}{l_2}$ will be

(1) $\frac{4}{3}$ (2) $\frac{3}{8}$

(3) $\frac{1}{2}$ (4) $\frac{5}{6}$

5. Electromagnetic wave of intensity 1800 W/m^2 falls on a completely absorbing spherical surface having radius *R* as shown in the figure

Force exerted by beam on the sphere is

(1) $10\pi \times 10^{-10}$ N (2) $54\pi \times 10^{-10}$ N

(3) $21\pi \times 10^{-10}$ N (4) Zero

6. Three waves of equal frequency having amplitudes 12, 4 and 8 unit, meet at a point with successive phase difference of $\frac{\pi}{2}$. Amplitude of resulting wave will be

(1) 24 unit (2) $12\sqrt{2}$ unit

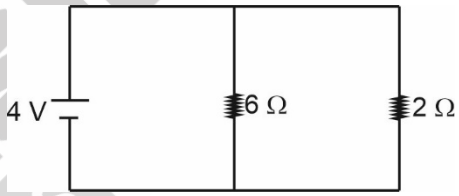
(3) $4\sqrt{2}$ unit (4) 20 unit

7. A block of mass 2 kg is projected on a rough horizontal surface with momentum 30 kg m/s. If block stopped after moving a distance 8 m on the surface then coefficient of friction between the block and the surface is

(1) 1.4 (2) 0.4

(3) 0.8 (4) 0.25

8. The value of current in the 2 Ω resistor in the given circuit is



(1) 1 A (2) 2 A

(3) $\frac{8}{3}$ A (4) $\frac{4}{3}$ A

9. The incorrect statement among the following is

(1) A dimensionally correct equation may be correct

(2) A dimensionally correct equation may be incorrect

(3) A dimensionally incorrect equation must be incorrect

(4) A dimensionally correct equation must be correct

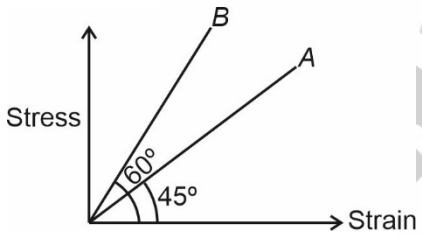
Space for Rough Work

10. A ball is projected from ground at an angle θ with horizontal. At the top of its trajectory, the directions of its velocity and acceleration are
    (1) Perpendicular to each other
    (2) Parallel to each other
    (3) Antiparallel to each other
    (4) At an angle of 45º with each other

11. A swimmer can swim with 4 m/s in still water. He cross a river of width 80 m by swimming perpendicular to the river flow. If the speed of river is 3 m/s, then the drift of the swimmer when he cross the river is
    (1) 80 m
    (2) 40 m
    (3) 100 m
    (4) 60 m

12. According to Newton's third law of motion, the action and reaction forces
    (1) Must act on the same body
    (2) Must act on the different bodies
    (3) Must be unequal in magnitude
    (4) Must be equal in magnitude and act in the same direction

13. The stress versus strain graph for wires of two materials *A* and *B* is shown in figure. The material which is more elastic among the two is



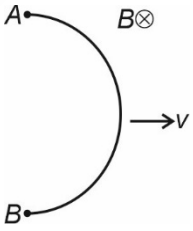
    (1) Material *A*
    (2) Material *B*
    (3) Both are equally elastic
    (4) Can't be determined

14. A body of density δ is floating in a liquid of density δ. The body is slightly pushed down and released, then the body
    (1) Will come out of the liquid
    (2) Will come back to the earlier position
    (3) Will remain submerged, where it is left
    (4) Will sink to the bottom

15. 1 g of ice at 0ºC is mixed with 8 g of water at 8ºC, the equilibrium temperature of the mixture will be
    (1) 1ºC (2) 0ºC
    (3) 2ºC (4) 8ºC

16. A convex mirror forms an image of the sun at a distance of 10 cm from it, then
    (1) The radius of curvature of the mirror is 20 cm
    (2) The radius of curvature of the mirror is 10 cm
    (3) The radius of curvature of the mirror is 5 cm
    (4) The radius of curvature of the mirror is 40 cm

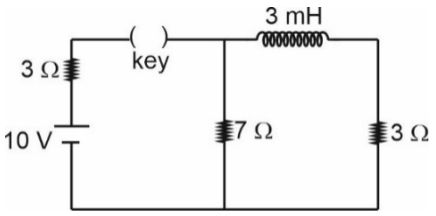
17. A thin wire *AB* of length *l* is bent into a semicircle. It is then moved with speed *v* as shown in a uniform transverse magnetic field. The potential difference across its two ends is



    (1) Blv
    (2) $\frac{2Blv}{\pi}$
    (3) $\frac{Blv}{\pi}$
    (4) $2Blv$

Space for Rough Work

18. In the circuit shown in the figure, the value of current passing through the battery just after the key is closed



(1) 1 A (2) 2 A

(3) Zero (4) $\frac{10}{13}$ A

19. A transformer with primary turns as 100 and secondary turns as 300 is supplied with 50 V ac, the output voltage is

(1) 50 V (2) 100 V

(3) 200 V (4) 150 V

20. Two point charges +3 C and +6 C repel each other with a force of 18 N. If –4 C is given to both the charges separately, the new force will be

(1) 2 N, repulsive (2) 2 N, attractive

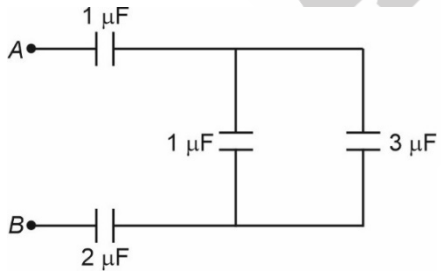
(3) 6 N, repulsive (4) 6 N, attractive

21. A uniform electric field $\vec{E} = 2\hat{i} + 3\hat{j} - 4\hat{k}$ (N/C) exists in a region. The electric flux (in SI units) passing through a square of side 2 cm lying in $x - y$ plane is

(1) 4×10^{-4} (2) 34×10^{-4}

(3) 16×10^{-4} (4) Zero

22. The effective capacitance of the network between points *A* and *B* is



(1) $\frac{7}{4}$ μF (2) 7 μF

(3) $\frac{4}{7}$ μF (4) $\frac{4}{9}$ μF

23. Total degree of freedom of a rigid triatomic linear molecule of a gas is

(1) 5 (2) 3

(3) 6 (4) 7

24. At a point *A* on earth surface the angle of dip $\delta = -30^\circ$ while on another point *B* it is $\delta = 60^\circ$. We can interpret that

(1) *A* is located in Northern hemisphere and *B* is located in Southern hemisphere

(2) *B* is located in Northern hemisphere and *A* is located in Southern hemisphere

(3) *A* and *B* both are located in Northern hemisphere

(4) *A* and *B* both are located in Southern hemisphere

25. Maximum kinetic energy of a photoelectron is *E* when the wavelength of incident light is λ. If maximum kinetic energy becomes four times when wavelength is reduced to one third, then work function of the metal is (*c* is speed of light)

(1) $\frac{hc}{\lambda}$ (2) $\frac{3hc}{\lambda}$

(3) $\frac{hc}{2\lambda}$ (4) $\frac{hc}{3\lambda}$

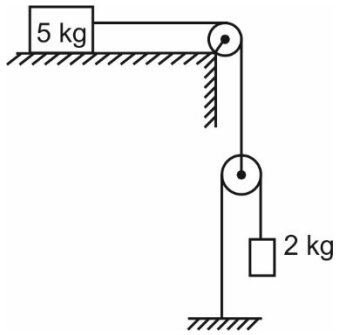
26. In a YDSE experiment, the coherent light sources of wavelength λ are at $2d$ distance from each other and screen is placed at a distance *D* from the slits. If n^{th} bright fringe is formed on the screen exactly opposite to a slit, the value of *n* must be

(1) $\frac{d^2}{4\lambda D}$ (2) $\frac{d^2}{\lambda D}$

(3) $\frac{2d^2}{\lambda D}$ (4) $\frac{d^2}{2\lambda D}$

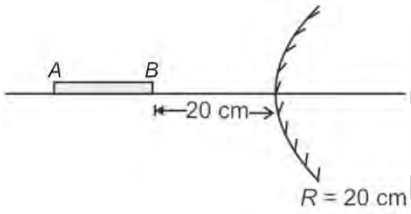
Space for Rough Work

27. If all the pulleys are massless and strings are ideal then tension in the string connected with 2 kg block is



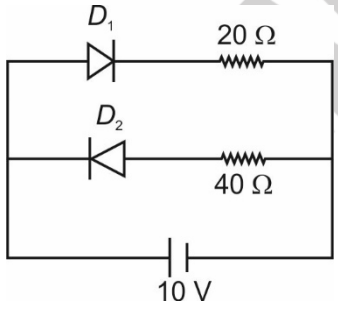
(1) 12.8 N (2) 7.7 N
(3) 20 N (4) Zero

28. A thin wooden rod of length 0.05 m is placed in front of a spherical mirror as shown in the figure. Length of the image rod will be



(1) 5 cm (2) $\frac{10}{21}$ cm
(3) 10 cm (4) $\frac{21}{10}$ cm

29. Two ideal diodes are connected to a battery as shown in the circuit. The current supplied by the battery is



(1) Zero (2) 0.5 A
(3) 0.4 A (4) 0.75 A

30. If the radius of a circular coil is doubled and the number of turns are halved then the magnetic field at the centre of the coil, for the same current will
(1) Get doubled
(2) Get one fourth
(3) Get quadrupled
(4) Remain unchanged

31. On the basis of Bohr's atomic model the radius of 3rd orbit of hydrogen atom is
(1) Three times of radius of first orbit
(2) Nine times of radius of first orbit
(3) One third of radius of first orbit
(4) Equal to the radius of first orbit

32. A thin brass sheet at 20ºC and a thin steel sheet at 40°C have the same surface area. The common temperature at which both would have the same area will be
($\alpha_{brass} = 19 \times 10^{-6}$/ºC and $\alpha_{steel} = 11 \times 10^{-6}$/ºC)
(1) – 3.7ºC (2) –7.5ºC
(3) 12ºC (4) Not possible

33. If the critical angle for total internal reflection from a medium to vacuum is 30º, then velocity of light in the medium is
(1) $\frac{3}{2}\times10^8\,\frac{m}{s}$ (2) $2\times10^8\,\frac{m}{s}$
(3) $3\times10^8\,\frac{m}{s}$ (4) $\frac{3}{4}\times10^8\,\frac{m}{s}$

34. The angular velocity of a rotating body is $\vec{\omega} = \hat{i} - 2\hat{j} + 2\hat{k}$. Velocity of a point on the body having position vector $\vec{r} = 4\hat{j} - 3\hat{k}$ is having magnitude
(1) $\sqrt{29}$ unit (2) $\sqrt{79}$ unit
(3) $\sqrt{120}$ unit (4) $\sqrt{87}$ unit

Space for Rough Work

35. The magnetic field at the centre of a circular current carrying coil of radius R is B_c. The magnetic field on its axis at a distance R from the centre is B_a. The value of $\frac{B_c}{B_a}$ will be

(1) $\sqrt{2}$

(2) $\frac{1}{2\sqrt{2}}$

(3) $2\sqrt{2}$

(4) $\frac{1}{\sqrt{2}}$

SECTION - B

36. The rate of emission of heat by a black body at temperature T is Q. Rate of emission of heat by another body having emissivity half unit and same surface area at temperature $3T$, is

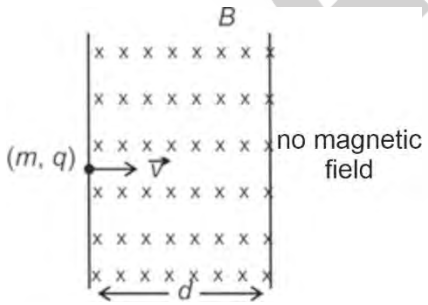
(1) 81 Q

(2) 9 Q

(3) 33.5 Q

(4) 40.5 Q

37. A particle of mass m and charge q enters a region of magnetic field with speed v as shown in the figure. The deviation of the particle when it comes out of the field is $\left[d = \frac{mv}{\sqrt{2}qB}\right]$



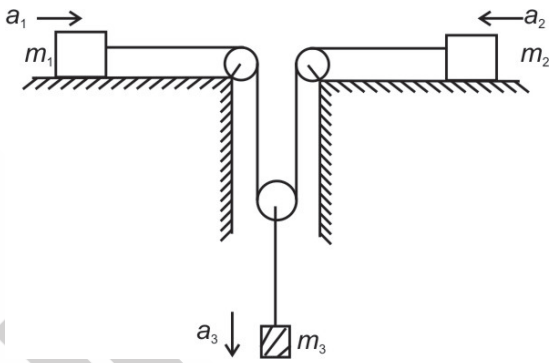
(1) π

(2) $\frac{\pi}{2}$

(3) $\frac{\pi}{4}$

(4) Zero

38. In the figure given below, the correct relation between acceleration a_1, a_2 and a_3 is



(1) $2a_1 + 2a_2 = a_3$

(2) $a_1 + a_2 = 2a_3$

(3) $a_1 + a_2 = a_3$

(4) $a_1 = a_2 = a_3$

39. A doubly ionised Lithium atom is excited from its ground state (n = 1) to n = 3 state. The wavelengths of the spectral lines for corresponding transition are given by $\lambda_{32}, \lambda_{31}$ and λ_{21}. The value of $\frac{\lambda_{32}}{\lambda_{31}}$ and $\frac{\lambda_{21}}{\lambda_{31}}$ are respectively

(1) 8.1, 0.67

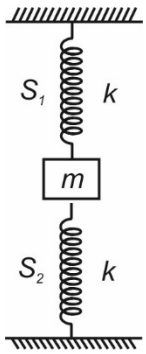
(2) 8.1, 1.2

(3) 6.4, 1.2

(4) 6.4, 0.67

Space for Rough Work

40. After learning SHM, Guddu a curious student of XI class, designed a spring pendulum with identical springs of spring constant k and a small block of mass 'm' as shown in figure.



When block is at rest it just touches the lower spring. So, Guddu forgot to connect lower spring with block. The time period of oscillation of the block when it is slightly pushed downward and released, is

(1) $2\pi\sqrt{\frac{m}{2k}}$

(2) $2\pi\sqrt{\frac{2m}{k}}$

(3) $\pi\sqrt{\frac{m}{2k}}$

(4) $\pi\sqrt{\frac{m}{k}}\left[1+\frac{1}{\sqrt{2}}\right]$

41. A 2 μF capacitor is charged with the help of a 60 V battery. After disconnecting the battery it is connected with another uncharged capacitor of 1 μF. The potential difference across the plates of 2 μF capacitor will be

(1) 30 V

(2) 60 V

(3) 40 V

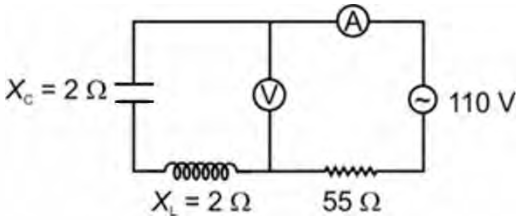
(4) 20 V

42. The escape velocity from a planet is v_e. A tunnel is dug along the diameter of the planet. If a small body of mass m is dropped into this tunnel then the kinetic energy of the body when it pass through the centre of the planet is

(1) $\frac{1}{2}mv_e^2$ (2) $\frac{1}{4}mv_e^2$

(3) mv_e^2 (4) Zero

43. The reading of the ammeter and voltmeter connected in the given circuit are respectively



(1) 2 A, 110 V (2) 2 A, 0 V

(3) 2 A, 55 V (4) 1 A, 0 V

44. In YDSE using a monochromatic light of wavelength λ, the path difference corresponding to any point having half of the maximum intensity (n is any integer)

(1) $(2n+1)\frac{\lambda}{2}$ (2) $(2n+1)\frac{\lambda}{4}$

(3) $(2n+1)\frac{\lambda}{8}$ (4) $(2n+1)\frac{\lambda}{16}$

45. The equation for a wave travelling in x-direction on a stretched string is given by

$y = (5\text{ cm})\sin\{(2\pi\text{ cm}^{-1})x - (100\pi)\text{ s}^{-1}t\}$

Acceleration of a particle at $x = 8$ cm and $t = 0.11$ s will be

(1) $20\ \pi^2$ cm/s^2

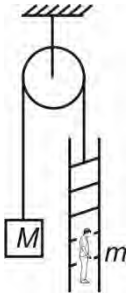
(2) $10\ \pi^2$ cm/s^2

(3) $5\ \pi^2$ cm/s^2

(4) Zero

Space for Rough Work

46. A rope passes over a pulley has a ladder mass (M-m) with a man of mass m on one end while another mass M on its other end as shown in the figure.



Initially system is at rest. The man climbs up with velocity V_0 relative to ladder. If all strings and pulleys are ideal then the velocity of centre of mass of this system is

(1) $\frac{mV_0}{2M}$ (2) $\frac{MV_0}{M+m}$

(3) $\frac{mV_0}{M+m}$ (4) $\frac{MV_0}{2(M+m)}$

47. Two solid conductors are made up of same material and have same lengths. The first wire has circular cross-section of radius a and the other wire has square cross-section of side length a. The ratio of resistances of first wire to the second wire is

(1) $\pi : 1$ (2) $1 : 1$

(3) $1 : \pi$ (4) $1 : 2$

48. A particle moving on a straight line has speeds 8 m/s and zero at t_1 = 2 s and t_2 = 7 s respectively, then average retardation of the particle is equal to

(1) 1.6 m/s^2 (2) Zero

(3) 2 m/s^2 (4) 1.2 m/s^2

49. In a photoelectric experiment, when 3 eV energy is supplied to a metal plate the electron has maximum kinetic energy equal to 1.2 eV. If photons with 4 eV are supplied in the same experiment, then the maximum kinetic energy of the electron will be

(1) 2.0 eV (2) 2.2 eV

(3) 1.2 eV (4) 1.8 eV

50. If the first member of the Lyman series of the hydrogen has wavelength λ_0, then wavelength of the first member of the Balmer Series is

(1) $\frac{23}{5}\lambda_0$ (2) $\frac{36}{5}\lambda_0$

(3) $\frac{9}{5}\lambda_0$ (4) $\frac{27}{5}\lambda_0$

CHEMISTRY

SECTION - A

51. 4 mole of an ideal gas expanded reversibly and isothermally from 10 litre to 20 litre at 350 K. The work done during the process is

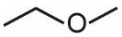
(1) – 2.63 kCal

(2) – 1.93 kCal

(3) 4.13 kCal

(4) 6.19 kCal

52. The ether which is most difficult to cleave on heating with HBr is

(1) 

(2) $Ph - CH_2 - O - CH_2 - Ph$

(3) $Ph - O - CH_3$

(4) $Ph - O - Ph$

Space for Rough Work

53. In coagulating a positive sol, the order of coagulating power of PO_4^{3-}, NO_3^-, SO_4^{2-} and $[Fe(CN)_6]^{4-}$ is

(1) $NO_3^- > SO_4^{2-} > PO_4^{3-} > [Fe(CN)_6]^{4-}$

(2) $PO_4^{3-} > [Fe(CN)_6]^{4-} > SO_4^{2-} > NO_3^-$

(3) $SO_4^{2-} > PO_4^{3-} > NO_3^- > [Fe(CN)_6]^{4-}$

(4) $[Fe(CN)_6]^{4-} > PO_4^{3-} > SO_4^{2-} > NO_3^-$

54. Depressant used in the separation of ZnS from PbS is:

(1) NaCN (2) NaOH

(3) HCl (4) $Ca(OH)_2$

55. In contact process which of the following is/are formed?

(1) SO_2 (2) SO_3

(3) H_2SO_4 (4) All of these

56. The impure copper obtained in the Bessemerisation process is called

(1) Blister copper (2) Copper pyrites

(3) Copper spelter (4) Glitter copper

57. Consider the following reaction

Vegetable oils + A $\xrightarrow{Ni}$ Vegetable ghee

A in the reaction is

(1) H_2

(2) H_2SO_4

(3) O_2

(4) NO

58. Ferrimagnetic substances

(1) Lose ferrimagnetism on heating and become diamagnetic

(2) Lose ferrimagnetism on heating and become paramagnetic

(3) Do not change their magnetic behaviour on heating

(4) Convert into ferromagnetic substances on heating

59. If half life time of a first order reaction is 12 min then find the time required for 99.9% completion of reaction.

(1) 60 min

(2) 120 min

(3) 48 min

(4) 1200 min

60. Read all the statements regarding coupling reaction.

(a) It is an example of electrophilic substitution reaction

(b) The compounds obtained are often coloured due to extended conjugated system

(c) The reaction of diazonium salt with aniline yields orange-red dye

(d) The reaction of diazonium salt with phenol takes place in basic medium

Choose the correct statement(s).

(1) Only a is correct

(2) a and c are correct

(3) a, b and c are correct

(4) a, b and d are correct

61. **Assertion (A):** $[Cu(NH_3)_4]^{2+}$ is a paramagnetic complex ion.

Reason (R): Due to unavailability of empty 3*d* orbital. It is formed by sp^3 hybridization.

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

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

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

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

Space for Rough Work

62. Match list-I (voids) with list-II (coordination number) and choose the correct option.

List-I (Voids)	List-II (Coordination number)
a. Triangular	(i) 4
b. Tetrahedral	(ii) 6
c. Cubic	(iii) 3
d. Octahedral	(iv) 8

(1) a(iii), b(ii), c(iv), d(i)
(2) a(iii), b(i), c(iv), d(ii)
(3) a(iv), b(i), c(iii), d(ii)
(4) a(ii), b(iii), c(iv), d(i)

63. 8 mol of A reacted with 12 mol of B according to the reaction $2A + 3B \longrightarrow 2C$. The maximum moles of C formed is
(1) 4 mol (2) 2 mol
(3) 8 mol (4) 10 mol

64. The wave number of radiation having wavelength 500 Å is
(1) $2 \times 10^{-7} cm^{-1}$ (2) $2 \times 10^{-6} cm^{-1}$
(3) $2 \times 10^{5} cm^{-1}$ (4) $2 \times 10^{6} cm^{-1}$

65. Highest energy among the following for a multielectron atom is
(1) 5*d* (2) 4*f*
(3) 6*p* (4) 7*s*

66. Correct order of ionisation energies is
(1) Li > Be > B (2) Be > Li > B
(3) Be > B > Li (4) B > Be > Li

67. Select the incorrect statement.
(1) Dipole moment of NH_3 is greater than NF_3
(2) BF_3 is a non-polar molecule
(3) 1D = 3.33564×10^{30} C·m
(4) CO_2 contains polar bonds

68. Shape of NH_3 is
(1) See saw (2) Square planar
(3) Tetrahedral (4) Pyramidal

69. Equal weights of oxygen and methane are mixed in an empty vessel at 300 K. The fraction of total pressure exerted by methane is
(1) $\frac{1}{3}$ (2) $\frac{2}{3}$
(3) $\frac{1}{2}$ (4) $\frac{2}{5}$

70. **Assertion (A):** o-nitrophenol is less soluble in water than para isomers.
Reason (R): p-nitrophenols exist as associated molecules.
(1) Both assertion and reason are correct and reason is the correct explanation of assertion
(2) Both assertion and reason are correct but reason is not the correct explanation of assertion
(3) Assertion is correct but reason is incorrect
(4) Both assertion and reason are incorrect

71. Homogeneous equilibrium among the following is/are
(1) $Fe^{3+}(aq) + SCN^{-}(aq) \rightleftharpoons [Fe(SCN)]^{2+}(aq)$
(2) $CH_3COOC_2H_5(aq) + H_2O(l) \rightleftharpoons CH_3COOH(aq) + C_2H_5OH(aq)$
(3) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
(4) All of these

72. pH of 0.01 M aqueous solution of CH_3COOH is ($pK_a = 4.74$)
(1) 3.37 (2) 5.05
(3) 6.7 (4) 6.99

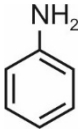
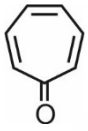
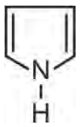
73. Example of electron deficient hydride is
(1) B_2H_6 (2) CH_4
(3) H_2O (4) NH_3

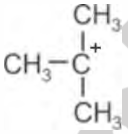
Space for Rough Work

74. Which among the following can form stable superoxide?
(1) Ba (2) Ca
(3) Na (4) K

75. Solvay process is used to prepare
(1) $MgSO_4$ (2) Na_2SO_4
(3) K_2CO_3 (4) Na_2CO_3

76. Aluminium chloride in acidified aqueous solution forms
(1) $[Al(OH)_4]^-$ (2) $[Al(OH)_6]^{3-}$
(3) $\left[Al(H_2O)_6\right]^{3+}$ (4) $\left[Al(H_2O)_4\right]^{3+}$

77. Heterocyclic aromatic compound among the following is
(1)  (2) 
(3)  (4) 

78. Most stable carbocation among the following is
(1) $C_6H_5\overset{+}{C}H_2$ (2) $CH_3-\overset{+}{C}=CH_2$
(3) $\overset{+}{C}H_2-CH=CH_2$ (4) 

79. $R-C\equiv C-R'$ $\xrightarrow[Pd/BaSO_4]{H_2}$ A, $\xrightarrow[Liq.\ NH_3]{Na}$ B. A and B are
(1) Same molecules (2) Chain isomers
(3) Geometrical isomers (4) Position isomers

80. Growth of fish gets inhibited when the concentration of dissolved oxygen of water is below
(1) 6 ppm (2) 10 ppm
(3) 17 ppm (4) 12 ppm

81. Which pollutant causes brown mottling of teeth?
(1) Fluoride (2) Nitrate
(3) Lead (4) Sulphate

82. **Assertion (A):** Hydrometallurgy involves dissolving the ore in a suitable reagent followed by precipitation by a more electropositive metal.
Reason (R): Copper is extracted by hydrometallurgy.
(1) Both assertion and reason are correct and reason is the correct explanation of assertion
(2) Both assertion and reason are correct but reason is not the correct explanation of assertion
(3) Assertion is correct but reason is incorrect
(4) Both assertion and reason are incorrect

83. Mass of silver deposited at cathode by passage of 9.65 A current for 1000 sec is (Ag = 108 u)
(1) 27 g (2) 54 g
(3) 10.8 g (4) 216 g

84. $xMnO_4^- + H_2O + I^- \rightarrow yMnO_2 + zOH^- + IO_3^-$
The value of x, y and z for balanced equation respectively are
(1) 2, 2 and 1 (2) 1, 2 and 4
(3) 2, 2 and 2 (4) 2, 2 and 3

85. For a chemical reaction rate constant is nearly doubled with 10°C rise in temperature. If r is rate of reaction at 25°C then rate of reaction at 65°C is
(1) 16r (2) 2r
(3) 4r (4) 8r

SECTION - B

86. Which of the following is false for chemisorption?
(1) Caused by chemical bond formation
(2) It is irreversible
(3) Highly specific in nature
(4) No activation energy is needed

Space for Rough Work

87. In froth floatation process the froth stabiliser used is

(1) Pine oil (2) Fatty acid

(3) Xanthates (4) Cresol

88. XeF_6 on complete hydrolysis gives

(1) $XeOF_4$ (2) XeO_2F_2

(3) XeO_3 (4) Xe

89. Maximum magnetic moment is of

(1) Ti^{3+} (2) Cr^{2+}

(3) Mn^{2+} (4) Ni^{2+}

90. 1 mol of $CoCl_3 \cdot 4NH_3$ on reaction with excess of $AgNO_3$ solution gives

(1) 1 mol AgCl

(2) 2 mol AgCl

(3) 3 mol AgCl

(4) No AgCl

91. $\left[Co(NH_3)_3(NO_2)_3\right]$ can show

(1) Geometrical isomerism

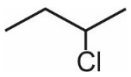
(2) Optical isomerism

(3) Structural isomerism

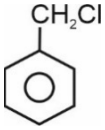
(4) Both (1) and (3)

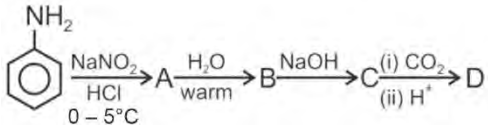
92. Which compound, undergoes fastest S_N1 reaction among the following?

(1) 

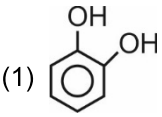
(2) 

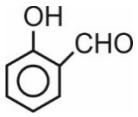
(3) 

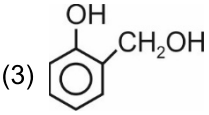
(4) 

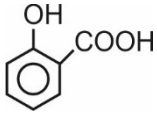
93. 

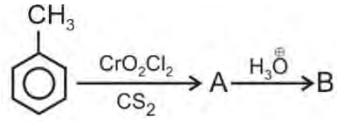
The product D is

(1) 

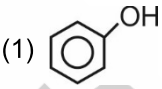
(2) 

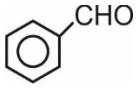
(3) 

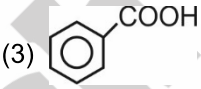
(4) 

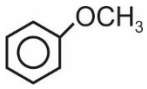
94. 

The product B is

(1) 

(2) 

(3) 

(4) 

95. Benzaldehyde on reaction with 50% aq. NaOH solution forms

(1) Benzyl alcohol (2) Sodium benzoate

(3) Phenol (4) Both (1) and (2)

96. Which amine does not form sulphonamides on reaction with Hinsberg's reagent?

(1) 

(2) CH_3NH_2

(3) $(CH_3)_2NH$ (4) $(CH_3)_3N$

97. Glucose on prolonged heating with HI gives

(1) n–Hexane (2) Gluconic acid

(3) Fructose (4) Saccharic acid

98. Osteomalacia is caused by the deficiency of

(1) Vitamin A (2) Vitamin B_1

(3) Vitamin B_2 (4) Vitamin D

Space for Rough Work

99. Copolymerisation of 1, 3– butadiene and acrylonitrile in the presence of peroxide catalyst gives
(1) Buna–S (2) Buna–N
(3) Bakelite (4) Novolac

100. Which among the following is an antifertility drug?
(1) Norethindrone
(2) Salvarsan
(3) Tetracycline
(4) Luminal

BOTANY

SECTION - A

101. Standardisation of scientific names for animals is done by
(1) ICNCP (2) ICZN
(3) ICBN (4) ICNB

102. Select the **correct** order in which the following steps of DNA fingerprinting are performed.
a. Detection of hybridized DNA by autoradiography.
b. Blotting of separated DNA fragments.
c. Digestion of DNA by Restriction Endonuclease.
d. Isolation of DNA
e. Separation of DNA by electrophoresis.
f. Hybridization using VNTR probe.
(1) $d \rightarrow c \rightarrow e \rightarrow b \rightarrow f \rightarrow a$
(2) $a \rightarrow d \rightarrow b \rightarrow e \rightarrow c \rightarrow f$
(3) $b \rightarrow e \rightarrow c \rightarrow f \rightarrow a \rightarrow d$
(4) $c \rightarrow f \rightarrow d \rightarrow a \rightarrow b \rightarrow e$

103. Read the following statements and state true (T) or false (F) w.r.t. chromosomal disorders.
A. Rudimentary ovaries can be observed in individuals suffering from Turner's syndrome.
B. Klinefelter's syndrome is a result of trisomy.
C. Failure of segregation of chromatids during cell division results in the gain or loss of a single chromosome results in polyploidy.
D. Individuals afflicted with Turner's syndrome exhibits many loops on finger tips.
E. Significant development of breasts is found in individuals afflicted with Turner's syndrome.

	A	B	C	D	E
(1)	F	F	F	F	T
(2)	T	T	F	F	F
(3)	T	F	T	F	T
(4)	F	T	T	T	T

104. If a certain mutation makes the *lac* y gene non-functional, which of the following effect will be observed in the cell present in lactose containing medium?
(1) Structural genes will express constitutively.
(2) Breakdown of lactose will retard.
(3) Cell permeability towards β-galactosides will increase.
(4) Cell will show enhanced levels of transacetylase.

105. Select the **incorrect** statement w.r.t. higher plant cells.
(1) Are generally smaller than animal cells
(2) Have a rigid cell wall made up of cellulose
(3) Generally lack centrioles and centrosomes
(4) Contain plastids

106. Which of the following reactions is catalyzed by ribozyme in translation?
(1) Peptide bond formation
(2) Aminoacylation of tRNA
(3) Binding of smaller subunit of ribosome to mRNA
(4) Movement of ribosome along the length of mRNA

Space for Rough Work

107. Read the given statements and select the **correct** option.

Statement A: Phosphorus is a major constituent of biological membranes, nucleic acids and cellular energy transfer system.

Statement B: Carbon is structural element of the cell.

(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements A and B are correct
(4) Both statements A and B are incorrect

108. Which of the following structures is a primary constriction of chromosome?

(1) Kinetochore (2) Centromere
(3) Satellite (4) Nucleosome

109. Select the **odd** one out w.r.t. chloroplast.

(1) Inner membrane is relatively less permeable.
(2) Stroma contains enzyme required for the synthesis of carbohydrates and proteins.
(3) Chlorophyll pigments are present in stroma.
(4) Flat membranous tubules connect the thylakoids of different grana.

110. In which of the given plants, double fixation of CO_2 occurs?

(1) Rice (2) Potato
(3) *Sorghum* (4) Wheat

111. Select the **incorrect** match

(1) G_1 phase – Continuous growth of cell
(2) G_2 phase – Centriole duplication
(3) S phase – DNA duplication
(4) G_0 phase – Metabolically active stage

112. Which of the following pairs belongs to the same taxonomic category?

(1) Hominidae and Primata
(2) Diptera and Insecta
(3) Dicotyledonae and Muscidae
(4) Poales and Sapindales

113. Match column-I with column-II and select the **correct** option w.r.t. species and their characteristics that make them susceptible to extinction.

	Column-I (Species)		**Column-II (Population characteristics)**
A.	Rhinoceros	I.	Small population size and low reproductive rate
B.	Giant panda	II.	Fixed habit and migratory routes
C.	Eagle	III.	Large body size
D.	Whooping crane	IV.	High trophic level in food chain

(1) A-III, B-II, C-I, D-IV (2) A-III, B-I, C-IV, D-II
(3) A-IV, B-III, C-II, D-I (4) A-IV, B-II, C-III, D-I

114. Which of the following features is not associated with cyanobacteria?

(1) Form blooms in polluted water.
(2) Colonies are generally surrounded by gelatinous sheath.
(3) Oxidise nitrites and use the released energy for their food production.
(4) Some of them possess heterocysts.

115. Flowers have feathery stigma to easily trap the air borne pollen grains is the characteristic features of which of the given plant?

(1) *Yucca* (2) *Hydrilla*
(3) Wheat (4) *Zostera*

116. In which of the following plants, ovary becomes two-chambered due to false septum?

(1) *Argemone*
(2) *Dianthus*
(3) *Primrose*
(4) Pea

Space for Rough Work

117. Read the following statements and choose the **correct** option.

Statement A: Heartwood comprises of dead elements with highly lignified walls.

Statement B: The peripheral region of the secondary xylem is involved in the conduction of water.

(1) Only statement A is correct
(2) Only statement A is incorrect
(3) Both the statements A and B are correct
(4) Both the statements A and B are incorrect

118. Select the **odd** one out w.r.t. features of liverworts

(1) Plant body is thalloid.
(2) Sporophyte is the main plant body
(3) Asexual reproduction takes place by fragmentation
(4) Spores produced within the capsule germinate to form free-living gametophyte.

119. Phycoerythrin with chlorophyll d is found in

(1) *Ectocarpus* (2) *Dictyota*
(3) *Polysiphonia* (4) *Fucus*

120. The A together with B forms mitotic apparatus. Choose the option which **correctly** fill up the given blanks A and B.

	A	**B**
(1)	One aster	Spindle fibre
(2)	Centriole	Centrosome
(3)	Two asters	Spindle fibres
(4)	Centrosome	Microtubule

121. What will be the osmotic pressure of the cell if the solute potential is –25 bar?

(1) –25 bar
(2) +25 bar
(3) –26 bar
(4) +26 bar

122. Which of the following processes require ATP?

(1) Absorption of water by dry wood
(2) Diffusion of gases
(3) Loading of sucrose in sieve tubes
(4) Apoplastic movement of water

123. Activator of PEP carboxylase is also involved in

(1) Auxin synthesis
(2) Opening and closing of stomata
(3) Maintenance of ribosome structure
(4) Splitting of water during photosynthesis

124. Denitrification is carried out by

(1) *Nitrosomonas*
(2) *Nitrococcus*
(3) *Pseudomonas*
(4) *Nitrobacter*

125. Select the **incorrect** match.

(1) *Calotropis* – Valvate aestivation
(2) Cotton – Twisted aestivation
(3) China rose – Vexillary aestivation
(4) *Cassia* – Imbricate aestivation

126. Which of the following has lowest alcohol concentration among all?

(1) Whiskey
(2) Brandy
(3) Rum
(4) Beer

127. Which of the following enzymes is responsible for the primary CO_2 fixation in mesophyll cells of C_4 plants?

(1) RuBisCO
(2) Hexokinase
(3) PEPcase
(4) Malate dehydrogenase

Space for Rough Work

128. Which of the following scientists is credited with the description of first action spectrum of photosynthesis?
(1) Julius von Sachs
(2) Cornelius van Niel
(3) Joseph Priestley
(4) T.W. Engelmann

129. Water splitting during light reaction occurs in
(1) Stroma lamellae
(2) Stroma
(3) Stroma side of thylakoid membrane
(4) Lumen side of thylakoid membrane

130. Sporophyte is dominant in all of the given plant groups, **except**
(1) Angiosperms (2) Bryophytes
(3) Gymnosperms (4) Pteridophytes

131. In which of the following processes, CO_2 is not evolved?
(1) Lactic acid fermentation
(2) Alcoholic fermentation
(3) Krebs' cycle
(4) Link reaction

132. Which of the following phytohormones is responsible for promoting bolting in beet?
(1) Auxin (2) Cytokinin
(3) Ethylene (4) Gibberellin

133. Which of the following statements is/are not true?
a. In protists and monerans, the organism or the parent cell divides by mitosis to give rise to new individuals.
b. Gametes are always produced by meiotic division.
c. In several simple plants like algae, bryophytes and pteridophytes, water is the medium through which gamete transfer take place.
d. Gamete is the vital link that ensures continuity of species between organisms of one generation and the next.
(1) Only b
(2) Only b and d
(3) Only a and c
(4) Only c and d

134. Pollens of which of the following exhibit viability only for 30 minutes?
(1) Members of Rosaceae
(2) Members of Leguminosae
(3) Members of Solanaceae
(4) Rice

135. Select the **incorrect** statement w.r.t. ATP synthesis in mitochondria.
(1) F_1 headpiece is a peripheral membrane protein complex and contains the site for synthesis of ATP.
(2) F_0 forms the channel through which proton cross the inner membrane.
(3) The entire region of inner mitochondrial membrane is permeable to protons except at the oxysomes.
(4) The energy released in ETS is utilised in synthesising ATP with the help of ATP synthase.

SECTION-B

136. A protozoan which is endoparasite and does **not** have locomotory structure is
(1) *Trypanosoma* (2) *Paramoecium*
(3) *Plasmodium* (4) *Amoeba*

137. How many cells are found in a mature angiosperm embryo sac?
(1) 8 (2) 10
(3) 7 (4) 5

Space for Rough Work

138. The simple tissue which is dead and without protoplast performs all of the given functions, **except**
(1) Provides mechanical support to the organs
(2) Provides gritty texture to guava
(3) Performs photosynthesis
(4) Provides hardness to fruit walls of nuts, walnuts, almonds etc.

139. Which of the following traits shows incomplete dominance?
(1) Flower position in garden pea
(2) Skin colour in human
(3) Flower colour in snapdragon
(4) Human ABO blood group

140. For a flaccid cell,
(1) $\psi_P = 0$ (2) DPD = 0
(3) OP – TP = 0 (4) DPD = TP

141. Which of the following scientists prepared first genetic map for *Drosophila*?
(1) T.H. Morgan
(2) Sutton and Boveri
(3) Correns
(4) Alfred Sturtevant

142. Biosynthetic phase of photosynthesis directly depends on
(1) Presence of light
(2) Assimilatory power produced during light reaction
(3) Splitting of water
(4) Diffusion of O_2 out of chloroplasts

143. Ladybird can be used in controlling
(1) Aphids
(2) Mosquitoes
(3) Butterfly caterpillars
(4) Root-borne pathogens

144. Select the **incorrect** statement w.r.t. features of human genome project.
(1) The functions are unknown for over 50 percent of the discovered genes
(2) Chromosome 1 has fewest genes while the Y has most genes
(3) Less than 2 percent genome codes for protein
(4) The average gene consists of 3000 bases, but sizes vary greatly, with largest known human gene being dystrophin at 2.4 million bases

145. How many of the given auxins are natural?
a. IAA b. IBA
c. NAA d. 2, 4 – D
e. 2, 4, 5 – T
(1) 3 (2) 2
(3) 4 (4) 5

146. Which of the following is an example of beneficial population interaction?
(1) Amensalism
(2) Competition
(3) Parasitism
(4) Mutualism

147. All of the following plants show developmental heterophylly, **except**
(1) Cotton
(2) Coriander
(3) Larkspur
(4) Buttercup

148. Natural ageing of a lake by nutrient enrichment of its water is termed as
(1) Biomagnification
(2) Bioprospecting
(3) Eutrophication
(4) El Nino effect

Space for Rough Work

149. Mung bean resistant to yellow mosaic virus is obtained through
(1) Hybridization
(2) Mutation breeding
(3) Conventional breeding
(4) Tissue culture

150. The cell wall is indestructible and impregnated with silica. This cell wall is found in members of which of the given kingdom according to Whittaker's classification system?
(1) Monera (2) Protista
(3) Fungi (4) Plantae

ZOOLOGY

SECTION - A

151. How many groups of the animals given in the box below are uricotelic in nature?

Reptiles, Birds, Cartilaginous fishes, Mammals, Aquatic insects, *Hydra*, Land snails

(1) 3 (2) 4
(3) 5 (4) 6

152. Choose the **incorrect** statement.
(1) Sucrose is a disaccharide made up of glucose and fructose.
(2) Lecithin is a phosphorylated glyceride found in cell membranes.
(3) Only peptide bonds are involved in stabilizing tertiary structure of proteins.
(4) Lipids are not polymeric compounds.

153. Compound epithelium is present in the inner lining of
(1) Pancreatic ducts (2) Small intestine
(3) Stomach (4) PCT

154. Choose the **incorrect** match w.r.t. blood corpuscles in a healthy human male.

(1)	Thrombocytes	1.5-3.5 lakhs/mm^3 of blood	Blood clotting
(2)	Monocytes	6-8% of all leucocytes	Phagocytosis
(3)	Leucocytes	6000-8000/mm^3 of blood	Immune function
(4)	Eosinophils	0-1% of all leucocytes	Release histamine and serotonin

155. Choose the **incorrect** statement w.r.t. absorption of the following products.
(1) Small amount of glucose is absorbed with the help of carrier proteins.
(2) Glucose and glycine are absorbed by active transport.
(3) Amino acids are always absorbed only by simple diffusion.
(4) Long chain fatty acids and glycerol cannot be absorbed directly into blood.

156. Identify the non-polymeric substance.
(1) Proteins
(2) Nucleic acids
(3) Palmitic acid
(4) Polysaccharides

157. Upon arrival of a stimulus, the polarised state of a resting neuronal membrane is reversed by
(1) Efflux of K^+ into ECF
(2) Activation of $Na^+ – K^+$ pump
(3) Influx of Na^+ into axoplasm
(4) Influx of K^+ into axoplasm

Space for Rough Work

158. The organism that is not a member of phylum Echinodermata is
(1) *Ophiura*
(2) *Asterias*
(3) *Pennatula*
(4) *Antedon*

159. How many of the components given below in the box are present in the saliva of an adult man?

Na^+, HCO_3^-, Cl^-, IgA, Lysozyme, Salivary amylase, K^+, Maltose

(1) Six (2) Seven
(3) Eight (4) Five

160. Hypersecretion of thyroid hormones can lead to
(1) Acromegaly (2) Graves' disease
(3) Simple goitre (4) Cretinism

161. Which of the following is not the correct expression for respiratory volumes and capacities?
(1) VC = IC + ERV
(2) FRC = ERV + RV
(3) TLC = IC + VC
(4) EC = TV + ERV

162. The total thickness of diffusion membrane in an adult man under normal physiological conditions is
(1) More than a millimetre
(2) Less than a millimetre
(3) Equal to a millimetre
(4) Twice the millimetre

163. The feature not exhibited by *Struthio* is
(1) Oviparity
(2) Air sacs for exchange of gases between body cells and atmosphere
(3) Fully ossified bones
(4) Presence of beak

164. Deposition of calcium, fats and cholesterol leading to narrowing of lumen of coronary arteries is termed as
(1) Angina (2) Heart failure
(3) Atherosclerosis (4) Hypertension

165. Choose the **incorrect** feature w.r.t. most abundant cells in the healthy human blood.
(1) Devoid of nucleus
(2) Have an average life span of 120 days
(3) Destroyed in the spleen
(4) Responsible for the active immune responses of the body

166. All of the following are bacterial STIs, except
(1) Syphilis (2) Gonorrhoea
(3) Chlamydiasis (4) Genital herpes

167. Aldosterone is secreted by A in response to B blood pressure, causes C of D from E. Choose the option that fills the blanks **correctly**.

	A	B	C	D	E
(1)	Adrenal medulla	High	Secretion	K^+	PCT
(2)	Pituitary gland	Low	Reabsorption	K^+	DCT
(3)	Adrenal cortex	High	Secretion	Na^+	PCT
(4)	Adrenal cortex	Low	Reabsorption	Na^+	DCT

168. Which of the following segments allows passage of small amounts of urea into medullary interstitium to keep up the osmolarity?
(1) Descending limb of Henle's loop
(2) Collecting duct
(3) Thin segment of ascending limb
(4) Distal convoluted tubule

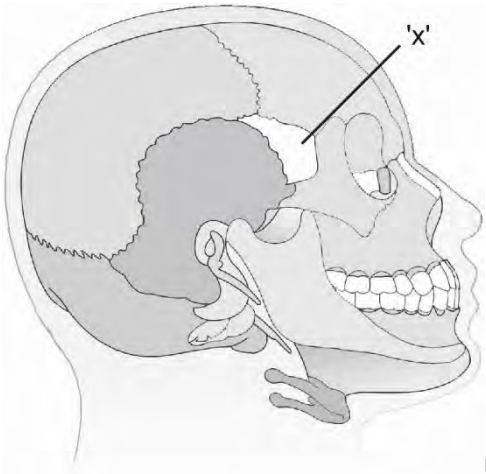
Space for Rough Work

169. About 50% of lymphoid tissue in human body is contributed by

(1) Spleen (2) Thymus

(3) MALT (4) Lymph nodes

170. Which of the following does not hold true for the bone marked as 'X' in the figure given below?



(1) It is unpaired

(2) It is a cranial bone

(3) It is a facial bone

(4) It is a part of axial skeleton

171. The number of metatarsals in one hindlimb of an adult man is

(1) Equal to the number of lumbar vertebrae in an adult man

(2) More than the number of metacarpals in one forelimb of man

(3) Less than the number of floating ribs in an adult man

(4) Equal to the number of false ribs in an adult man

172. Homozygous purelines are obtained by

(1) Inbreeding (2) Out-breeding

(3) Cross-breeding (4) Out-crossing

173. Choose the **incorrect** statement w.r.t. human eye.

(1) Suspensory ligaments attached to ciliary body hold the lens in place.

(2) Photosensitive compound of human eye is made up of retinal and opsin.

(3) Retinal is a derivative of vitamin-A.

(4) The anterior part of retina contains blind spot which lack cones but has few rods.

174. Complete the analogy by selecting the **correct** option.

Body temperature : Hypothalamus :: Memory : ___

(1) Pons

(2) Medulla oblongata

(3) Association areas of cerebrum

(4) Midbrain

175. The stained DNA can be extracted from agarose gel by the process called

(1) Electrophoresis

(2) Elution

(3) Fingerprinting

(4) Transformation

176. Choose the **incorrect** match regarding the parts of reproductive system of male cockroach and their functions.

(1) Seminal vesicles – Secrete outer layer of spermatheca

(2) Mushroom shaped gland – Provide nutrition to sperms

(3) Testes – Formation of sperms

(4) Vas deferens – Transportation of sperms

Space for Rough Work

177. Select the **correct** set of animals that belong to the same taxon.

(1) *Sycon*, *Spongilla*, *Hydra*

(2) *Physalia*, *Pleurobrachia*, *Pennatula*

(3) *Columba*, *Canis*, *Ctenoplana*

(4) *Anopheles*, *Aedes*, *Apis*

178. The production of both sense and antisense RNA in host cells leads to mRNA silencing. This technique has been used to control nematode infection in

(1) Stem of tobacco plant

(2) Seeds of cotton plant

(3) Roots of tobacco plant

(4) Stem of cotton plant

179. The human male ejaculates about 'A' million sperms during coitus, of which for normal fertility 'B' % must have normal shape and size and at least 'C' % of them must show vigorous motility. Choose the option that **correctly** identifies A, B and C.

	A	B	C
(1)	200 – 300	70	30
(2)	200 – 300	60	40
(3)	200 – 300	40	60
(4)	200 – 300	30	70

180. The chromosome number in meiocyte of 'X' is 12 while chromosome number in gamete of 'Y' is 4. Select the option that **correctly** identifies 'X' and 'Y' respectively.

(1) House fly, Fruit fly

(2) Rat, Cat

(3) House fly, Cat

(4) Fruit fly, House fly

181. A method of sterilization, in which, a part of fallopian tube is cut or tied up is

(1) Called vasectomy

(2) A barrier method of contraception

(3) A method of inhibition of ovulation

(4) Highly effective for birth control

182. All of the following are inserted into the female reproductive tract to cover the cervix during coitus, **except**

(1) Diaphragms (2) Vaults

(3) Condom (4) Lippes loop

183. Choose the **incorrect** match.

(1)	Eyes of *Octopus* and mammals	Convergent evolution
(2)	Bones of forelimbs of vertebrates	Divergent evolution
(3)	Presence of fossils	In igneous rocks
(4)	Heart of bat, man and cheetah	Homology

184. Which of the following was characterised by three-horned face and quadrupedal locomotion?

(1) *Tyrannosaurus* (2) *Triceratops*

(3) *Stegosaurus* (4) *Brachiosaurus*

185. Choose the marine fish among the following.

(1) *Hilsa* (2) *Catla*

(3) *Labeo* (4) Rohu

SECTION - B

186. If a gene of interest is inserted within the coding sequence of the enzyme β-galactosidase, the recombinants will appear in which colour in the presence of chromogenic substrate?

(1) Blue

(2) Red

(3) Green

(4) White

Space for Rough Work

187. All of the following involve *in vitro* fertilisation, **except**

(1) GIFT (2) ZIFT

(3) IUT (4) ICSI

188. Choose the **incorrect** match.

(1) Adrenal gland – Present on the anterior part of each kidney

(2) Thymus – On the dorsal side of aorta

(3) Thyroid – Either side of the trachea

(4) Hypothalamus – Basal part of diencephalon

189. The process in human reproduction that does not occur in female reproductive tract is

(1) Capacitation (2) Insemination

(3) Fertilisation (4) Spermiation

190. Consider the given statements and choose the **correct** answer.

Statement A: All cartilages in vertebrate embryos are replaced by bones in adults.

Statement B: The bone marrow in all bones is the site of production of blood cells.

(1) Both statements are correct

(2) Both statements are incorrect

(3) Only statement A is correct

(4) Only statement B is correct

191. Select the **incorrect** statement.

(1) *Myxine* exhibits open type of circulation.

(2) In *Carcharodon*, notochord is persistent throughout life.

(3) *Pterophyllum* exhibits external fertilisation.

(4) In *Hyla*, tympanum represents ear.

192. All of the given statements are true for DNA, **except**

(1) It is a negatively charged molecule.

(2) It cannot pass through cell membranes.

(3) It is the genetic material of all organisms without exception.

(4) In order to cut the DNA with restriction enzymes, it needs to be in pure form.

193. Choose the **incorrect** match.

(1) Lepidopteran – Tobacco budworm

(2) Coleopteran – Mosquito

(3) Dipteran – Flies

(4) Lepidopteran – Army worm

194. Match column I with column II and select the **correct** option.

	Column I		**Column II**
a.	Ascariasis	(i)	*Haemophilus influenzae*
b.	Filariasis	(ii)	*Wuchereria*
c.	Ringworm	(iii)	*Ascaris*
d.	Pneumonia	(iv)	*Trichophyton*

(1) a(iii), b(ii), c(iv), d(i) (2) a(i), b(ii), c(iii), d(iv)

(3) a(ii), b(iii), c(iv), d(i) (4) a(iii), b(iv), c(ii), d(i)

195. Choose the **incorrect** statement w.r.t. human evolution.

(1) The skull of baby chimpanzee is more like adult chimpanzee skull than adult human skull.

(2) The story of evolution of modern man appears to be parallel evolution of human brain and language.

(3) Agriculture came around 10,000 years back and human settlements started.

(4) *Ramapithecus* was more man-like while *Dryopithecus* was more ape-like.

Space for Rough Work

196. It is estimated that **(A)** of the world livestock population is in India and China but their contribution to the world farm produce is **(B)**.

Select the **correct** option.

	(A)	**(B)**
(1)	Less than 70%	More than 25%
(2)	More than 70%	Only 25%
(3)	Less than 70%	Less than 25%
(4)	More than 70%	More than 25%

197. Complete the analogy and select the **correct** option.

Crow : 15 years :: Crocodile : ____

(1) 140 years

(2) 100 years

(3) 60 years

(4) 25 years

198. The part of brain that is associated with complex functions like memory and communication are 'X'. Choose the **incorrect** statement w.r.t. 'X'.

(1) 'X' are present in cerebral cortex.

(2) 'X' are the association areas.

(3) 'X' are neither clearly sensory nor motor in function.

(4) 'X' are responsible for intersensory association and regulation of respiration as they have respiratory rhythm centre.

199. The type of joint present between temporal bone and occipital bone is also present between

(1) Atlas and axis

(2) Carpal and metacarpal

(3) Humerus and pectoral girdle

(4) Parietal bone and frontal bone

200. **Assertion (A):** If the head of a cockroach is cut off, it will still live for as long as one week.

Reason (R): The head region is supplied by suboesophageal ganglion and rest of the body is supplied by supraoesophageal ganglion.

In the light of above statements select the **correct** option.

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

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

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

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

❑ ❑ ❑

Space for Rough Work

28/04/2023

Phase-1
CODE-B

Corporate Office: Aakash Tower, 8, Pusa Road, New Delhi-110005, Ph.011-47623456

FINAL TEST SERIES for NEET-2023

MM : 720 **Test-12** **Time : 3 Hrs. 20 Mins.**

Answers

1. (3)	41. (3)	81. (1)	121. (2)	161. (3)
2. (3)	42. (2)	82. (2)	122. (3)	162. (2)
3. (4)	43. (2)	83. (3)	123. (3)	163. (2)
4. (2)	44. (2)	84. (3)	124. (3)	164. (3)
5. (2)	45. (4)	85. (1)	125. (3)	165. (4)
6. (3)	46. (1)	86. (4)	126. (4)	166. (4)
7. (1)	47. (3)	87. (4)	127. (3)	167. (4)
8. (2)	48. (1)	88. (3)	128. (4)	168. (2)
9. (4)	49. (2)	89. (3)	129. (4)	169. (3)
10. (1)	50. (4)	90. (1)	130. (2)	170. (3)
11. (4)	51. (2)	91. (4)	131. (1)	171. (1)
12. (2)	52. (4)	92. (1)	132. (4)	172. (1)
13. (2)	53. (4)	93. (4)	133. (2)	173. (4)
14. (4)	54. (1)	94. (2)	134. (4)	174. (3)
15. (2)	55. (4)	95. (4)	135. (3)	175. (2)
16. (1)	56. (1)	96. (4)	136. (3)	176. (1)
17. (2)	57. (1)	97. (1)	137. (3)	177. (4)
18. (1)	58. (2)	98. (4)	138. (3)	178. (3)
19. (4)	59. (2)	99. (2)	139. (3)	179. (2)
20. (2)	60. (4)	100. (1)	140. (1)	180. (1)
21. (3)	61. (3)	101. (2)	141. (4)	181. (4)
22. (3)	62. (2)	102. (1)	142. (2)	182. (4)
23. (1)	63. (3)	103. (2)	143. (1)	183. (3)
24. (2)	64. (3)	104. (2)	144. (2)	184. (2)
25. (4)	65. (4)	105. (1)	145. (2)	185. (1)
26. (3)	66. (3)	106. (1)	146. (4)	186. (4)
27. (2)	67. (3)	107. (3)	147. (4)	187. (1)
28. (2)	68. (4)	108. (2)	148. (3)	188. (2)
29. (2)	69. (2)	109. (3)	149. (2)	189. (4)
30. (2)	70. (2)	110. (3)	150. (2)	190. (2)
31. (2)	71. (4)	111. (2)	151. (1)	191. (1)
32. (2)	72. (1)	112. (4)	152. (3)	192. (3)
33. (1)	73. (1)	113. (2)	153. (1)	193. (2)
34. (1)	74. (4)	114. (3)	154. (4)	194. (1)
35. (3)	75. (4)	115. (3)	155. (3)	195. (1)
36. (4)	76. (3)	116. (1)	156. (3)	196. (2)
37. (3)	77. (3)	117. (3)	157. (3)	197. (3)
38. (2)	78. (4)	118. (2)	158. (3)	198. (4)
39. (3)	79. (3)	119. (3)	159. (2)	199. (4)
40. (4)	80. (1)	120. (3)	160. (2)	200. (3)

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FINAL TEST SERIES for NEET-2023

MM : 720 **Test-12** **Time : 3 Hrs. 20 Mins.**

Answers and Solutions

PHYSICS

SECTION - A

1. Answer (3)

$$\frac{N_0}{16} = N_0 e^{-\lambda(3t)} \Rightarrow e^{3\lambda t} = 16$$

$$N = N_0 e^{-\frac{9t\lambda}{2}}$$

$$= N_0 (e^{-3\lambda t})^{3/2} = N_0 \left(\frac{1}{16}\right)^{3/2}$$

$$N = \frac{N_0}{64}$$

2. Answer (3)

For A to $B \Rightarrow$ Isochoric process

$W_{AB} = 0$

For $B \rightarrow C \Rightarrow$ Isothermal process

$$W_{BC} = nRT \ln \frac{P_i}{P_f}$$

$$= 3R(2T_0) \ln \left[\frac{2P_0}{8P_0}\right]$$

$= 6\, RT_0 \ln [2^{-2}]$

$= -12\, RT_0 \ln 2$

3. Answer (4)

$y = 4 \sin (4t + \pi/3) \Rightarrow \omega = 4$

$v = 4 \times \cos (4t + \pi/3) \,.\, 4 = 16 \cos (4t + \pi/3)$

at $t = T/4$

$$v = 16\cos\left(\frac{4.T}{4} + \frac{\pi}{3}\right) = 16\cos\left(\frac{2\pi}{4} + \frac{\pi}{3}\right)$$

$$= 16\cos\left(\frac{\pi}{2} + \frac{\pi}{3}\right)$$

$$= 16\left(\frac{-\sqrt{3}}{2}\right) = -8\sqrt{3}$$

$$K.E. = \frac{1}{2}mv^2$$

$$= \frac{1}{2} \times 10 \times 10^{-3} \times 64 \times 3 \times 1$$

= 0.96 unit

4. Answer (2)

First overtone of closed organ pipe $f_1 = \frac{3v}{4l_1}$

Third overtone of open organ pipe $f_2 = \frac{4v}{2l_2}$

$$f_1 = f_2 \Rightarrow \frac{l_1}{l_2} = \frac{3}{8}$$

5. Answer (2)

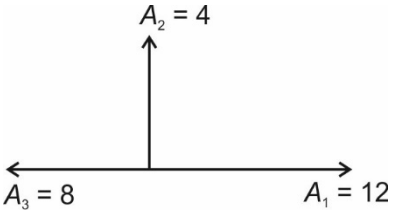
Radiation pressure is

$$P = \frac{I}{c}$$

$$F = \frac{I}{c}A = \frac{1800}{3 \times 10^8} \times \pi \times 9 \times 10^{-4}$$

$= 1800 \times \pi \times 3 \times 10^{-12}$ N $= 54\pi \times 10^{-10}$ N

6. Answer (3)



$\vec{A}_{net} = \vec{A}_1 + \vec{A}_2 + \vec{A}_3$

$A_{net} = \sqrt{4^2 + 4^2} = 4\sqrt{2}$ unit

7. Answer (1)

$F = ma = \mu mg$

$a = \mu g$

$x = \frac{v^2}{2\mu g} = \frac{P^2}{2m^2\mu g}$

$\mu = \frac{P^2}{2m^2 gx} = \frac{900}{2\times 4\times 10\times 8} = 1.4$

8. Answer (2)

$i = \frac{V}{R} \Rightarrow i = \frac{4}{2} = 2$ A

9. Answer (4)

A dimensionally correct equation may be correct or incorrect

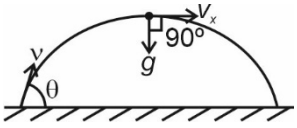
For example:

$S = ut + \frac{1}{2}at^2$ ...I

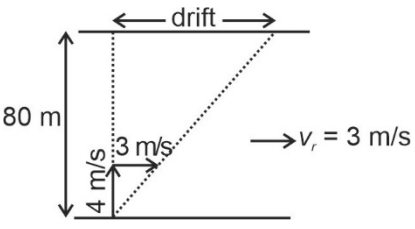
$S = ut + at^2$ ...II

I is correct & II is incorrect but both are dimensionally correct.

10. Answer (1)



11. Answer (4)



Time taken to cross the river

$t = \frac{80}{4} = 20$ s

Drift $\Rightarrow d = 3 \times 20 = 60$ m

12. Answer (2)

The action-reaction forces must act on different bodies along the same line of action in the opposite direction.

13. Answer (2)

Young's modulus is the measure of elasticity. From graph $Y_B > Y_A$ as young's modulus given by slope of stress strain curve.

14. Answer (4)

Since the density of liquid and the body is same, therefore no net force will act on the body.

15. Answer (2)

Heat required if 1 g of ice convert into water

$Q_1 = mL_f = 1$ g × 80 cal/g = 80 cal ...(i)

Heat released if 8 g of water lower its temperature by 8ºC

$Q_2 = ms\Delta T = 8$ g $\frac{1 \text{ cal}}{\text{g ºC}} \times 8$ °C = 64 cal ...(ii)

Clearly, $Q_1 > Q_2 \Rightarrow$ The final mixture will be ice-water, hence the equilibrium temperature will be 0ºC

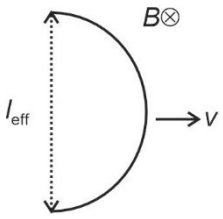
16. Answer (1)

Convex mirror forms image at its focus of a very distant object.

For a mirror, $R = 2f$

$\therefore \quad R = 2 \times 10$ cm = 20 cm

17. Answer (2)

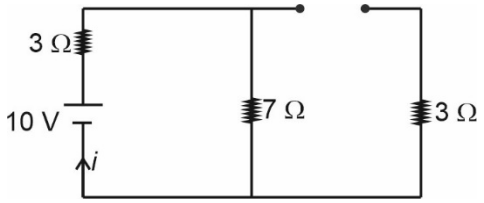


$l = \pi R \Rightarrow R = \frac{l}{\pi}$ ...(i)

$\varepsilon = Bl_0 v = B \times 2R \times v = \frac{2Blv}{\pi}$

18. Answer (1)

Just after the key is closed, the inductor act as a open wire. Therefore, the effective circuit at $t = 0$ will be



$$i = \frac{V}{R} = \frac{10}{3+7} = 1\text{ A}$$

19. Answer (4)

For a transformer

$$\frac{V_S}{V_P} = \frac{N_S}{N_P} \Rightarrow \frac{V_S}{50} = \frac{300}{100} \Rightarrow V_S = 150\text{ V}$$

20. Answer (2)

$$F = \frac{kq_1q_2}{r^2}$$

1st case

$$18 = \left|\frac{k \times 3 \times 6}{r^2}\right| \quad \text{...(i)}$$

2nd case

$q_1 = 3 - 4 = -1$, $q_2 = 6 - 4 = 2$

$$F' = \left|\frac{k \times (-1) \times 2}{r^2}\right| \quad \text{...(ii)}$$

$$\frac{18}{F'} = \frac{18}{2} \Rightarrow F' = 2\text{ N (Attractive)}$$

21. Answer (3)

$$\phi_E = \int \vec{E}.\overrightarrow{dA}$$

$$\phi_E = \left(2\hat{i} + 3\hat{j} - 4\hat{k}\right)\frac{\text{N}}{\text{C}}.\left(4\text{ cm}^2\hat{k}\right)$$

$$\phi_E = -4 \times 4 \times 10^{-4}\left(\frac{\text{N m}^2}{\text{C}}\right) = -16 \times 10^{-4}\,\frac{\text{N m}^2}{\text{C}}$$

22. Answer (3)

1 μF and 3 μF are in parallel combination.

$\therefore$ $C_1 = 1 + 3 = 4$ μF

Then, the capacitors are in series combination

$$\therefore \quad \frac{1}{C_{\text{eq}}} = \frac{1}{1} + \frac{1}{4} + \frac{1}{2}$$

$$\frac{1}{C_{eq}} = \frac{4+1+2}{4} \Rightarrow C_{\text{eq}} = \frac{4}{7}\mu\text{F}$$

23. Answer (1)

Triatomic linear molecule has 3 translational and 2 rotational degree of freedom.

24. Answer (2)

Angle of dip is taken as positive for northern hemisphere while it is negative for southern hemisphere.

25. Answer (4)

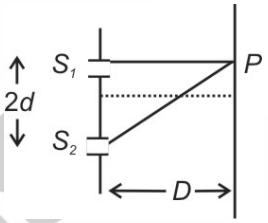
$$E = \frac{hc}{\lambda} - \phi \quad \text{... (i)}$$

$$4E = \frac{hc}{(\lambda/3)} - \phi \Rightarrow 4E = \frac{3hc}{\lambda} - \phi \quad \text{... (ii)}$$

From (i) and (ii)

$$\phi = \frac{hc}{3\lambda}$$

26. Answer (3)

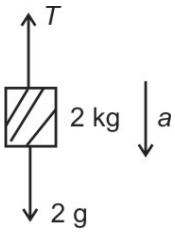


$N\beta = d$

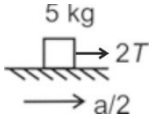
$$\frac{N.D\lambda}{2d} = d$$

$$N = \frac{2d^2}{\lambda D}$$

27. Answer (2)



$2g - T = 2a$ ... (i)



$$2T = \frac{5a}{2} \quad \text{... (ii)}$$

From (i) and (ii)

$$T = \frac{10}{13}g = 7.7\text{ N}$$

28. Answer (2)

$v_A = \frac{uf}{u-f} = \frac{-25\times10}{-25-10} = \frac{50}{7}$ cm

$v_B = \frac{uf}{u-f} = \frac{-20\times(10)}{-20-10} = \frac{20}{3}$ cm

Length of image = $\frac{50}{7} - \frac{20}{3} = \frac{10}{21}$ cm

29. Answer (2)

$V = IR$

$I = \frac{10}{20} = \frac{1}{2}$A

30. Answer (2)

$B_{centre} = \frac{\mu_0}{4\pi}\frac{2\pi in}{r}$

$B_{centre} \propto \frac{n}{r}$

$\frac{B'}{B} = \frac{n'}{n}\times\frac{r}{r'} = \frac{1}{4}$

$B' = \frac{B}{4}$

31. Answer (2)

Radius of Bohr's model

$r_n = 0.529\frac{n^2}{z}$Å

$r \propto n^2$

Hence, $r_3 = 9r_1$

32. Answer (2)

$A_0[1+2\alpha_B(\theta-20)] = A_0[1+2\alpha_s(\theta-40)]$

$\Rightarrow \quad 19(\theta-20) = 11(\theta-40)$

$\Rightarrow \quad 19\theta - 11\theta = 380 - 440$

$\Rightarrow \quad \theta = -\frac{60}{8} = -7.5°C$

33. Answer (1)

$\mu = \frac{1}{\sin C} = \frac{1}{\sin 30^o} = 2$

Velocity of light in the medium

$v = \frac{3\times10^8}{2} = 1.5\times10^8$ m/s

34. Answer (1)

$\vec{v} = \vec{\omega}\times\vec{r}$

$= -2\hat{i} + 3\hat{j} + 4\hat{k}$

$|\vec{v}| = \sqrt{2^2+3^2+4^2}$

$= \sqrt{29}$ unit

35. Answer (3)

$\frac{B_c}{B_a} = \left(\frac{R^2+x^2}{R^2}\right)^{3/2} = \left(\frac{R^2+R^2}{R^2}\right)^{3/2}$

$= 2\sqrt{2}$

SECTION - B

36. Answer (4)

$Q = \sigma AT^4$

$Q' = \sigma eAT'^4$

$= \frac{1}{2}(\sigma A 81T^4) = \frac{Q81}{2} = 40.5\ Q$

37. Answer (3)

$R = \frac{mv}{qB}$

$\sin\theta = \frac{R}{d} = \frac{1}{\sqrt{2}}$

$\theta = 45°$

38. Answer (2)

From basic constraint relation

$a_1 + a_2 = 2a_3$

39. Answer (3)

$\frac{1}{\lambda} \propto R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$

$\frac{1}{\lambda_{32}} \propto \frac{5}{36}R \Rightarrow \lambda_{32} \propto \frac{36}{5R}$

Similarly $\lambda_{31} \propto \frac{9}{8R}$ and $\lambda_{21} \propto \frac{4}{3R}$

$\therefore \quad \frac{\lambda_{32}}{\lambda_{31}} = 6.4$ and $\frac{\lambda_{21}}{\lambda_{31}} = 1.2$

40. Answer (4)

$$T = \frac{T_1}{2} + \frac{T_2}{2}$$

$$= \frac{1}{2}\left[2\pi\sqrt{\frac{m}{k}} + 2\pi\sqrt{\frac{m}{2k}}\right]$$

$$= \pi\sqrt{\frac{m}{k}}\left[1 + \frac{1}{\sqrt{2}}\right]$$

41. Answer (3)

$$V_{\text{common}} = \frac{C_1V_1 + C_2V_2}{C_1 + C_2}$$

$$= \frac{2\mu F \times 60 + 0}{3\mu F}$$

= 40 V

42. Answer (2)

$$v_e = \sqrt{2gR}$$

At centre $K_e = \frac{1}{2}mv^2 = -\frac{GMm}{R} + \frac{3}{2}\frac{GMm}{R}$

$$K = \frac{2gmR}{4} = \frac{1}{4}mv_e^2$$

43. Answer (2)

Reading of voltmeter = $V_L - V_C = 0$

Reading of ammeter = $\frac{E_{rms}}{Z} = \frac{110}{55} = 2\,A$

44. Answer (2)

$$I = I_{max}\cos^2\left(\frac{\phi}{2}\right)$$

$$\Rightarrow \quad \frac{1}{2}I_{max} = I_{max}\cos^2\left(\frac{\phi}{2}\right)$$

$$\cos\left(\frac{\phi}{2}\right) = \frac{1}{\sqrt{2}} \Rightarrow \frac{\phi}{2} = (2n+1)\frac{\pi}{4}$$

$$\phi = (2n+1)\frac{\pi}{2}$$

$$\frac{2\pi}{\lambda}\Delta x = (2n+1)\frac{\pi}{2} \qquad \Rightarrow \Delta x = (2n+1)\frac{\lambda}{4}$$

45. Answer (4)

$a = -\omega^2 y$

$y = 5\text{ cm}\sin\{2\pi \times 8 - 100\pi \times 0.11\}$

$y = 5\text{ cm}\sin(16\pi - 11\pi)$

$y = 5\text{ cm}\sin 5\pi = 0$

46. Answer (1)

$$V_{cm} = \frac{MV + m(V_0 - V) - (M-m)V}{2M}$$

Here, let V = velocity of ladder

$$= \frac{mV_0}{2M}$$

47. Answer (3)

Resistance $R = \frac{\rho l}{A}$

$$\frac{R_1}{R_2} = \frac{A_2}{A_1} \Rightarrow \frac{R_1}{R_2} = \frac{a^2}{\pi a^2} = \frac{1}{\pi}$$

48. Answer (1)

$$\left|< \vec{a} >\right| = \left|\frac{\overrightarrow{v_f} - \overrightarrow{v_i}}{\Delta t}\right| = \frac{0-8}{7-2} = \frac{-8}{5}\ \text{m/s}^2$$

49. Answer (2)

$KE_{max} = E - \phi$

where ϕ is work function of metal

1st case

1.2 eV = 3 eV – $\phi \Rightarrow \phi$ = 1.8 eV

2nd case

KE_{max} = 4 eV – 1.8 eV

= 2.2 eV

50. Answer (4)

$$\frac{1}{\lambda} = R\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

For Lyman series:

$$\frac{1}{\lambda_0} = R\left(1 - \frac{1}{2^2}\right) \Rightarrow \frac{1}{\lambda_0} = R \times \frac{3}{4} \qquad ...(i)$$

For Balmer series:

$$\frac{1}{\lambda'} = R\left(\frac{1}{2^2} - \frac{1}{3^2}\right)$$

$$\frac{1}{\lambda'} = \frac{R \times 5}{36} \qquad ...(ii)$$

$$\lambda' = \frac{27}{5}\lambda_0$$

CHEMISTRY

SECTION - A

51. Answer (2)

$$w = -2.303nRT\log\frac{V_f}{V_i}$$

$$= \frac{-2.303\times4\times2\times350}{1000}\log\frac{20}{10}$$

$$= -1.93\,Kcal$$

52. Answer (4)

$Ph-\underset{\uparrow}{O}-\underset{\uparrow}{Ph}$

Double bond character developed in C–O bonds due to resonance.

53. Answer (4)

More the charge (valency) of ion,

More will be the coagulating power.

Order of coagulating power:

$[Fe(CN)_6]^{4-} > PO_4^{3-} > SO_4^{2-} > NO_3^-$

54. Answer (1)

NaCN is used as depressant in the separation of ZnS from PbS.

55. Answer (4)

$$S \xrightarrow{O_2} SO_2 \xrightarrow[\text{Catalyst}]{V_2O_5} SO_3 \xrightarrow{H_2SO_4} \underset{\text{Oleum}}{H_2S_2O_7}$$

56. Answer (1)

Blister copper obtained in Bessemerisation process.

57. Answer (1)

Vegetable oils + $H_2 \xrightarrow{Ni}$ vegetable ghee

58. Answer (2)

Ferrimagnetic substances lose ferrimagnetism on heating and become paramagnetic.

59. Answer (2)

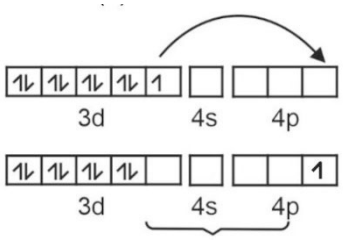
For first order reaction $t_{99.9\%} = 10\left(t_{1/2}\right)$

= 10 ×12 = 120 min

60. Answer (4)

The reaction of diazonium with aniline gives yellow dye.

61. Answer (3)



due to one unpaired e^-, the complex will be paramagnetic and there is also an empty *d*-orbital.

So $\left[Cu(NH_3)_4\right]^{2+}$ is dsp^2 hybridised.

62. Answer (2)

Voids	Coordination number
Triangular	3
Tetrahedral	4
Octahedral	6
Cubic	8

63. Answer (3)

$$2A + 3B \longrightarrow 2C$$

(i) 8 12 0

(f) 0 0 8 mol

64. Answer (3)

$$\overline{\nu} = \frac{1}{\lambda} = \frac{1}{500\times10^{-10}\,m}$$

$= 2 \times 10^7\ m^{-1}$

$= 2 \times 10^5\ cm^{-1}$

65. Answer (4)

Energy order $7s > 6p > 5d > 4f$

66. Answer (3)

Element	Li	Be	B
I.E(KJ mol^{-1})	520	899	801

67. Answer (3)

1D = 3.33564×10^{-30} C.m.

68. Answer (4)

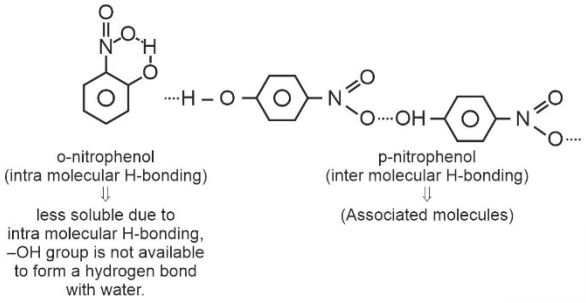
NH_3 has 3 bond pairs and 1 lone pair so shape is pyramidal.

69. Answer (2)

Fraction of pressure of CH_4 = mole fraction of CH_4

$$= \frac{\frac{1}{16}}{\frac{1}{16}+\frac{1}{32}} = \frac{2}{3}$$

70. Answer (2)



o-nitrophenol
(intra molecular H-bonding)
⇓
less soluble due to intra molecular H-bonding, –OH group is not available to form a hydrogen bond with water.

p-nitrophenol
(inter molecular H-bonding)
⇓
(Associated molecules)

71. Answer (4)

If the reactants and products are present in same phase then the equilibrium established in the reaction will be homogeneous equilibrium.

72. Answer (1)

$$pH = \frac{1}{2}pKa - \frac{1}{2}\log C$$

$$= \frac{4.74}{2} - \frac{1}{2}\log(10^{-2})$$

= 3.37

73. Answer (1)

B_2H_6 is an electron deficient covalent hydride

74. Answer (4)

KO_2 is a stable superoxide

75. Answer (4)

Solvay process is used to prepare Na_2CO_3.

Solvay process cannot be used to prepare K_2CO_3 as $KHCO_3$ is too soluble.

76. Answer (3)

Al has 3*d* orbital so it forms $[Al(H_2O)_6]^{3+}$ ion in acidified aqueous solution.

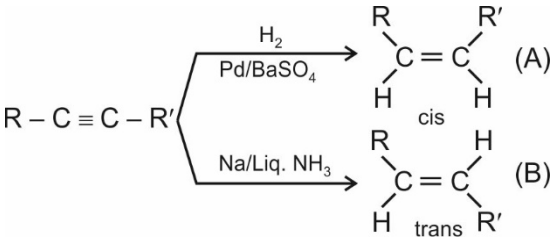
77. Answer (3)

; heterocyclic aromatic compound

78. Answer (4)

$(CH_3)_3\overset{+}{C}$ is highly stabilised carbocation due to hyperconjugation.

79. Answer (3)



80. Answer (1)

81. Answer (1)

MnO is an antiferromagnetic substance.

82. Answer (2)

Copper is extracted by hydrometallurgy from low grade ores.

The solution containing Cu^{2+} is treated with scrap iron or H_2.

$Cu^{2+}(aq.) + H_2(g) \rightarrow Cu(s) + 2H^+(aq.)$

83. Answer (3)

m = Zit

$$= \frac{108}{96500} \times 9.65 \times 1000$$

= 10.8 g

84. Answer (3)

Balanced equation is

$$2MnO_4^- + H_2O + I^- \rightarrow 2MnO_2 + 2OH^- + IO_3^-$$

85. Answer (1)

$$\overset{r}{25°C} \xrightarrow{2r} \overset{}{35°C} \xrightarrow{4r} \overset{}{45°C} \xrightarrow{8r} \overset{}{55°C} \xrightarrow{16r} \overset{}{65°C}$$

SECTION - B

86. Answer (4)

Chemisorption needs activation energy as strong chemical bonds are formed.

87. Answer (4)

Pine oil, fatty acids and Xanthates are collectors

88. Answer (3)

$XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$

89. Answer (3)

Mn^{2+} has five unpaired electrons.

90. Answer (1)

$CoCl_3.4NH_3 \longrightarrow [CoCl_2(NH_3)_4]Cl$

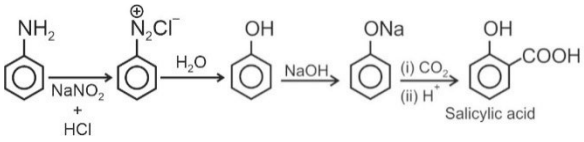
91. Answer (4)

- $–NO_2$ is an ambidentate ligand so it can show linkage isomerism.
- $[Co(NH_3)_3(NO_2)_3]$ can show geometrical isomerism i.e. fac and mer isomer.

92. Answer (1)

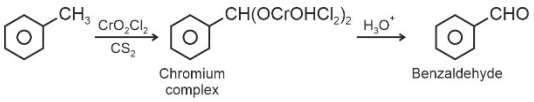
More stable is the carbocation formed faster is the rate of S_N1 reaction

93. Answer (4)



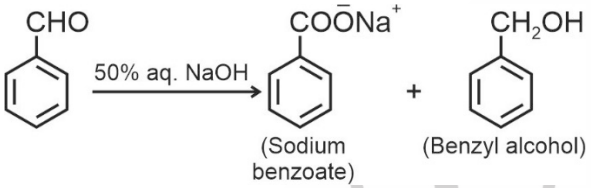
94. Answer (2)

Given reaction is Etard reaction



95. Answer (4)

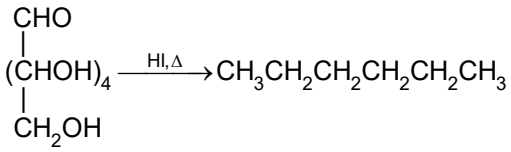
Example of Cannizzaro reaction



96. Answer (4)

$(CH_3)_3N$, 3° amine does not react with Hinsberg's reagent.

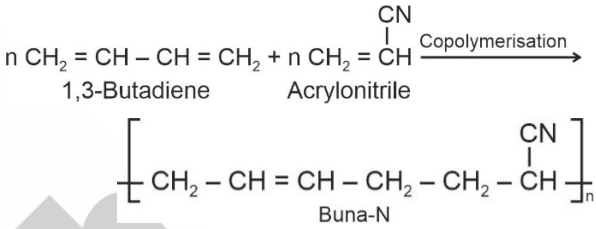
97. Answer (1)



98. Answer (4)

Osteomalacia is caused by the deficiency of vitamin D.

99. Answer (2)



100. Answer (1)

Norethindrone and novestrol are used as antifertility drugs.

BOTANY

SECTION - A

101. Answer (2)

Rules of scientific naming of animals is assigned in International Code of Zoological Nomenclature (ICZN).

ICNCP denotes International Code of Nomenclature for Cultivated Plants.

ICBN denotes International Code for Botanical Nomenclature.

ICNB denotes International Code of Nomenclature of Bacteria.

102. Answer (1)

The correct sequence of DNA fingerprinting process is

(i) Isolation of DNA

(ii) Digestion of DNA by Restriction Endonuclease.

(iii) Gel electrophoresis.

(iv) Southern blotting.

(v) Hybridization by VNTR probe.

(vi) Autoradiography.

103. Answer (2)

Females afflicted with Turner's syndrome (45 with XO) are sterile as ovaries are rudimentary. Klinefelter's syndrome is caused due to the presence of an additional copy of X-chromosome resulting into a karyotype of 47, XXY. Failure of segregation of chromatids during cell division cycle results in the gain or loss of a chromosome(s), called aneuploidy. Failure of cytokinesis after telophase stage of cell division results in an increase in a whole set of chromosomes in an organism and, this phenomenon is known as polyploidy. Individuals afflicted with Down's syndrome exhibits many loops on finger tips. Gynaecomastia is found in individuals afflicted with Klinefelter's syndrome.

104. Answer (2)

The *lac* y gene codes for permease, which allows the entry of lactose inside the cell. As *lac* y gene becomes non-functional due to mutation, lactose is not able to enter inside the cell making its breakdown by β-galactosidase (inside the cell) stop.

105. Answer (1)

Plant cells are generally larger than animal cell.

106. Answer (1)

Peptide bond formation is catalyzed by enzyme peptidyl transferase (a type of ribozyme, a catalytic RNA *i.e.*, 23S rRNA in bacteria).

107. Answer (3)

Phosphorus is a constituent of cell membranes, certain proteins, all nucleic acids and nucleotides, and is required for all phosphorylation reactions. Carbon is structural element of the cell.

108. Answer (2)

Every chromosome has a primary constriction or the centromere.

109. Answer (3)

Chlorophyll pigments are present in the thylakoids.

The chloroplasts are double membrane bound. Of the two, the inner chloroplast membrane is relatively less permeable. The stroma of the chloroplast contains enzymes required for the synthesis of carbohydrates and proteins. There are flat membranous tubules called the stroma lamellae connecting the thylakoids of the different grana.

110. Answer (3)

Sorghum is C_4 plant in which double CO_2 fixation occurs. Rice, potato and wheat are C_3 plants.

111. Answer (2)

Centriole duplication takes place in S-phase

112. Answer (4)

Poales and Sapindales represent order of wheat and mango, respectively.

Hominidae and Muscidae represents family of man and housefly, respectively. Primata and Diptera represents orders of man and housefly, respectively. Insecta and Dicotyledonae represents class of housefly and mango, respectively.

113. Answer (2)

Species more susceptible to extinction have the following population characteristics:

(i) Large body size (e.g.; Rhinoceros, Lion)

(ii) Small population size and low reproductive rate (e.g.; Giant Panda, Blue whale).

(iii) High trophic level in food chain (e.g., Eagle, Bengal tiger).

(iv) Fixed habit and migratory routes (e.g., Whooping crane, blue whale)

114. Answer (3)

Cyanobacteria are photosynthetic autotrophs. Chemosynthetic autotrophic bacteria oxidise various inorganic substances such as nitrates, nitrites and ammonia and use the released energy for their ATP production.

115. Answer (3)

Wheat shows anemophily. Flowers having large feathery stigma to easily trap the air borne pollen grains is a characteristic of wind pollinated flowers. Yucca is pollinated by *Pronuba* moth (insect).

Zostera and *Hydrilla* are pollinated by water.

116. Answer (1)

In parietal placentation, the ovules develop on the inner wall of the ovary or on the peripheral part. Ovary is one-chambered but it becomes two-chambered due to the formation of the false septum *e.g.,* mustard and *Argemone*. Pea shows marginal placentation. *Dianthus* and *Primrose* show free central placentation

117. Answer (3)

The peripheral region of the secondary xylem, is lighter in colour and is known as the sapwood. It is involved in the conduction of water and minerals from root to leaf.

118. Answer (2)

In liverworts, gametophyte is the main plant body.

Asexual reproduction in liverworts takes place by fragmentation of thalli, or by the formation of specialised structures called gemmae. The sporophyte is differentiated into foot, seta and capsule. After meiosis, spores are produced within the capsule. These spores germinate to form free-living gametophytes.

119. Answer (3)

Phycoerythrin and chlorophyll d are found in the members of Rhodophyceae. *Polysiphonia* is a member of Rhodophyceae. *Ectocarpus*, *Dictyota* and *Fucus* are members of Phaeophyceae.

120. Answer (3)

Each centrosome radiates out microtubules called aster. The two asters together with spindle fibres form mitotic apparatus.

121. Answer (2)

Numerically, osmotic pressure is equivalent to the osmotic potential (solute potential), but the sign is opposite. Thus, osmotic pressure will be 25 bar.

122. Answer (3)

The movement of sugar in the phloem begins at the source, where sugars are loaded (actively transported) into a sieve tube. All other mentioned processes are passive in nature.

123. Answer (3)

Mg^{2+} is an activator of PEP carboxylase and helps to maintain the ribosome structure.

Zinc is needed in the synthesis of auxin. Potassium helps in opening and closing of stomata. The best-defined function of manganese is in the splitting of water to liberate oxygen during photosynthesis.

124. Answer (3)

Denitrification is carried by bacteria *Pseudomonas* and *Thiobacillus*. *Nitrosomonas, Nitrococcus* and *Nitrobacter* are involved in nitrification.

125. Answer (3)

Twisted aestivation is seen in China rose.

126. Answer (4)

Beer has 3-6% of alcohol concentration.

127. Answer (3)

PEPcase is responsible for the CO_2 fixation in mesophyll cells of C_4 plants.

RuBisCO is responsible for the primary of CO_2 fixation in mesophyll cells of C_3 plants. Hexokinase and malate dehydrogenase are involved in respiratory pathways.

128. Answer (4)

T.W. Engelmann gave the first action spectrum.

Julius Von Sachs found that the green parts in plants is where glucose is made. Cornelius Van Niel inferred that oxygen evolved by the green plants comes from water and not from CO_2. Joseph Priestley concluded that the plants restore to the air whatever the breathing mouse and the burning candle remove.

129. Answer (4)

Splitting of the water molecule takes place on the lumen side of thylakoid membrane.

130. Answer (2)

In bryophyte, dominant phase is gametophyte.

131. Answer (1)

CO_2 is not evolved during lactic acid fermentation.

$$\text{Pyruvic acid} \xrightarrow[\text{FMN, } Zn^{+2}]{\text{lactic acid dehydrogenase}} \text{lactic acid}$$

Alcoholic fermentation:

$$\text{Pyruvic acid} \xrightarrow[Mg^{+2}]{\text{Pyruvic acid decarboxylase}} \text{Acetaldehyde} + CO_2$$

$$\text{Acetaldehyde} + \text{NADH} + H^{H} \xrightarrow{\text{Alcohol dehydrogenase}} \text{Ethanol} + NAD^{+}$$

Link reaction:

$$\text{Pyruvic acid} + \text{CoA} + NAD^{+} \xrightarrow{\text{Pyruvate dehydrogenase, } Mg^{+2}} \text{Acetyl CoA} + CO_2 + \text{NADH} + H^{+}$$

In Krebs' cycle, two decarboxylation reactions occur.

132. Answer (4)

Gibberellin promotes bolting in beet, cabbages and many plants with rosette habit.

Auxin stimulates apical dominance. Cytokinins are essential for cytokinesis. Ethylene promotes fruit ripening.

133. Answer (2)

Gametes can be produced either by mitotic or meiotic division depending upon the ploidy of gamete mother cell.

Zygote is the vital link that ensures continuity of species between organisms of one generation and the next.

134. Answer (4)

In some cereals such as rice and wheat, pollen grain loose viability within 30 minutes of their release.

135. Answer (3)

Inner mitochondrial membrane is permeable to protons only in the region of F_0-F_1.

SECTION-B

136. Answer (3)

Plasmodium is a sporozoan and does not have locomotory structure. It is an endoparasite.

Trypanosoma is a flagellated protozoan. *Paramoecium* is a ciliated protozoan. *Amoeba* is an amoeboid protozoan.

137. Answer (3)

A typical angiospermic embryo sac, at maturity is 8 nucleated and 7-celled.

138. Answer (3)

Sclerenchyma is usually dead and without protoplast.

139. Answer (3)

Codominance can be observed in human blood group AB. Flower colour in snapdragon shows incomplete dominance. Skin colour in humans shows polygenic inheritance. Flower position in garden pea shows complete dominance.

140. Answer (1)

For a flaccid cell, $\psi_w = \psi_s$ or TP (ψ_p) = 0.

141. Answer (4)

Alfred Sturtevant used the frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes and mapped their position on the chromosome.

T.H. Morgan proved chromosomal theory of inheritance. Sutton and Boveri proposed chromosome theory of inheritance. Correns, de Vries and Tschermak rediscovered the principles of heredity already worked out by Mendel.

142. Answer (2)

Biosynthetic phase does not directly depend on the presence of light but is directly dependent on the product of light reaction, *i.e.,* ATP and NADPH.

All other events are associated with light reaction.

143. Answer (1)

Ladybird can be used to control aphids.

Dragonflies are useful to get rid of mosquitoes. *Bacillus thuringiensis* (Bt) is a microbial biocontrol agent that can be introduced to control butterfly caterpillars. *Trichoderma* are very common in the root ecosystems and are effective against several plant pathogens.

144. Answer (2)

Chromosome 1 has most gene (2968), and the Y has the fewest (231) genes.

145. Answer (2)

IAA and IBA are natural auxins.

146. Answer (4)

Mutualism (+/+) is an example of beneficial population interaction.

Competition, refers to the interaction of two organisms striving for the same resources. Amensalism is an interaction between two organisms of different species in which one species inhibits the growth of other species by secreting certain chemicals. In parasitism only one species benefits and the interaction is detrimental to the other species.

147. Answer (4)

Differences in shapes of leaves produced in air and those produced in water in buttercup represent the heterophyllous development due to the environment.

148. Answer (3)

Eutrophication is the natural ageing of a lake by nutrient enrichment of its water.

The phenomenon through which certain pollutants get accumulated in tissues in increasing concentrations along the food chain, is called biomagnification. Bioprospecting is exploring molecular, genetic and species-level diversity for products of economic importance rise in temperature is leading to deleterious changes in the environment and resulting in odd climatic changes (El Nino effect).

149. Answer (2)

In mung bean, induced mutations helped in the incorporation of resistance to yellow mosaic virus.

150. Answer (2)

Kingdom Protista includes diatoms and their walls are embedded with silica and thus, walls are indestructible.

ZOOLOGY

SECTION - A

151. Answer (1)

Reptiles, birds and land snails are uricotelic in nature.

152. Answer (3)

Tertiary structure is stabilised by peptide bonds, hydrogen bonds, ionic bonds, covalent bonds, hydrophobic bonds and Van der Waals interactions.

153. Answer (1)

Compound epithelium covers the dry surface of the skin, the moist surface of buccal cavity, pharynx, inner lining of ducts of salivary glands and of pancreatic ducts.

154. Answer (4)

Secretion of inflammatory mediators is the function of basophils.

155. Answer (3)

Amino acids can be absorbed by simple diffusion, facilitated transport and active transport.

156. Answer (3)

Palmitic acid is a lipid that has 16 carbons including carboxyl carbon.

157. Answer (3)

Depolarisation of a resting neuronal membrane occurs due to influx of Na^+.

158. Answer (3)

Pennatula belongs to the phylum Cnidaria.

159. Answer (2)

The saliva secreted into the oral cavity contains electrolytes $(Na^+, K^+, Cl^-, HCO_3^-)$ and enzymes, salivary amylase and lysozyme. IgA is a secretory antibody.

160. Answer (2)

Graves' disease is an autoimmune disease that occurs due to hypersecretion of thyroxine.

161. Answer (3)

TLC *i.e.*, total lung capacity equals to IC + FRC or RV + ERV + TV + IRV.

162. Answer (2)

The total thickness of diffusion membrane in an adult man is much less than a millimetre.

163. Answer (2)

Air sacs connected to lungs supplement respiration but do not participate in exchange of gases between atmosphere and body cells.

164. Answer (3)

Coronary artery disease is often termed atherosclerosis. It affects the vessels that supply blood to heart muscle.

165. Answer (4)

Erythrocytes or Red Blood Cells (RBCs) are the most abundant of all the cells in blood. These play a significant role in transport of respiratory gases but do not participate in immune responses.

166. Answer (4)

Genital herpes is a viral STI caused by Herpes simplex virus.

167. Answer (4)

Aldosterone is secreted by adrenal cortex in response to low blood pressure and blood volume.

168. Answer (2)

DCT is not permeable to urea. Collecting duct allows passage of small amounts of urea into the medullary interstitium to keep up the osmolarity.

169. Answer (3)

Mucosa Associated Lymphoid Tissue (MALT) constitutes about 50% of the total lymphoid tissue in human body.

170. Answer (3)

Bone marked as 'X' is the sphenoid bone which forms the base of the cranium. It is not a facial bone.

171. Answer (1)

Number of metacarpals in one hindlimb of an adult man = 5

Number of lumbar vertebrae in an adult man = 5

Number of false ribs in an adult man = 3 pairs

172. Answer (1)

Inbreeding involves mating of more closely related individuals of same breed for 4-5 generations which give rise to homozygous purelines.

173. Answer (4)

Blind spot lacks rods and cones.

174. Answer (3)

Association areas are responsible for complex functions like intersensory associations, memory and communication.

175. Answer (2)

The separated bands of DNA are cut out from the agarose gel and extracted *via* process called elution.

The DNA fragments obtained and purified in this way are used for constructing rDNA.

176. Answer (1)

Seminal vesicles store the sperms and glue them together to form spermatophore.

177. Answer (4)

Anopheles, *Aedes*, *Apis* – Arthropoda

Sycon, *Spongilla* – Porifera

Canis – Mammalia

178. Answer (3)

Meloidogyne incognita infects roots of tobacco plants and causes great reduction in the yield. This can be prevented by RNAi.

179. Answer (2)

Human male ejaculates 200-300 million sperms per ejaculate under normal conditions.

180. Answer (1)

Animal	Chromosome number in meiocyte	Chromosome number in gamete
House fly	12	6
Fruit fly	8	4
Cat	38	19
Dog	78	39

181. Answer (4)

Vasectomy is a male sterilization method involving cutting and tying up a part of vas deferens. Tubectomy does not affect ovulation.

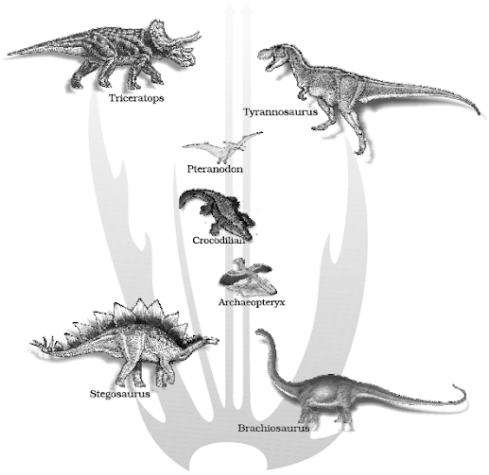
182. Answer (4)

Lippes loop is a non-medicated IUD that is inserted by doctors or expert nurses in the uterus through vagina.

183. Answer (3)

Fossils are abundantly found in sedimentary rocks.

184. Answer (2)



185. Answer (1)

Hilsa is an edible marine fish.

SECTION - B

186. Answer (4)

Lac Z gene codes for β–galactosidase which gives blue colour with chromogenic substrate X–gal. Insertional inactivation of this gene produces white coloured colonies.

187. Answer (1)

GIFT involves *in vivo* fertilisation.

188. Answer (2)

The thymus gland is a lobular structure located between lungs behind the sternum on the ventral side of aorta.

189. Answer (4)

After spermiogenesis, sperm heads become embedded in the Sertoli cells, and are finally released from the seminiferous tubules by the process called spermiation.

190. Answer (2)

Most of the cartilages in vertebrate embryos are replaced by bones in adults. The bone marrow in some bones is the site of production of blood cells.

191. Answer (1)

Myxine belongs to the class Cyclostomata and possesses closed type of circulation.

192. Answer (3)

RNA is the genetic material of viruses like HIV.

193. Answer (2)

Coleopterans include beetles while dipterans include mosquitoes.

194. Answer (1)

Diseases		Causative agent
Ascariasis	–	*Ascaris*
Filariasis	–	*Wuchereria*
Ringworm	–	*Trichophyton*
Pneumonia	–	*Haemophilus influenzae*

195. Answer (1)

The skull of baby chimpanzee is more like adult human skull than adult chimpanzee skull.

196. Answer (2)

It is estimated that more than 70 per cent of the world livestock population is in India and China. However, their contribution to the world farm produce is only 25 per cent.

197. Answer (3)

The approximate lifespans of parrot and tortoise are 140 years and 100 years respectively.

198. Answer (4)

The cerebral cortex contains motor areas, sensory areas and large regions that are neither clearly sensory nor motor in function.

These regions are called association areas are responsible for complex functions like intersensory associations, memory and communication.

199. Answer (4)

Fibrous joints are shown by the flat skull bones which fuse end to end with the help of dense fibrous connective tissues in the form of sutures to form the cranium.

200. Answer (3)

In the head region of cockroach the brain is represented by supra oesophageal ganglion which supplies nerves to antennae and compound eyes.

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