

# NEET (2024)

## PRACTICE TEST – 04

DURATION : 200 Minutes

M. MARKS : 720

### Topics covered

<b>Physics :</b>	Moving Charge Magnetism, Magnetism and Matters, and Electromagnetic Induction (up to Faraday and Lenz Laws)
<b>Chemistry :</b>	Alcohol, Phenol and Ether
<b>Biology :</b>	<b>(Botany):</b> Molecular Basis of Inheritance (The DNA, The Search for Genetic Material Part-1, The Search for Genetic Material Part-2, RNA World, Replication) <b>(Zoology):</b> Human Health and Diseases

### General Instructions:

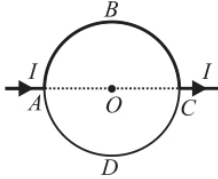
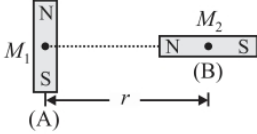
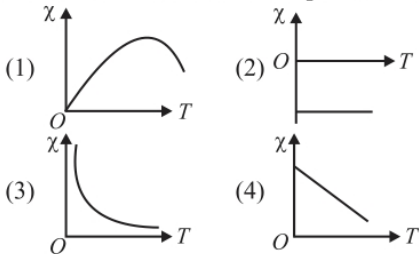
1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 min.** duration.
3. The test booklet consists of **200** questions. The maximum marks are **720**.
4. There are four Section in the Question Paper, Section I, II, III & IV consisting of Section-I (**Physics**), Section-II (**Chemistry**), Section-III (**Botany**) & Section IV (**Zoology**) and having **50 Questions** in each part in each part in which you have to attempt all the 35 questions from section A and 10 questions from section B.
5. There is only one correct response for each question.
6. Each correct answer will give 4 marks while 1 Mark will be deducted for a wrong MCQ response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

### OMR Instructions:

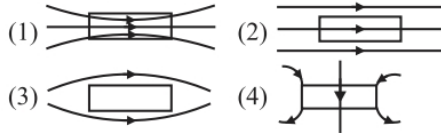
1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

## SECTION-I (PHYSICS)

### SECTION - A

1. An alpha particle moves with a velocity 4 m/s along  $x$ -axis in uniform magnetic field  $\vec{B} = 2\hat{j}$  tesla. The magnitude of force experienced by it at that instant will be  
 (1)  $2.56 \times 10^{-19}$  N (2)  $25.6 \times 10^{-19}$  N  
 (3)  $512 \times 10^{-19}$  N (4)  $0.512 \times 10^{-19}$  N
  
2. An electron is moving in a circular orbit of radius  $r$  with speed  $v$ . It produces a magnetic field  $B$  at its centre, then radius of circle is equal to  
 (1)  $\frac{\mu_0 ev}{4\pi B}$  (2)  $\frac{\mu_0 ev}{4\pi B^2}$   
 (3)  $\left(\frac{\mu_0 v}{4\pi B}\right)^2$  (4)  $\left(\frac{\mu_0 ev}{4\pi B}\right)^{1/2}$
  
3. In the figure shown, radius of cross-section of wire  $ABC$  is double that of  $ADC$  and both are made up of same material. Magnetic field at  $O$  is  
  
 (1) Normally into the paper  
 (2) Normally out of the paper  
 (3) Along  $OB$   
 (4) Zero
  
4. A wire of length 5 m is placed in uniform magnetic field of 2 mT. It makes  $30^\circ$  with the field. If 4 A current is flowing in the wire, then force per unit length on wire is  
 (1)  $1 \text{ mN m}^{-1}$  (2)  $2 \text{ mN m}^{-1}$   
 (3)  $5 \text{ mN m}^{-1}$  (4)  $4 \text{ mN m}^{-1}$
  
5. Two beams of electrons are moving parallel to each other then magnetic force acting between them is  
 (1) Attractive  
 (2) Zero  
 (3) Repulsive  
 (4) May be attractive or repulsive
  
6. A charged particle is released from rest in a region of uniform magnetic field. The path of the particle will be  
 (1) Straight line  
 (2) Circle  
 (3) Helix  
 (4) It will not experience any force
  
7. A cyclotron is operated at an oscillator frequency of 24 MHz and has a dee radius of 60 cm. To accelerate the deuterons, the magnitude of magnetic field needed is approximately  
 (1) 3.1 T (2) 4.2 T  
 (3) 1.2 T (4) 0.2 T
  
8. An electron accelerated through a potential difference  $V$  passes through a uniform transverse magnetic field and experiences a force  $F$ . If the accelerating potential is increased by  $3V$ , the electron in the same magnetic field will experience a force of  
 (1)  $F$  (2)  $3F$   
 (3)  $2F$  (4)  $\sqrt{3}F$
  
9. Point  $A$  and  $B$  are situated perpendicular to the axis of a small bar magnet at large distance  $x$  and  $3x$  from its centre on opposite sides. The ratio of the magnetic fields at  $A$  and  $B$  will be approximately equal to  
 (1) 2 : 9 (2) 1 : 9  
 (3) 27 : 1 (4) 9 : 1
  
10. Two short bar magnets  $A$  and  $B$  of dipole moment  $M_1$  and  $M_2$  respectively are arranged as shown in figure. The magnitude of torque on the bar magnet  $A$  due to the bar magnet  $B$  is  
  
 (1)  $\frac{\mu_0}{4\pi} \cdot \frac{3M_1M_2}{r^3}$  (2)  $\frac{\mu_0}{4\pi} \cdot \frac{6M_1M_2}{r^4}$   
 (3)  $\frac{\mu_0}{2\pi} \cdot \frac{M_1M_2}{r^3}$  (4) Zero
  
11. For a diamagnetic substance (symbols have their usual meanings)  
 (1)  $\chi_m > 0, \mu_r > 1$  (2)  $\chi_m < 0, \mu_r > 1$   
 (3)  $\chi_m < 0, \mu_r < 1$  (4)  $\chi_m > 0, \mu_r < 1$
  
12. The graph which correctly represents variation of magnetic susceptibility of a diamagnetic substance as a function of absolute temperature is  


13. A superconductor slab is placed in a magnetic field. The correct representation of magnetic field lines in space is



14. The magnetic flux linked with a coil is given by  $\phi(\text{Wb}) = 3t^2 + 4t + 8$ , (where  $t$  is in s) then magnitude of the induced emf in the coil at  $t = 2$  s will be

- (1) 4 V (2) 2 V  
(3) 8 V (4) 16 V

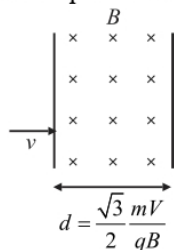
15. A deuteron and an  $\alpha$ -particle with same momentum enter perpendicular to uniform magnetic field. Then ratio of radii of their respective circular paths is

- (1)  $\sqrt{2} : 1$  (2) 2 : 1  
(3) 1 : 2 (4) 1 : 1

16. Two charged particles having same linear momentum describe circular paths of radius  $R_1$  and  $R_2$  respectively in uniform transverse magnetic field. If the ratio of their respective charges is 1 : 3, then the ratio of  $R_1$  and  $R_2$  will be

- (1) 1 : 3 (2) 3 : 1  
(3) 1 : 9 (4) 9 : 1

17. A particle having charge  $q$  and mass  $m$ , enters a uniform magnetic field  $B$  as shown. The displacement of the particle in the field is



- (1)  $\frac{mv}{2qB}$  (2)  $\frac{mv}{qB}$   
(3)  $\frac{\sqrt{3}mv}{2qB}$  (4)  $\frac{2mv}{\sqrt{3}qB}$

18. The Curie's law is given as (symbols have their usual meanings)

- (1)  $\mu_r = 1 - \chi$  (2)  $H = \frac{cB_0}{T^2}$   
(3)  $\chi = \frac{c\mu_0}{T}$  (4)  $\chi = \frac{c\mu_0}{T^2}$

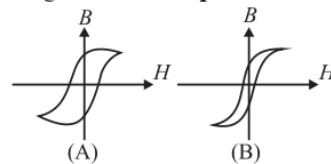
19. Time period of a vibration magnetometer is  $T_0$ . Its magnet is replaced by another magnet whose moment of inertia is two times and magnetic moment is half of the initial magnet. The new time period of vibration magnetometer will be

- (1)  $T_0$  (2)  $\sqrt{2}T_0$   
(3)  $\frac{3}{2}T_0$  (4)  $2T_0$

20. Meissner effect is related to

- (1) Paramagnetic substance  
(2) Superconductors  
(3) Antiferromagnetic substance  
(4) Ferromagnetic substance

21. Hysteresis loops for two magnetic materials (A) and (B) are shown in the figure. These materials are to be used to make cores for transformer and electromagnet, then it is prefer to use material



- (1) (A) for both transformer and electromagnet  
(2) (B) for both electromagnet and transformer  
(3) (A) for electromagnet and (B) for transformer  
(4) (A) for transformer and (B) for electromagnet

22. The magnetic susceptibility of a substance at room temperature is  $-0.0002$ . The susceptibility when the temperature is increased by  $2^\circ\text{C}$ , will be

- (1)  $-0.0001$   
(2)  $0.0002$   
(3)  $-0.0002$   
(4)  $0.0005$

23. A dip circle is oriented with its plane at an angle of  $30^\circ$  with the magnetic meridian at a place. The apparent angle of dip shown by the dip circle is  $45^\circ$ . The true angle of dip at the place will be

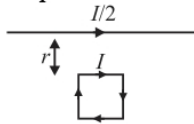
- (1)  $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$  (2)  $\tan^{-1}(2)$   
(3)  $\tan^{-1}(4)$  (4)  $\tan^{-1}(1/2)$

24. A magnet of magnetic moment  $M$  oscillating freely in earth's horizontal magnetic field makes  $n$  oscillations per minute. If the magnetic moment is doubled and the earth's horizontal field is also doubled, then number of oscillations made per minute would be

- (1)  $2n$  (2)  $\frac{n}{\sqrt{2}}$   
(3)  $4\sqrt{2}n$  (4)  $2\sqrt{2}n$

25. The ultimate individual unit of magnetism in any magnet is called
- (1) North pole
  - (2) South pole
  - (3) Magnetic dipole
  - (4) Quadrupole

26. A square loop, carrying a steady current  $I$ , is placed in a horizontal plane near to a long straight conductor carrying a steady current  $I/2$  at a distance  $r$  from the conductor as shown in figure. The loop will experience



- (1) A net attractive force towards the conductor
- (2) A net repulsive force towards the conductor
- (3) A net torque acting upwards perpendicular to the horizontal plane
- (4) A net torque acting downward perpendicular to the horizontal plane

27. An electron is moving in a circular orbit of radius  $r$  makes  $N$  rotations per second. The magnetic field produced at the centre has a magnitude

- (1)  $\frac{\mu_0 Ne}{2r}$
- (2)  $\frac{\mu_0 N^2 e}{2r}$
- (3)  $\frac{\mu_0 Ne}{2\pi r}$
- (4) Zero

28. A charged particle of mass  $m$  and charge  $q$  travels on a circular path of radius  $r$  in a uniform perpendicular magnetic field  $B$ . The time taken by the particle to complete half revolution is

- (1)  $2\pi m/qB$
- (2)  $\pi m/qB$
- (3)  $q\pi/mB$
- (4)  $2\pi q/mB$

29. **Statement-A** : When a charge particle of charge ' $q$ ' moves with a velocity  $v$  in magnetic field of induction  $\vec{B}$  then force acting on it  $\vec{F} = q(\vec{v} \times \vec{B})$

**Statement-B**: An electron is projected in a magnetic field along the lines of force then their will be no effect on the motion of electron.

- (1) A is true B is false
- (2) A is false B is true
- (3) Both A and B are false
- (4) Both A and B are true

30. A current carrying loop of radius  $r$  carries a current  $I$  in clock wise direction. It is placed in a uniform

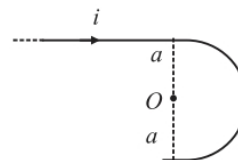
magnetic field  $B$  such that plane of the coil is parallel to field. The net torque on the coil is

- (1)  $\pi r^2 IB$
- (2)  $2\pi r^2 IB$
- (3)  $2\pi r IB$
- (4) Zero

31. An electron and a proton enter a magnetic field perpendicularly. Both have the same kinetic energy. Which of the following is true?

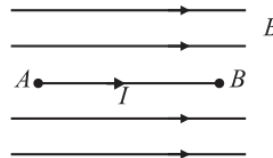
- (1) Trajectory of proton is less curved
- (2) Trajectory of electron is less curved
- (3) Both trajectories are equally curved
- (4) Both move on a straight line path

32. Magnetic field at point  $O$  due to the given structure is



- (1)  $\frac{\mu_0}{4a} \left( \frac{1}{\pi} + 1 \right) (-\hat{k})$
- (2)  $\frac{\mu_0 i}{2a} (-\hat{k})$
- (3)  $\frac{\mu_0 i}{2a} (\pi + 1) \hat{k}$
- (4)  $\frac{\mu_0 i}{4a} (\pi + 1) (-\hat{k})$

33. The magnetic force on a current carrying wire of length  $l$  placed in a magnetic field as shown in the figure is



- (1)  $Bil$
- (2)  $Bil^2$
- (3)  $Bil^2/2$
- (4) Zero

34. A straight wire of mass 100 g and length 50 cm carries a current of 1 A. It is suspended in mid-air by uniform horizontal magnetic field  $B$ . The magnetic field  $B$  (in tesla) is

- (1) 1 T
- (2) 0.5 T
- (3) 2 T
- (4) 3 T

35. In a toroid, the number of turns in per metre length is 500 and current through it is  $\frac{1}{2\pi}$  A. The magnetic field produced inside (in weber/m<sup>2</sup>) will be

- (1)  $10^2$
- (2)  $10^{-4}$
- (3)  $2 \times 10^{-2}$
- (4)  $5 \times 10^{-3}$

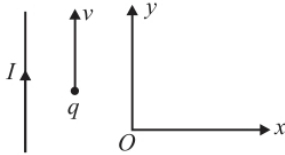


**SECTION - B**

36. The radius of a circular current carrying coil is  $R$ . At what distance from the centre of the coil on its axis the intensity of magnetic field will be  $\frac{1}{3\sqrt{3}}$  times to that at centre?

- (1)  $R$  (2)  $\frac{R}{\sqrt{2}}$   
 (3)  $\sqrt{2} R$  (4)  $2 R$

37. A negative charge ' $q$ ' moves parallel to a very long straight wire carrying  $I$  current as shown in figure. The direction of force on the charge is

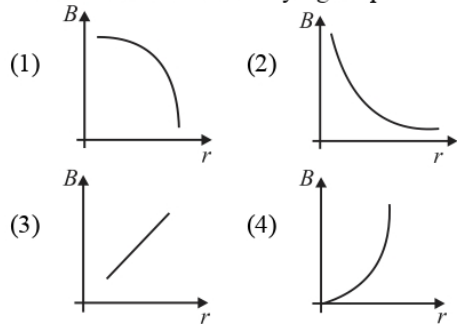


- (1) Opposite to  $OX$  (2) Along  $OX$   
 (3) Opposite to  $OY$  (4) Along  $OY$

38. An electron accelerated through a potential difference ' $V$ ' passes through a uniform transverse magnetic field experience a force  $F$ . If the accelerating potential increase to  $2 V$ , the electron in the same magnetic field will experience a force

- (1)  $F$  (2)  $\sqrt{2} F$   
 (3)  $2F$  (4)  $\frac{F}{\sqrt{2}}$

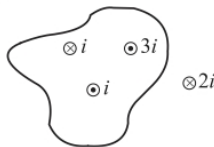
39. Which of the following graphs, shows the variation of magnetic induction  $B$  (at the centre) with radius of current carrying loop.



40. A positively charged particle enters in a uniform magnetic field with uniform velocity  $v$ . If angle between velocity and magnetic field is  $180^\circ$ , the trajectory will be

- (1) Straight line (2) Circular  
 (3) Helical (4) Elliptical

41. The value of  $\oint \vec{B} \cdot d\vec{\ell}$  for the loop as shown in the figure will be



- (1)  $2\mu_0 i$  (2)  $3\mu_0 i$   
 (3)  $\mu_0 i$  (4)  $5\mu_0 i$

42. A charged particle of charge  $q$  and mass  $m$  enters perpendicularly in a magnetic field  $B$ . Kinetic energy of particle is  $E$ , then time period of rotation is

- (1)  $\frac{\pi m}{qB}$  (2)  $\frac{2\pi m}{qB}$   
 (3)  $\frac{2\pi m}{qBE}$  (4)  $\frac{2\pi E}{qB}$

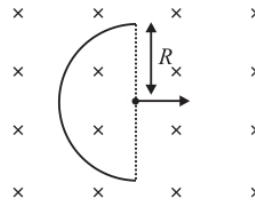
43. The magnetic force acting on a charged particle of charge  $-4\mu\text{C}$  moving with velocity  $(\hat{i} + 2\hat{j}) \times 10^6 \text{ m/s}$  in a magnetic field of  $3T$  acting in  $x$ -direction, is

- (1)  $9 \text{ N}$  in  $z$ -direction  
 (2)  $24 \text{ N}$  in  $z$ -direction  
 (3)  $9 \text{ N}$  in  $y$ -direction  
 (4)  $24 \text{ N}$  in  $y$ -direction

44. A charged particle is accelerated through potential  $V_0$  is subjected to a crossed electric field ( $E$ ) and magnetic field ( $B$ ). The field are adjusted such that the charged particle is not deflected. The specific charge of particle is given by

- (1)  $\frac{E^2}{2B^2V_0}$  (2)  $\frac{B^2}{2V_0E^2}$   
 (3)  $\frac{2V_0B^2}{E^2}$  (4)  $\frac{2V_0E^2}{B^2}$

45. The magnetic force on a current carrying semicircular loop moving in a transverse magnetic field as shown in the figure will be

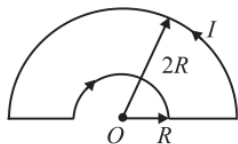


- (1)  $BIR$  (2)  $2 BIR$   
 (3)  $4 BIR$  (4)  $\frac{BIR}{2}$

46. A long straight wire of radius  $a$  carries a steady current  $I$ . The current is uniformly distributed over its cross-section. The magnetic field at a distance  $\frac{2a}{3}$  from its centre is

- (1)  $\frac{\mu_0 I}{2\pi a}$  (2)  $\frac{\mu_0 I}{\pi a}$   
 (3)  $\frac{\mu_0 I}{3\pi a}$  (4)  $\frac{2\mu_0 I}{\pi a}$

47. The figure below shows a current loop having two semi-circular arc joined by two radial lines. The magnetic field at  $O$  is



- (1)  $\frac{\mu_0 I}{2R}$                       (2)  $\frac{\mu_0 I}{4R}$   
 (3)  $\frac{\mu_0 I}{8R}$                       (4)  $\frac{\mu_0 I}{R}$
48. The path of a charged particle entering in a uniform magnetic field making an angle  $60^\circ$  with the field is  
 (1) Circular                      (2) Straight  
 (3) Elliptical                      (4) Helical

49. A ring of radius  $R$  and mass  $M$  has charge  $q$  uniformly distributed on it. It rotate with angular velocity  $\omega$ . The magnetic moment of the ring will be

- (1)  $\frac{q\omega R^2}{2}$                       (2)  $q\omega R^2$   
 (3)  $\frac{q\omega R^2}{4}$                       (4)  $\frac{q\omega R^2}{3}$

50. A charged particle moves in a gravity free space without change in velocity. Which of the following is not possible in that space?

- (1)  $E = 0, B = 0$                       (2)  $E \neq 0, B = 0$   
 (3)  $E = 0, B \neq 0$                       (4)  $E \neq 0, B \neq 0$

## SECTION-II (CHEMISTRY)

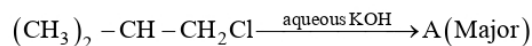
### SECTION - A

51. Cyclohexanol is a:  
 (1) Primary alcohol    (2) Secondary alcohol  
 (3) Tertiary alcohol    (4) Aromatic alcohol
52. Which of the following alcohols gives a red colour in Victor-Meyer test:  
 (1)  $\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—OH}$   
 (2)  $\begin{array}{c} \text{CH}_3\text{—CH—OH} \\ | \\ \text{CH}_3 \end{array}$   
 (3)  $(\text{CH}_3)_3\text{C—OH}$   
 (4)  $\begin{array}{c} \text{CH}_3\text{—CH—CH}_2\text{—CH}_3 \\ | \\ \text{OH} \end{array}$
53. For the reaction,  $\text{C}_2\text{H}_5\text{OH} + \text{HX} \rightarrow \text{C}_2\text{H}_5\text{X} + \text{H}_2\text{O}$  the order of reactivity is:  
 (1)  $\text{HI} > \text{HCl} > \text{HBr}$   
 (2)  $\text{HI} > \text{HBr} > \text{HCl}$   
 (3)  $\text{HCl} > \text{HBr} > \text{HI}$   
 (4)  $\text{HBr} > \text{HI} > \text{HCl}$
54. If two  $-\text{OH}$  groups are attached to 1,3-carbon atoms, it is called:  
 (1)  $\alpha$ -glycol                      (2)  $\beta$ -glycol  
 (3)  $\gamma$ -glycol                      (4)  $\Delta$ -glycol
55.  $\text{CH}_2 = \text{CH}_2 \xrightarrow[\text{Ag}]{\text{O}_2} \text{X} \xrightarrow[473\text{K}]{\text{Steam}} \text{Y}$   
 The compound Y is:  
 (1) Ethylene glycol  
 (2) Epoxyethane  
 (3) Ethanal  
 (4) Ethanol
56. Butan-2-ol is a:  
 (1) Primary alcohol  
 (2) Secondary alcohol  
 (3) Tertiary alcohol  
 (4) Dihydric alcohol

57. Which one of the following is a secondary alcohol?

- (1) 2-Methyl-1-propanol  
 (2) 2-Methyl-2-propanol  
 (3) 2-Butanol  
 (4) 1-Butanol

58. In the reaction-



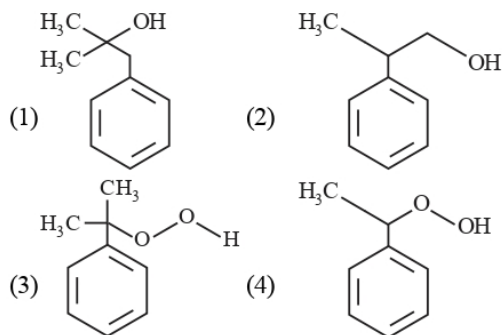
A will be:

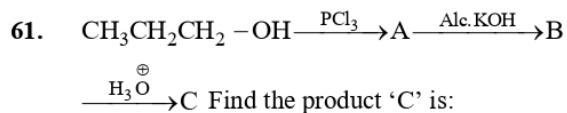
- (1)  $(\text{CH}_3)_2\text{—CH—CH}_2\text{OH}$   
 (2)  $(\text{CH}_3)_3\text{—C—OH}$   
 (3)  $\text{CH}_3\text{—CH(OH)—CH}_2\text{CH}_3$   
 (4)  $(\text{CH}_3)_2\text{—C=CH}_2$

59. Isobutyl alcohol is a:

- (1) Primary alcohol  
 (2) Secondary alcohol  
 (3) Tertiary alcohol  
 (4) None of these

60. Which of the following is known as cumene hydroperoxide?





- (1)  $\text{CH}_3\text{CH}=\text{CH}_2$  (2)  $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ | \\ \text{OH} \end{array}$   
 (3)  $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ | \\ \text{Cl} \end{array}$  (4)  $\text{CH}_3\text{CH}_2\text{CH}_2-\text{Cl}$

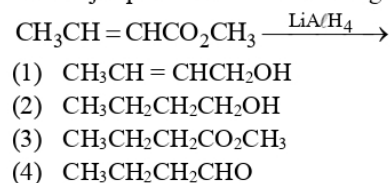
62. Which of the following 'gem' diols is stable?

- (1)  $\begin{array}{c} \text{OH} \\ | \\ \text{CH}_3-\text{C}-\text{H} \\ | \\ \text{OH} \end{array}$  (2)  $\begin{array}{c} \text{OH} \\ | \\ \text{CBr}_3-\text{C}-\text{H} \\ | \\ \text{OH} \end{array}$   
 (3)  $\begin{array}{c} \text{OH} \\ | \\ \text{CF}_3-\text{C}-\text{H} \\ | \\ \text{OH} \end{array}$  (4)  $\begin{array}{c} \text{OH} \\ | \\ \text{C}_6\text{H}_5-\text{C}-\text{C}_6\text{H}_5 \\ | \\ \text{OH} \end{array}$

63. What reagent(s) can be used to convert 2-methyl pentanol into 2-methyl pentanal?

- (1)  $\text{Na}_2\text{Cr}_2\text{O}_7$  (2)  $\text{LiAlH}_4$   
 (3)  $\text{CrO}_3, \text{py}$  (4)  $\text{KMnO}_4$

64. The major product of the following reaction is:



65. Boiling point of alcohol is comparatively higher than that of corresponding alkane due to:

- (1) Intermolecular hydrogen bonding  
 (2) Intramolecular hydrogen bonding  
 (3) Volatile nature  
 (4) None of these

66. **Assertion:** p-nitrophenol is more acidic than phenol.

**Reason:** Nitro group helps in the stabilisation of the phenoxide ion by dispersal of negative charge due to resonance.

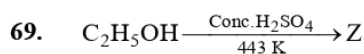
- (A) Assertion and reason both are correct and reason is correct explanation of assertion.  
 (B) Both assertion and reason are correct statements but reason is not correct explanation of assertion.  
 (C) Assertion is correct statement but reason is wrong statement.  
 (D) Assertion is wrong statement but reason is correct statement.

67. Conversion of ethyl alcohol into acetaldehyde is an example of:

- (1) hydrolysis  
 (2) oxidation  
 (3) reduction  
 (4) molecular rearrangement

68. Which of the following compounds give most stable carbocation (intermediate) on dehydration?

- (1)  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3-\text{C}-\text{OH} \\ | \\ \text{CH}_3 \end{array}$  (2)  $\begin{array}{c} \text{CH}_3\text{CHCH}_2\text{CH}_2\text{OH} \\ | \\ \text{CH}_3 \end{array}$   
 (3)  $\begin{array}{c} \text{CH}_3\text{CHCH}_2\text{CH}_3 \\ | \\ \text{OH} \end{array}$  (4)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$



In the above reaction Z is identified as:

- (1)  $\text{C}_2\text{H}_5-\text{O}-\text{C}_2\text{H}_5$  (2)  $\text{C}_2\text{H}_5\text{CHO}$   
 (3)  $\text{CH}_2=\text{CH}_2$  (4)  $\text{C}_2\text{H}_5\text{SO}_3\text{H}$

70. Glycerol is a:

- (1) Primary alcohol  
 (2) Monohydric alcohol  
 (3) Secondary alcohol  
 (4) Trihydric alcohol

71. Which one of the following reactions is not true when heated with copper at  $300^\circ\text{C}$ ?

- (1) secondary alcohol  $\rightarrow$  ketone  
 (2) tertiary alcohol  $\rightarrow$  olefin  
 (3) phenol  $\rightarrow$  benzyl alcohol  
 (4) primary alcohol  $\rightarrow$  aldehyde

72. Which one is a primary alcoholic group?

- (1)  $-\text{CH}_2\text{OH}$  (2)  $\begin{array}{c} > \text{CH}-\text{OH} \end{array}$   
 (3)  $\begin{array}{c} > \text{C}-\text{OH} \end{array}$  (4)  $\begin{array}{c} > \text{C}-\text{C} < \\ | \quad | \\ \text{OH} \quad \text{OH} \end{array}$

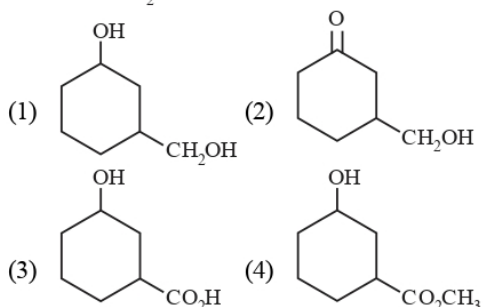
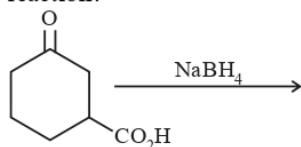
73. The reaction of Grignard reagent with formaldehyde followed by acidification gives:

- (1) An aldehyde  
 (2) A ketone  
 (3) A carboxylic acid  
 (4) A primary alcohol

74. Alcohols given below follow which of the following mechanism with conc.  $\text{HCl}/\text{anhydrous ZnCl}_2$ :

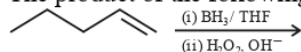
- (i)  $\text{CH}_3\text{OH}$   
 (ii)  $\text{CH}_3\text{CH}_2\text{OH}$   
 (iii)  $\begin{array}{c} \text{CH}_3\text{CHCH}_3 \\ | \\ \text{OH} \end{array}$   
 (1)  $\text{S}_{\text{N}}1, \text{S}_{\text{N}}2, \text{S}_{\text{N}}2$  (2)  $\text{S}_{\text{N}}2, \text{S}_{\text{N}}2, \text{S}_{\text{N}}1$   
 (3)  $\text{S}_{\text{N}}2, \text{S}_{\text{N}}1, \text{S}_{\text{N}}1$  (4)  $\text{S}_{\text{N}}1, \text{S}_{\text{N}}1, \text{S}_{\text{N}}2$

75. What is the major product of the following reaction?



76.  $\text{LiAlH}_4$  is a:
- (1) Acid (2) Base  
(3) Reducing Agent (4) Oxidising Agent
77. Ortho-dihydroxy benzene is:
- (1) Carvacrol (2) Resorcinol  
(3) Catechol (4) Orcinol
78. The general molecular formula, which represent the homologous series of alkanol is:
- (1)  $\text{C}_n\text{H}_{2n}\text{O}$  (2)  $\text{C}_n\text{H}_{2n+1}\text{O}$   
(3)  $\text{C}_n\text{H}_{2n+2}\text{O}$  (4)  $\text{C}_n\text{H}_{2n}\text{O}_2$
79. Primary, secondary and tertiary-alcohols can be distinguished by:
- (1) Reimer-Tiemann reaction  
(2) Tollens' reagent  
(3) Lucas test  
(4) Lassaigne's test
80. Oxidation of alcohol to aldehyde can be done by:
- (1) Treatment with  $\text{LiAlH}_4$   
(2) Treatment with  $\text{NaBH}_4$   
(3) Treatment with  $\text{LiBH}_4$   
(4) Treatment with PCC

81. The product of the following reaction is:



- (1) 2-pentanol (2) pentane  
(3) pentan-2-one (4) 1-pentanol

82. **Assertion:** The bond angle in alcohols is slightly less than the tetrahedral angle.

**Reason:** In alcohols, the oxygen of  $-\text{OH}$  group is attached to  $\text{sp}^3$  hybridized carbon atom.

- (1) Both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.  
(2) Both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

- (3) The Assertion is correct but Reason is incorrect.  
(4) Both the Assertion and Reason are incorrect.

83. What is the IUPAC name of m-cresol?

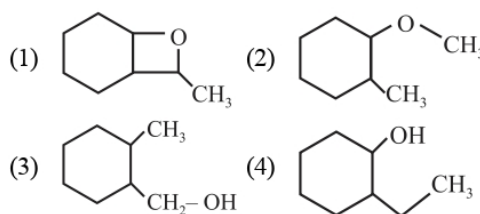
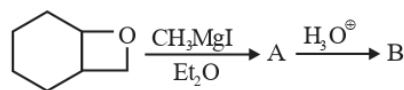
- (1) Benzene-1,3-diol  
(2) 3-methylphenol  
(3) 3-chlorophenol  
(4) 3-methoxyphenol

84. Match the following named reactions of column 1 with appropriate functional group in column 2 and choose the correct answer:

	Column -1		Column -2
A	Dow reaction	a	Alcohol
B	Williamson synthesis	b	Ether
C	Pinacol pinacolone rearrangement	c	Phenol

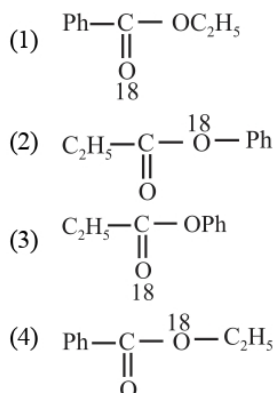
- (1) A- c, B-b, C-a  
(2) A- b, B-a, C-c  
(3) A- a, B-b, C-c  
(4) A- c, B-a, C-b

85. What is the major product (B) of the following reaction:



### SECTION - B

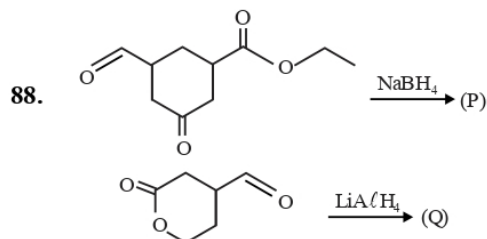
86.  $\text{Ph}-\text{COOH} + \text{C}_2\text{H}_5\text{OH} \xrightarrow[\text{Conc. H}_2\text{SO}_4]{18}$  major product will be:





87. Which alcohol produces turbidity with Lucas reagent most slowly?

- (1) 2-butanol (2) t-butyl alcohol  
(3) Isobutyl alcohol (4) Benzyl alcohol



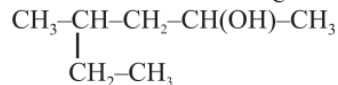
Sum of Total number of alcohol formed in product P and Q is

- (1) 1 (2) 2  
(3) 3 (4) 5

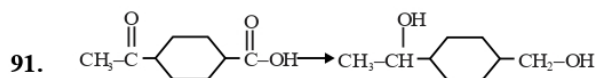
89. An isomer of ethanol is:

- (1) Methanol (2) Dimethyl ether  
(3) Acetone (4) Diethyl ether

90. The IUPAC name of the given compound is:



- (1) 2-ethylpentan-4-ol  
(2) 4-ethylpentan-2-ol  
(3) 4-methylhexan-2-ol  
(4) 4-methylpentan-2-ol



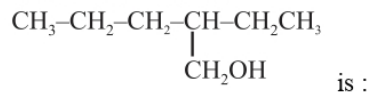
Above conversion can be done by:

- (1)  $\text{NaBH}_4$  (2)  $\text{LiAlH}_4$   
(3) PCC (4)  $\text{KMnO}_4$

92. Which of the following does not turn orange colour of chromic acid to green:

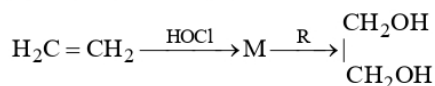
- (1) 1° alcohol  
(2) 2° alcohol  
(3) 3° alcohol  
(4) Allyl alcohol

93. The IUPAC name of



- (1) 3-Propyl butan-1-ol  
(2) 2-Ethylpentan-1-ol  
(3) 3-Methyl hydroxyhexane  
(4) 2-Ethyl-2-propyl ethanol

94. In reaction sequence,



molecule M and reagent R, respectively are :

- (1)  $\text{CH}_3\text{CH}_2\text{Cl}$  and  $\text{NaOH}$   
(2)  $\text{CH}_3\text{CH}_2\text{OH}$  and  $\text{H}_2\text{SO}_4$   
(3)  $\text{CH}_2\text{Cl}-\text{CH}_2\text{OH}$  and aq.  $\text{NaHCO}_3$   
(4)  $\text{CH}_3-\text{CH}_3$  and heat

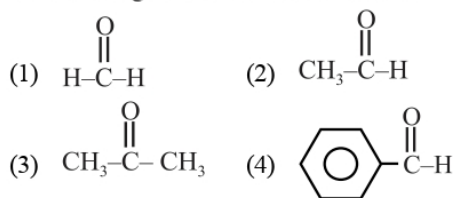
95. Which of the following compounds shows intramolecular hydrogen bonding:

- (1) p-Nitrophenol  
(2) Ethanol  
(3) o-Nitrophenol  
(4) Methanamine

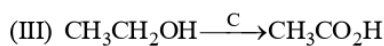
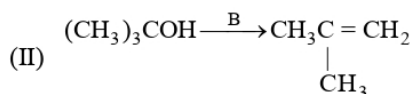
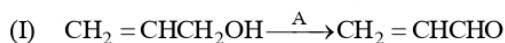
96. Which one of the following will produce a primary alcohol by reacting with  $\text{CH}_3\text{MgI}$  :

- (1) Acetone  
(2) Methyl cyanide  
(3) Ethylene oxide  
(4) Ethyl acetate

97. Which of the following compound when reacts with  $\text{CH}_3\text{MgBr}$  formation of 3° alcohol:



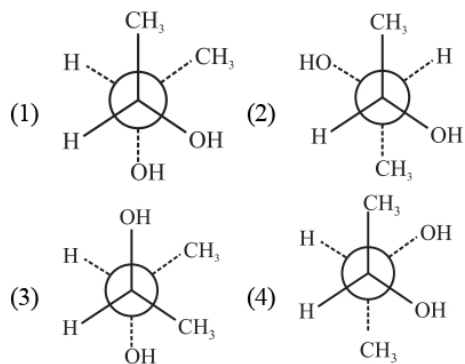
98. Consider oxidation of following alcohols:



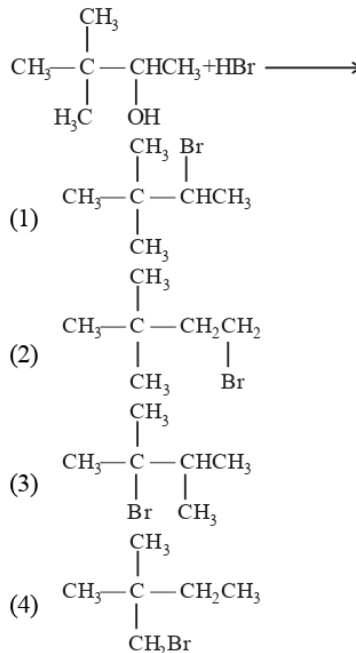
A, B, C, D are oxidizing agents which are respectively:

	A	B	C	D
(1)	$\text{MnO}_2$	$\text{Cu}/\Delta$	$\text{H}_2\text{CrO}_4$	$\text{KMnO}_4/\Delta$
(2)	$\text{Cu}/\Delta$	$\text{MnO}_2$	$\text{H}_2\text{CrO}_4$	$\text{KMnO}_4/\Delta$
(3)	$\text{MnO}_2$	$\text{Cu}/\Delta$	$\text{KMnO}_4/\Delta$	$\text{H}_2\text{CrO}_4$
(4)	$\text{MnO}_2$	$\text{H}_2\text{CrO}_4$	$\text{Cu}/\Delta$	$\text{KMnO}_4$

99. Which of the following is most stable conformation?



100. What is the major product of the following reaction?



### SECTION-III (BOTANY)

#### SECTION - A

101. Find out the **correct** options-

1. Uracil is purine.
2. 5-methyl uracil is thymine.
3. Histone octamer does not have H1 histones.
4. DNA is genetic material in bacteria and human cell.

- (1) 1, 2, 3 correct
- (2) 1, 2 correct
- (3) 2, 3 and 4 correct
- (4) 1, 3 correct

102. DNA as an acidic substance present in nucleus was first identified by.....

- (1) Chargaff
- (2) Friedrich Miescher
- (3) Crick
- (4) Watson

103. Which generates approximately uniform distance between the two strands of the helix?

- (1) Purine base pair with purine.
- (2) Always a purine comes opposite to a pyrimidine.
- (3) Always a pyrimidine comes opposite to a pyrimidine.
- (4) Always an adenine comes opposite to a guanine.

104. Mark the **incorrect** for core molecule of nucleosome

- (1) Consists of lysine and arginine rich histones.
- (2) Contains 146 bp of DNA helix.
- (3) Needs histone proteins for high degree packaging.
- (4) Negatively charged DNA is wrapped around the positively charged histone octamer.

105. In a nucleotide, a phosphate group is linked to OH of 5' C of a nucleoside through \_\_\_\_\_ linkage.

- (1) Phosphoester
- (2) Phosphodiester
- (3) Phosphoanhydride
- (4) Anhydride

106. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?

- (1) 20%
- (2) 40%
- (3) 30%
- (4) 60%

107. Type of linkage present in a polynucleotide chain is

- (1) 3' - 5' phosphodiester linkage
- (2) 5' - 3' phosphodiester linkage
- (3) Both (1) and (2)
- (4) Hydrogen bond

108. In DNA nitrogen bases are joined to each other by

- (1) H-bonds
- (2) Peptide bonds
- (3) Glycosidic bonds
- (4) Phosphodiester bonds

- 109.** Mark the **incorrect** statement.
- (1) DNA is chemically less reactive than RNA
  - (2) DNA is structurally more stable than RNA
  - (3) DNA is not catalytically active
  - (4) RNA is catalytically inactive
- 110.** DNA-dependent DNA polymerases catalyses polymerization in which direction?
- (1) 3'–5'                      (2) 5'–2'
  - (3) 5'–3'                      (4) 2'–5'
- 111.** Okazaki fragments of the lagging strand is joined together by the enzyme:
- (1) Primase                      (2) DNA ligase
  - (3) Topoisomerase              (4) Polymerase
- 112.** Okazaki segments are formed on..... strand of DNA.
- (1) Template strand              (2) Lagging strand
  - (3) Leading strand              (4) Coding strand
- 113.** NHCs protein involve in ..... process.
- (1) Higher level packaging in prokaryotes.
  - (2) Lower level packaging.
  - (3) Higher level packaging in eukaryotes.
  - (4) Formation of octamer.
- 114.** Mark the **incorrect** statement.
- (1) The discontinuously synthesised fragments are later joined by enzyme DNA ligase.
  - (2) The DNA-dependent DNA polymerases catalyse polymerisation only in one direction i.e. 3' → 5'
  - (3) The DNA polymerases on their own can't be initiate the process of replication.
  - (4) Both (2) and (3)
- 115.** In ..... Chargaff's rule is **not** applicable.
- (1) tRNA
  - (2) rRNA
  - (3) mRNA
  - (4) all
- 116.** Double helix model of DNA proposed by Watson and Crick has how many base pairs in one turn?
- (1) One base pair
  - (2) Two base pairs
  - (3) Five base pairs
  - (4) Ten base pairs
- 117.** In DNA helix, cytosine is paired with guanine by
- (1) Covalent bond
  - (2) Phosphate bond
  - (3) Three hydrogen bonds
  - (4) Two hydrogen bonds
- 118.** On which strand of DNA, replication is continuous?
- (1) 5' → 3' polarity strand
  - (2) 3' → 5' polarity strand
  - (3) 3' → 2' polarity strand
  - (4) 3' → 4' polarity strand
- 119.** Which of the following is **not** true for DNA polymerase?
- (1) Use template DNA
  - (2) Substrate is dNTPs
  - (3) Product is polynucleotide chain
  - (4) Can add nucleotide at 5' end
- 120.** RNA is the genetic material in
- (1) Prokaryotes
  - (2) Eukaryotes
  - (3) Tobacco Mosaic Virus (TMV)
  - (4) *E. coli*
- 121.** Distance between two consecutive nucleotides of one polynucleotide chain in DNA is–
- (1) 2 nm                              (2) 0.34 nm
  - (3) 3.4 nm                          (4) 24 nm
- 122.** Which of the following is **not** nucleoside?
- (1) DNA
  - (2) Thymidine
  - (3) Adenosine
  - (4) Uridine
- 123.** Which of the following phenomena was experimentally proved by Meselson and Stahl?
- (1) Transformation
  - (2) Transduction
  - (3) Semi-conservative DNA replication
  - (4) Central dogma
- 124.** If the sequence of bases in one strand of DNA is ATGCATGCA, what would be the sequence of bases on complementary strand?
- (1) ATGCATGCA              (2) AUGCAUGCA
  - (3) TACGTACGT              (4) UACGUACGU
- 125.** In Meselson and Stahl's experiments, heavy DNA was distinguished from normal DNA by centrifugation in
- (1) CsOH gradient              (2) <sup>14</sup>NH<sub>4</sub>Cl
  - (3) <sup>15</sup>NH<sub>4</sub>Cl                      (4) CsCl gradient
- 126.** In some viruses, RNA is present instead of DNA indicating that
- (1) Their nucleic acid must combine with host DNA before replication.
  - (2) They cannot replicate.
  - (3) There is no hereditary information.
  - (4) RNA can act to transfer heredity.

- 127.** Purines found both in DNA and RNA are
- (1) Adenine and guanine
  - (2) Guanine and cytosine
  - (3) Cytosine and thymine
  - (4) Adenine and thymine
- 128.** Which scientists experimentally proved that DNA is the sole genetic material in bacteriophage?
- (1) Beadle and Tatum
  - (2) Meselson and Stahl
  - (3) Hershey and Chase
  - (4) Jacob and Monod
- 129.** Consider Griffith's experiments on transformation in *Streptococcus pneumoniae*. Now imagine that you are extending these experiments by injecting a mixture of heat-killed strain R bacteria and live strain S bacteria into a mouse. The result will be that the mouse will \_\_\_\_\_, and you will find live strain \_\_\_\_\_ bacteria in its blood.
- (1) die; R
  - (2) live; R
  - (3) die; S
  - (4) live; S
- 130.** Experiments by Avery, McLeod, and McCarty supported DNA as the genetic material by showing that
- (1) both protein and DNA samples provided the transforming factor.
  - (2) DNA was not complex enough to be the genetic material.
  - (3) only samples with DNA provided activity.
  - (4) even though DNA was molecularly simple, it provided adequate variation to act as the genetic material.
- 131.** The primary function of DNA polymerase is to
- (1) add nucleotides to the growing daughter strand.
  - (2) seal nicks along the sugar-phosphate backbone of the daughter strand.
  - (3) unwind the parent DNA double helix.
  - (4) prevent reassociation of the denatured parent DNA strands.
- 132.** The lagging daughter strand of DNA is synthesized in what appears to be the "wrong" direction. This synthesis is accomplished by
- (1) ligating (connecting) short Okazaki fragments that are synthesized in short spurts in the "right" direction.
  - (2) primase.
  - (3) using multiple primers and RNA polymerase I.
  - (4) Both (1) and (2)
- 133.** RNA primers are necessary in DNA synthesis because
- (1) DNA polymerase can only add to an existing strand of nucleotides.
  - (2) DNA polymerase can not only add to an existing DNA strand.
  - (3) DNA primase is the first enzyme in the replication complex.
  - (4) All of the above
- 134.** Both deoxyribose and ribose belong to a class of sugars called
- (1) Trioses
  - (2) hexoses
  - (3) Pentoses
  - (4) Polysaccharides
- 135.** In prokaryotes the process of replication is catalysed by the following enzymes. Identify, which of the enzymes is in best coordination with the role.
- |                       |   |                                |
|-----------------------|---|--------------------------------|
| (1) Helicase          | - | Joins the ends of DNA segments |
| (2) DNA polymerase-I  | - | Synthesises DNA                |
| (3) DNA polymerase-II | - | Remove primer and fills gap    |
| (4) Primase           | - | Synthesis RNA primers          |
- SECTION - B**
- 136.** When the DNA replication starts the
- (1) Leading strand produces Okazaki fragment
  - (2) Hydrogen bonds between the nucleotides of two strands break
  - (3) Phosphodiester bond between the adjacent nucleotide breaks
  - (4) Bond between the nitrogen base and deoxyribose sugar breaks
- 137.** DNA strand which is formed continuously in 5' → 3' direction is called
- (1) Lagging strand
  - (2) Leading strand
  - (3) Template strand
  - (4) Stranded strand
- 138.** Isotopes used by Hershey and Chase were
- (1) <sup>32</sup>P and <sup>35</sup>S
  - (2) <sup>35</sup>P and <sup>32</sup>S
  - (3) <sup>34</sup>P and <sup>31</sup>S
  - (4) <sup>30</sup>P and <sup>32</sup>S
- 139.** What is ribonucleotide?
- (1) Ribose + Uracil + Phosphate
  - (2) Deoxyribose + Uracil + Phosphate
  - (3) Deoxyribose + Thymine + Phosphate
  - (4) Ribose + Thymine + Phosphate





155. Which one of the following non-infectious disease is the major cause of death in humans?

- (1) Cancer (2) AIDS  
(3) Asthma (4) Typhoid

156. Common symptoms of amoebiasis include.

- (1) Constipation  
(2) Abdominal pain and cramp  
(3) Stool with blood clots and excessive mucous  
(4) All of the above

157. Which of the following can be considered to be the main source of amoebic dysentery?

- (1) Contaminated food and water  
(2) Water and food contaminated by the faecal matter  
(3) Water and food contaminated by urine  
(4) Water and food contaminated by polluted air

158. The most serious form of malaria, malignant malaria is caused by:

- (1) *P. falciparum* (2) *P. vivax*  
(3) *P. malariae* (4) *All of these*

159. Select the correct statements regarding the characteristics of acquired immunity.

- (i) Cell-mediated immunity and humoral immunity are responsible for acquired immunity.  
(ii) It produces a primary response of low intensity.  
(iii) Active immunity is a types of acquired immunity.  
(iv) Polymorphonuclear leucocytes and natural killer cells are involved in acquired immunity.
- (1) (i), (ii) & (iii) (2) (i), (iii) & (iv)  
(3) (i) & (iv) (4) (i) & (iii) only

160. Match the column:

Column-I		Column-II	
A.	Helper T-cell	(i)	Supresses function of helper T-cells and killer T-cells
B.	Killer T-cell	(ii)	Stimulates B-cells to produce antibodies
C.	Suppressor T-cell	(iii)	Recognises antigen even after many years of first encounter
D.	Memory T-cell	(iv)	Destroy non-self cells

- (1) A-(i), B-(ii), C-(iii), D-(iv)  
(2) A-(ii), B-(iii), C-(iv), D-(i)  
(3) A-(ii), B-(iv), C-(i), D-(iii)  
(4) A-(i), B-(iv), C-(ii), D-(iii)

161. Which of the following is the reason for rheumatoid arthritis?

- (1) The ability to differentiate pathogens or foreign molecules from self-cells increases  
(2) Body attacks self-cells  
(3) More antibodies are produced in the body  
(4) The ability to differentiate pathogens or foreign molecules from self-cells is not lost

162. Consider the following statements regarding lymphocytes

- (I) T-lymphocytes form cell mediated immune system (CMIS).  
(II) The T-lymphocyte cells do not secrete antibodies, but help the B-lymphocyte cells to produce them.
- (1) Statement I is correct but II is incorrect  
(2) Statement I is incorrect but II is correct  
(3) Both statements I and II are correct  
(4) Both statements I and II are incorrect

163. Every day our body is exposed to a large number of infectious agents. But all are not capable of causing disease. This is due to:

- (1) Decreased virulence of pathogen  
(2) Immunity of an individual  
(3) Genotype of an individual  
(4) Lifestyle of an individual

164. Grafted kidneys may be rejected in a patient due to:

- (1) Humoral immune responses  
(2) Innate immune responses  
(3) Passive immune responses  
(4) Cell mediated immune responses

165. Immature lymphocytes differentiate in:

- (1) Liver and Spleen  
(2) Thymus and Bone marrow  
(3) Bone marrow and Thyroid  
(4) Spleen and Thymus

166. MALT constitutes about \_\_\_\_\_ per cent of the lymphoid tissue in human body.

- (1) 50 (2) 20  
(3) 70 (4) 10

167. Antigen binding site in antibody is found between.

- (1) Two light chains
- (2) Two heavy chains
- (3) One heavy and one light chain
- (4) Changes according to the nature of antigen

168. Consider the following statements:

- (I) IgE antibodies are produced in an allergic reaction.
- (II) B-lymphocytes mediate cell mediated immunity.
- (III) The yellowish fluid colostrum has abundant IgE antibodies.
- (IV) Spleen is a secondary lymphoid organ.

Choose the correct option

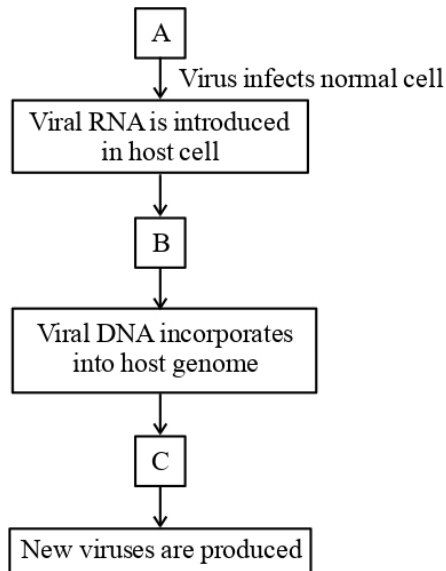
- (1) Only I is correct
- (2) I & II are correct
- (3) III & IV are connect
- (4) I & IV are correct

169. Colostrum, the yellowish fluid secreted by mother during the initial days of lactation is essential to provide immunity to the new-born infants because it contains.

- (1) Natural killer cells
- (2) Monocytes
- (3) Macrophages
- (4) Immunoglobulin-A

170. The below flowchart describes the replication of retrovirus in a host cell.

Observe and fill up the blank, A, B and C.



- (1) A-Retrovirus, B-viral DNA is produced; C-New viral RNA is produced by host cell

(2) A-Transcriptase, B-Bacterial RNA is produced, C-New viral DNA is produced by the infected cell

(3) A-Reverse transcriptase, B-Viral DNA is produced; C-New viral RNA is produced by the infected cell

(4) A-Reverse transcriptase, B-Viral DNA is produced, C-New viral DNA is produced by host cell

171. Scientists who study cancer are known as:

- (1) Endocrinologists
- (2) Oncologists
- (3) Conchologists
- (4) Haematologists

172. Malignant tumors are:

- (I) Mass of neoplastic cells.
- (II) Cells that grow very rapidly and damage the surrounding normal tissue.
- (III) Cells that show the property of metastasis.

Which of the statements given above are correct?

- (1) I & II
- (2) I & III
- (3) II & IV
- (4) All of the above

173. Spread of cancerous cells to distant sites is termed as:

- (1) Metastasis
- (2) Malignant neoplasm
- (3) Oncogenes
- (4) Proto-oncogenes

174. In heavy smokers, the alveoli of the lungs are enlarged and damaged which reduces the surface area for the exchange of respiratory gases. This condition is called.

- (1) Asthma
- (2) Emphysema
- (3) Silicosis
- (4) Insomnia

175. Match column I with column II and choose the correct option.

Column – I		Column-II	
A	Cytokine barriers	i	Mucus coating of respiratory tract
B	Cellular barriers	ii	Interferons
C	Physiological barriers	iii	Neutrophils and Macrophages
D	Physical barriers	iv	Tears and Saliva

Choose the correct answer from the options given below:

- (1) (A-ii), (B-iii), (C-iv), (D-i)
- (2) (A-iii), (B-i), (C-iv), (D-ii)
- (3) (A-iii), (B-i), (C-ii), (D-iv)
- (4) (A-ii), (B-iii), (C-i), (D-iv)

176. *Entamoeba histolytica* is a \_\_\_\_\_.
- (1) Bacteria
  - (2) Protozoan parasite
  - (3) Virus
  - (4) None of the above
177. The alveoli filled with fluid and lips and finger nails may turn gray to bluish in colour. These symptoms are related to:
- (1) Dysentery           (2) Pneumonia
  - (3) Common cold      (4) Diphtheria
178. Which of the following sets of diseases is caused by bacteria?
- (1) Cholera and tetanus
  - (2) Typhoid and smallpox
  - (3) Tetanus and mumps
  - (4) Herpes and influenza
179. Common cold differs from pneumonia in that:
- (1) Pneumonia is a communicable disease whereas the common cold is a nutritional deficiency disease
  - (2) Pneumonia can be prevented by a live attenuated bacterial vaccine whereas the common cold has no effective vaccine
  - (3) Pneumonia is caused by a virus while the common cold is caused by the bacterium *Haemophilus influenza*
  - (4) Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs
180. Which of the following glands is large sized at birth but reduces in size with ageing?
- (1) Pineal               (2) Pituitary
  - (3) Thymus             (4) Thyroid
181. Read the following statements and choose the correct options.
- (I) Ringworms are generally acquired from soil or by using towels, clothes, or even the comb of infected individuals.
- (II) Recombinant DNA technology has allowed the production of antigenic polypeptides of pathogens in bacteria or yeast.
- (III) There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive, and urogenital tracts) called mucosa-associated lymphoid tissue (MALT).
- (1) Only I is correct
  - (2) I & II are correct.
  - (3) I, II & III are correct.
  - (4) I & IV are correct.

182. **Assertion:** Mast cells in the human body release excessive amounts of inflammatory chemicals which cause allergic reactions.
- Reason:** Allergens in the environment on reaching human body stimulate mast cells in certain individuals.
- (1) Both assertion and reason are correct and reason is the correct explanation for assertion.
  - (2) Both assertion and reason are correct but reason is not the correct explanation for assertion
  - (3) Assertion is correct but reason is incorrect
  - (4) Both assertion and reason are incorrect
183. People who are at higher risk of contracting HIV infection include.
- (I) Drug addicts who take drugs intravenously.
  - (II) Individuals who require repeated blood transfusions.
  - (III) Children born to an HIV infected mother.
  - (IV) Individuals who have multiple sexual partners.
- (1) Statement I and II are only correct
  - (2) Statement I and IV are only correct
  - (3) Statement IV is only incorrect
  - (4) All statements are correct
184. The genetic material of HIV is:
- (1) dsDNA               (2) dsRNA
  - (3) ssDNA              (4) ssRNA
185. Modes of transmission of HIV occurs by:
- (I) Sexual contact with infected person.
  - (II) Transfusion of contaminated blood.
  - (III) Sharing infected needles.
  - (IV) From infected mother to her baby through placenta.
- Which of the statements given above are correct?
- (1) I & II               (2) I & III
  - (3) II, III, IV       (4) I, II, III & IV

**SECTION - B**

186. Which one of the following options gives the correct match of a disease with its causative organism and mode of infection?

	<b>Disease</b>	<b>Causative organism</b>	<b>Mode of infection</b>
(1)	Typhoid	<i>Salmonella typhi</i>	With inspired air
(2)	Pneumonia	<i>Streptococcus pneumoniae</i>	Droplet infection
(3)	Elephantiasis	<i>Wuchereria bancrofti</i>	With infected water and food
(4)	Malaria	<i>Plasmodium vivax</i>	Bite of male <i>Anopheles</i> mosquito



- 187.** Choose the wrong statement:
- (1) HIV has RNA as its genetic material
  - (2) HIV replicates in T-lymphocytes
  - (3) HIV spreads by sexual contact or sharing needle with the infected person and not by touch or physical contact with infected person
  - (4) The time lag between the infection and appearance of AIDS symptoms may vary from few hours to a week
- 188.** Which of the following techniques can be used to detect cancer of the internal organs?
- (1) Radiography
  - (2) Computed tomography
  - (3) Magnetic resonance imaging
  - (4) All of the above
- 189.** Smack is a drug obtained from the-
- (1) Latex of *Papaver somniferum*
  - (2) Leaves of *Cannabis sativa*
  - (3) Flowers of *Daturawrightii*
  - (4) Fruits of *Erythroxylum coca*
- 190.** Read the following statements and choose the correct options.
- (I) Drugs like barbiturates, amphetamines, benzodiazepines, and other similar drugs, that are normally used as medicines to help patients cope with mental illnesses like depression and insomnia, are often abused.
  - (II) Morphine is a very effective sedative and painkiller, and is very useful in patients who have undergone surgery.
  - (III) Natural cannabinoids are obtained from the coca plant *Erythroxylum coca*, native to South America.
- (1) Only I is correct
  - (2) I & II are correct.
  - (3) I, II & III are correct.
  - (4) I & III are correct.
- 191.** In the following questions, a statement of assertion is followed by a statement of reason.  
**Assertion:** Innate immunity is non-specific defence.  
**Reason:** It consists of four types of barriers  
 Mark the correct choice as:
- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
  - (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
  - (3) Assertion is true but Reason is false
  - (4) Both Assertion and Reason are false
- 192.** Building up of \_\_\_\_\_ is observed as a result of smoking which reduces the \_\_\_\_\_ availability to the tissues.
- (1) Carbon dioxide, carbon monoxide
  - (2) Carbon dioxide, oxygen
  - (3) Carbon monoxide, oxygen
  - (4) Oxygen, carbon monoxide
- 193.** The infective stage of Plasmodium in humans is:
- (1) Merozoite stage
  - (2) Sporozoite stage
  - (3) Cytomerozoite stage
  - (4) Schizont stage
- 194.** Where will you look for the sporozoites of the malarial parasite?
- (1) Saliva of infected female Anopheles mosquito
  - (2) Red blood corpuscles of human suffering from malaria
  - (3) Spleen of infected humans
  - (4) Blood of freshly moulted female Anopheles mosquito
- 195.** Which among of the following is used as a biological agent to feed on mosquito larvae in ponds?
- (1) Algae
  - (2) *Gambusia*
  - (3) Silver fish
  - (4) *Palaemon*
- 196.** The toxic substance responsible for chills and recurrent fever in malaria is:
- (1) Globin
  - (2) Haemozoin
  - (3) Urea
  - (4) Ammonia
- 197.** The gametocytes or sexual stage of Plasmodium develops in:
- (1) Human WBCs
  - (2) Human RBCs
  - (3) Hepatic cells
  - (4) Kidney cells
- 198.** Motile zygote of Plasmodium occurs in:
- (1) Gut of female Anopheles
  - (2) Salivary glands of Anopheles
  - (3) Human RBCs
  - (4) Human liver

199. Which of the following is/are reasons for alcohol abuse in adolescents?

- (I) Social pressure
- (II) Curiosity and need for adventure, excitement and experiment
- (III) To escape from stress, depression and frustration
- (IV) To overcome hardships of daily life

Which of the statements given above are correct?

- (1) I, II & III
- (2) I, III & IV
- (3) II, III & IV
- (4) I, II, III & IV

200. In the following questions, a statement of assertion is followed by a statement of reason.

**Assertion:** An antibody is represented by  $H_2L_2$ .

**Reason:** Each antibody molecule has four peptide chains, two small called light chains and two longer called heavy chains.

Mark the correct choice as:

- (1) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
- (2) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
- (3) Assertion is true but Reason is false
- (4) Both Assertion and Reason are false

# NEET (2024)

## PRACTICE TEST – 04 SOLUTION

DURATION : 200 Minutes

M. MARKS : 720

### ANSWER KEY

#### PHYSICS

1. (2)
2. (4)
3. (1)
4. (4)
5. (1)
6. (4)
7. (1)
8. (3)
9. (3)
10. (3)
11. (3)
12. (2)
13. (3)
14. (4)
15. (2)
16. (2)
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18. (3)
19. (4)
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24. (1)
25. (3)
26. (1)
27. (1)
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29. (4)
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31. (1)
32. (1)
33. (4)
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42. (2)
43. (2)
44. (1)
45. (2)
46. (3)
47. (3)
48. (4)
49. (1)
50. (2)

#### CHEMISTRY

51. (2)
52. (1)
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54. (3)
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98. (1)
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100. (3)

#### BOTANY

101. (3)
102. (2)
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106. (3)
107. (1)
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116. (4)
117. (3)
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148. (1)
149. (3)
150. (1)

#### ZOOLOGY

151. (1)
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156. (4)
157. (2)
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164. (4)
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168. (4)
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172. (4)
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185. (4)
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187. (4)
188. (4)
189. (1)
190. (2)
191. (2)
192. (3)
193. (2)
194. (1)
195. (2)
196. (2)
197. (2)
198. (1)
199. (4)
200. (1)

## SECTION – I (PHYSICS)

1. (2)

$$F = 2evB\sin\theta$$

$$= 2 \times 1.6 \times 8 \times 10^{-19} \text{ N}$$

$$= 25.6 \times 10^{-19} \text{ N}$$

2. (4)

$$\therefore B = \frac{\mu_0}{4\pi} \cdot \frac{qv}{r^2}$$

$$r = \sqrt{\frac{\mu_0 ev}{4\pi B}}$$

3. (1)

Resistance of  $ABC <$  Resistance of  $ADC$   
Current in  $ABC >$  Current in  $ADC$

$$|\vec{B}_{ABC}| > |\vec{B}_{ADC}|$$

$$\vec{B} = \vec{B}_{ABC} - \vec{B}_{ADC} \text{ (into the plane of paper)}$$

4. (4)

$$F = ILB\sin\theta \Rightarrow \frac{F}{L} = IB\sin\theta = 4 \times 2 \times 10^{-3} \times \frac{1}{2}$$

$$= 4 \text{ m Nm}^{-1}$$

5. (1)

If current is in same direction, then magnetic force between them will be attractive.

6. (4)

$$\vec{F} = q(\vec{v} \times \vec{B})$$

$$\vec{v} = 0, \vec{F} = 0$$

Hence particle would remain at rest.

7. (1)

$$f = \frac{qB}{2\pi m}$$

$$B = \frac{2\pi mf}{q} = \frac{2\pi \times 2 \times 1.67 \times 10^{-27} \times 24 \times 10^6}{1.6 \times 10^{-19}} \approx 3.1 \text{ T}$$

8. (3)

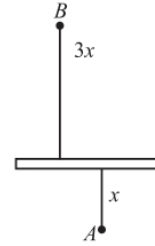
$$F = q(vB)$$

$$v \propto \sqrt{V}$$

$$\frac{F'}{F} = \sqrt{\frac{V'}{V}} = 2$$

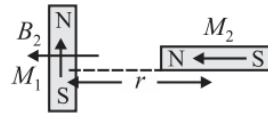
$$F' = 2F$$

9. (3)



$$B \propto \frac{1}{x^3}$$

10. (3)



$$B_2 = \frac{2\mu_0 M_2}{4\pi r^3} \text{ (: Magnetic field due to short magnetic dipole on axis)}$$

$$\tau_2 = M_1 B_2 \sin 90^\circ = \frac{2\mu_0 M_1 M_2}{4\pi r^3} = \frac{\mu_0 M_1 M_2}{2\pi r^3}$$

11. (3)

For diamagnetic substance  $\chi_m < 0$  and  $\mu_r < 1$

12. (2)

$$(\chi_m)_{\text{di}} \propto T^0 \text{ and negative}$$

13. (3)

Superconductors are perfect diamagnetic material.

14. (4)

$$|e| = \left| -\frac{d\phi}{dt} \right| = \left| -\frac{d}{dt}(3t^2 + 4t + 8) \right|$$

$$|e| = 6t + 4$$

$$|e(t = 2s)| = 16 \text{ V}$$

15. (2)

$$r = \frac{P}{qB}$$

$$\text{So, } r_d : r_\alpha = 2 : 1$$

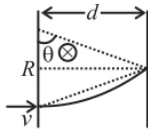
16. (2)

$$r = \frac{P}{qB}$$

$$\text{So, } r_d : r_\alpha = 3 : 1$$



17. (2)



$$R \sin \theta = d$$

$$\sin \theta = \frac{mv}{qB} = \frac{\sqrt{3} mv}{2 qB}$$

$$\sin \theta = \frac{\sqrt{3}}{2}, \theta = \frac{\pi}{3}$$

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

18. (3)

Curie's law for paramagnetic substance is given as

$$\chi = \frac{c\mu_0}{T}$$

19. (4)

$$T_0 = 2\pi \sqrt{\frac{I_0}{M_0 B}}$$

$$T = 2\pi \sqrt{\frac{1}{MB}} = 2\pi \sqrt{\frac{2I_0}{M_0 B}} = 2T_0$$

20. (2)

In superconductors, magnetic field lines are completely expelled ( $\chi_m = -1$ ). The phenomenon of perfect diamagnetism in superconductors is called Meissner effect.

21. (2)

For both, electromagnet and transformer, energy loss must be less, hence Hysteresis loop represented by material B has less area which means it dissipates less energy. Hence material B is proper to use for both transformer and electromagnet.

22. (3)

The magnetic susceptibility of a diamagnetic substance is independent of temperature.

23. (1)

$$\tan \delta' = \frac{\tan \delta}{\cos \theta}$$

$$\tan \delta = \cos \theta \tan \delta'$$

$$= \cos 30^\circ \times \tan 45^\circ = \frac{\sqrt{3}}{2}$$

24. (1)

$$f = \sqrt{\frac{MB}{I}}$$

as  $M \rightarrow 2M$  and  $B \rightarrow 2B$

$$f' = 2f$$

25. (3)

Monopole does not exist and hence the smallest individual unit is a dipole.

26. (1)

$$\vec{\tau} = \vec{M} \times \vec{B}$$

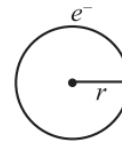
$\Rightarrow$  Magnetic field due to wire is in  $-z$  direction

$$\Rightarrow \vec{M} = iA(-k)$$

Hence  $\vec{\tau} = 0$

$$\Rightarrow \vec{F}_{\text{net}} \neq 0$$

27. (1)



$$\Rightarrow B = \frac{\mu_0 i}{2r}$$

$$\Rightarrow i = \frac{\Delta q}{T} = \frac{e}{\frac{1}{N}} = Ne$$

$$\Rightarrow B = \frac{\mu_0 Ne}{2r}$$

28. (2)

$$t = \frac{T}{2}$$

$$T = \frac{2\pi m}{qB} \Rightarrow t = \frac{\pi m}{qB}$$

29. (4)

$$\vec{F} = q\vec{V} \times \vec{B}$$

$$F = qVB \sin \theta$$

$$F = 0 \text{ at } \theta = 0^\circ$$

30. (1)

$$\vec{\tau} = \vec{M} \times \vec{B}$$

$$M = NIA = l\pi r^2$$

$$\tau = l\pi r^2 B \sin 90^\circ = l\pi r^2 B$$

31. (1)

$$r = \frac{mv}{qB} = \frac{\sqrt{2mK}}{qB}$$

$$\Rightarrow |e_p| = |e_e|$$

$$\Rightarrow m_p > m_e$$

$$\Rightarrow r_p > r_e$$

32. (1)

$$B = B_1 + B_2$$

$$B_1 = \frac{\mu_0 i}{4a} (-\hat{k})$$

$$B_2 = \frac{\mu_0 i}{4\pi a} (-\hat{k})$$

$$B = \frac{\mu_0 i}{4a} \left( \frac{1}{\pi} + 1 \right) (-\hat{k})$$

33. (4)

$$\vec{F}_n = i(\vec{I} \times \vec{B}) = Bi \sin 0 = 0$$

34. (3)

$$Bil = mg$$

$$B = \frac{100 \times 10^{-3} \times 10}{1 \times \frac{1}{2}}$$

$$B = 2T$$

35. (2)

$$B = \mu_0 ni$$

$$B = 4\pi \times 10^{-7} \times 500 \times \frac{1}{2\pi}$$

$$B = 10^{-4} \text{ T}$$

36. (3)

$$\left( \frac{\mu_0 i}{2R} \right) \frac{1}{3\sqrt{3}} = \frac{\mu_0 i R^2}{2(x^2 + R^2)^{\frac{3}{2}}}$$

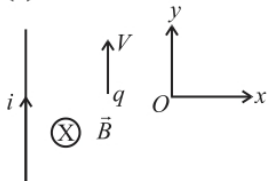
$$(X^2 + R^2)^{\frac{3}{2}} = 3\sqrt{3}R^3$$

$$(X^2 + R^2)^3 = 27R^6$$

$$X^2 + R^2 = 3R^2$$

$$X = \sqrt{2}R$$

37. (2)



By Fleming left hand rule force will be along OX.

38. (2)

$$F = qVB \sin \theta$$

$$F \propto V$$

$$F \propto \sqrt{V}$$

$$\frac{F'}{F} = \frac{\sqrt{2V}}{\sqrt{V}}$$

$$F' = \sqrt{2}F$$

39. (2)

$$B = \frac{\mu_0 i}{2r}$$

$$B \propto \frac{1}{r}$$

40. (1)

$$\vec{F} = q(\vec{V} \times \vec{B}) = 0$$

41. (2)

$$\int \vec{B} \cdot d\vec{\ell} = \mu_0 I_{\text{inside}} = \mu_0 (4i - i) = 3\mu_0 i$$

42. (2)

Time period is independent of kinetic energy

$$T = \frac{2\pi m}{qB}$$

43. (2)

$$\vec{F}_n = q(\vec{V} \times \vec{B})$$

$$= -4 \times 10^{-6} (\hat{i} + 2\hat{j}) \times 3\hat{i} \times 10^6 = 24 \text{ N}\hat{k}$$

44. (1)

$$qE = q(\vec{V} \times \vec{B})$$

$$V = \frac{E}{B}$$

$$\Rightarrow qV_0 = \frac{1}{2}mv^2$$

$$\Rightarrow v = \sqrt{\frac{2qV_0}{m}}$$

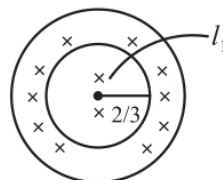
$$\Rightarrow \frac{E}{B} = \sqrt{\frac{2qV_0}{m}}$$

$$\frac{q}{m} = \frac{E^2}{2B^2V_0}$$

45. (2)

$$\vec{F}_m = I(\vec{\ell}_{\text{eff}} \times \vec{B}) = 2IRB$$

46. (3)



$$I_1 = \frac{I}{\pi a^2} \times \pi \left( \frac{2a}{3} \right)^2 = \frac{4I}{9}$$

$$\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{\text{enclosed}}$$

$$B \cdot 2\pi \frac{2a}{3} = \frac{\mu_0 4I}{9}$$

$$B = \frac{\mu_0 I}{3\pi a}$$

47. (3)

$$\vec{B} = \vec{B}_1 + \vec{B}_2$$

$$\vec{B}_1 = \frac{\mu_0 i}{8R} \hat{k}; \vec{B}_2 = \frac{\mu_0 i}{4R} (-\hat{k})$$

$$\vec{B} = \frac{\mu_0 I}{8R} \hat{k} - \frac{\mu_0 I}{4R} \hat{k}$$

$$|\vec{B}| = \frac{\mu_0 I}{8R}$$

48. (4)  
Path of the particle will be helical.

49. (1)

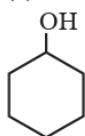
$$\mu_m = \frac{qL}{2M} = \frac{qMR^2\omega}{2M} = \frac{qR^2\omega}{2}$$

50. (2)

$E \neq 0$  and  $B = 0$  is not possible case.

## SECTION – II (CHEMISTRY)

51. (2)



-OH is attached to 2° carbon.

52. (1)

1° alcohol gives red colour in victor-meyer's test.

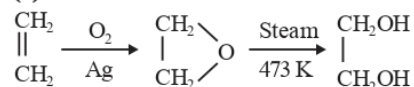
53. (2)

In halo acids: down the group, bond strength of H-X decreases.

54. (3)

Based on theory.

55. (1)



56. (2)

Butan-2-ol is a secondary alcohol.

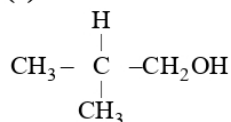
57. (3)

2-Butanol is secondary alcohol.

58. (1)

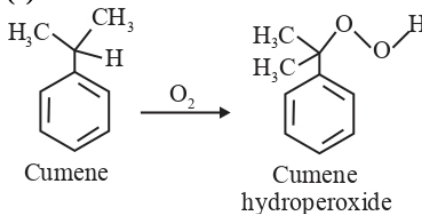
Aqueous KOH will do substitution here.

59. (1)

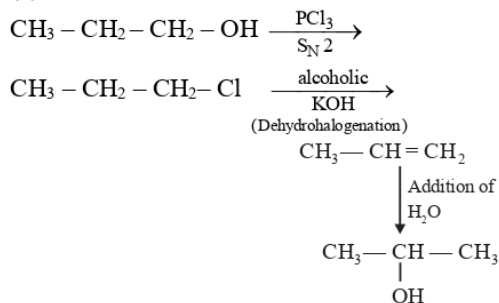


Isobutyl alcohol  
(1° -alcohol)

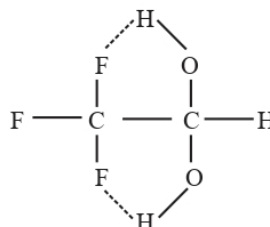
60. (3)



61. (2)



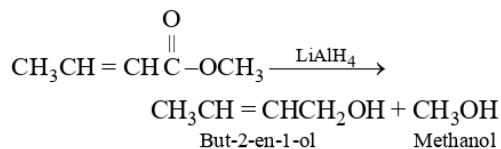
62. (3)



Stabilised by intramolecular hydrogen bonding.

63. (3)  
CrO<sub>3</sub>-pyridine is a selective oxidising agent.

64. (1)



65. (1)

In alcohol intermolecular hydrogen bonding is present while H-bonding is not possible in alkane. Boiling point  $\propto$  Intermolecular forces of attraction.

66. (1)

Reason is the correct explanation for assertion.

67. (2)

Alcohol can be convert into aldehyde via oxidation process.

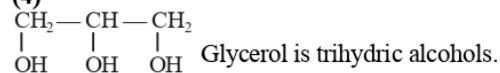
68. (1)

3° carbocation is the most stable carbocation among all.

69. (3)

Elimination of water occur here.

70. (4)



71. (3)

phenol  $\rightarrow$  benzyl alcohol

72. (1)

-CH<sub>2</sub>OH is primary alcohol.

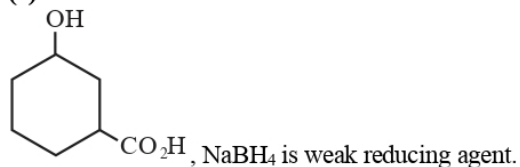
73. (4)

Grignard reagent reacts with formaldehyde to give 1° alcohols.

74. (2)



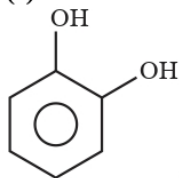
75. (3)



76. (3)

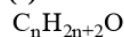
LiA/H<sub>4</sub> is a strong reducing agent.

77. (3)



o-dihydroxy benzene or catechol.

78. (3)



79. (3)

In Lucas test:

3° Alcohol  $\rightarrow$  Immediately turbidity appears.

2° Alcohol  $\rightarrow$  Turbidity appears after 5 minutes.

1° Alcohol  $\rightarrow$  No turbidity at room temperature.

On heating turbidity appears after 30 minutes.

80. (4)

PCC oxidize alcohol to aldehyde.

81. (4)

Here hydroboration and oxidation reaction occur.

82. (1)

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

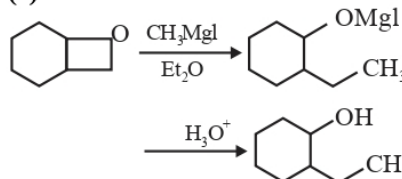
83. (2)

3-methylphenol

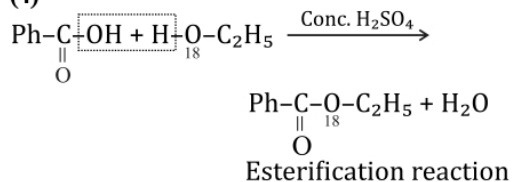
84. (1)

Column 1		Column 2	
A	Dow Reaction	c	Phenol
B	Williamson synthesis	b	Ether
C	Pinacol Pinacolne Rearrangement	a	Alcohol

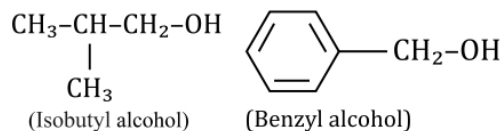
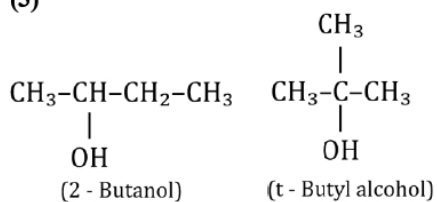
85. (4)



86. (4)



87. (3)



In Isobutyl alcohol ( $1^\circ$  alcohol) turbidity is observed after 30 minutes on heating.

88. (4)

$$P = 2, Q = 3, \\ P + Q = 2 + 3 = 5$$

89. (2)

Dimethyl ether is isomer of ethanol.

90. (3)

4-methylhexan-2-ol is the right answer.

91. (2)

$\text{LiAlH}_4$  will reduce both functional group.

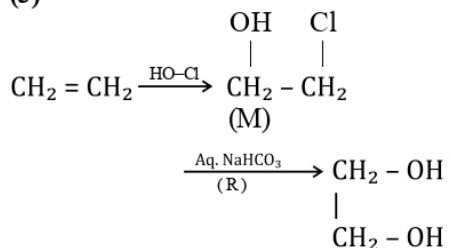
92. (3)

Tertiary alcohols are tough to be oxidised. The given reagent chromic acid is an oxidising agent. Thus, tertiary alcohol does not produce green colour.

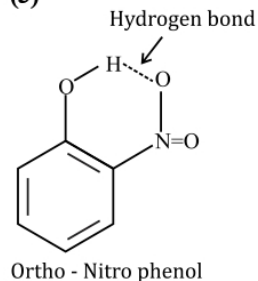
93. (2)

Based on theory.

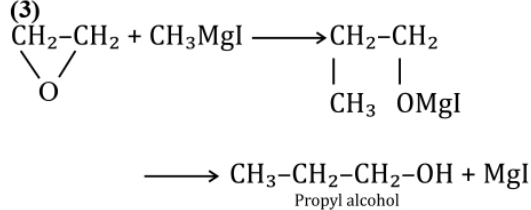
94. (3)



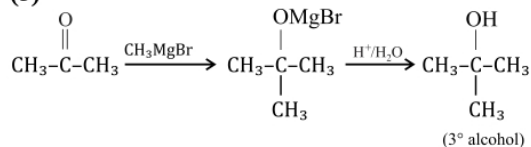
95. (3)



96. (3)



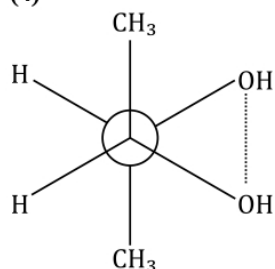
97. (3)



98. (1)

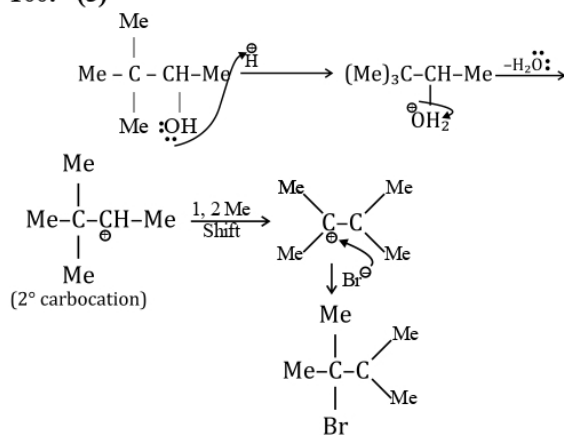
Based on theory.

99. (4)



Stabilised by intramolecular hydrogen bonding.

100. (3)



## SECTION – III (BOTANY)

- 101. (3)**  
Uracil is pyrimidine  
NCERT 12, Page No. 96-99
- 102. (2)**  
Friedrich Miescher first identified DNA as an acidic substance present in nucleus. He named it as nuclein.  
NCERT 12, Page No. 97
- 103. (2)**  
Purine always comes opposite to pyrimidine this will generate uniform distance between 2 strands of helix.  
NCERT 12, Page No. 97
- 104. (3)**  
The packaging of chromatin at higher level requires additional set of proteins referred as non-histone chromosomal protein.  
NCERT 12, Page No. 99
- 105. (1)**  
When a phosphate group is linked to OH of 5' C of a nucleoside through phosphoester linkage, of a corresponding nucleotide.  
NCERT 12, Page No. 96
- 106. (3)**  
If ds DNA = 20% of cytosine  
 $C \equiv G$   
 $G = 20\%$   
 $G + C = 40\%$   
 $A + T = 60\%$   
 $A = 60/2 = 30\%$   
NCERT 12, Page No. 97
- 107. (1)**  
3'-5' phosphodiester linkage present in a polynucleotide chain.  
NCERT 12, Page No. 96
- 108. (1)**  
In DNA, nitrogen bases are joined to each other by H-bonds. Adenine form two Hydrogen bond with thymine and Guanine form 3 H-Bond with cytosine.  
NCERT 12, Pg. No.97.
- 109. (4)**  
RNA is also now known to be catalytic, hence reactive.  
NCERT 12, Page No. 103
- 110. (3)**  
DNA-dependent DNA polymerases catalyses polymerization in 5' → 3'  
NCERT 12, Page No. 106
- 111. (2)**  
Okazaki fragments of the lagging strand is joined together by the enzyme DNA ligase.  
NCERT 12, Page No. 106
- 112. (2)**  
Consequently, on one strand (the template with polarity 3' → 5'), the replication is continuous, while on the other (the template with polarity 5' → 3'), it is discontinuous. The discontinuously synthesised fragments are later joined by the enzyme DNA ligase.  
NCERT Pg. No. 106
- 113. (3)**  
The packaging of chromatin at higher level requires additional set of proteins that collectively are referred to as Non-histone Chromosomal (NHC) proteins.  
NCERT 12, Page No. 99-100-
- 114. (2)**  
The DNA-dependent DNA polymerases catalyse polymerisation only in one direction, that is 5' → 3'  
NCERT Pg. No. 106
- 115. (4)**  
Chargaff's rule is not applicable for ss DNA and RNA as there is no complementary base pairing. Chargaff's rule applicable for ds DNA, the ratio between Adenine and Thymine and Guanine and Cytosine are constant and equals one.  
NCERT 12, Page No. 97
- 116. (4)**  
10 bp in each turn.  
Class 12th NCERT Pg. No.97
- 117. (3)**  
Guanine is bonded with Cytosine with three H-bonds  
NCERT 12, Page No. 97
- 118. (2)**  
On one strand (the template with polarity 3' → 5'), the replication is continuous, while on the other (the template with polarity 5' → 3'), it is discontinuous.  
NCERT 12, Page No. 106
- 119. (4)**  
DNA is always synthesised in 5' → 3' direction means it add nucleotide at 3' end of the growing strand.  
NCERT 12, Page No. 90



- 120. (3)**  
RNA is the genetic material (for example, Tobacco Mosaic viruses, QB bacteriophage, etc.)  
NCERT 12, Page No. 103
- 121. (2)**  
Distance between two consecutive nucleotides of one polynucleotide chain in DNA is 0.34 nm.  
NCERT 12, Page No. 97
- 122. (1)**  
Adenosine, Uridine, Thymidine are nucleoside. DNA is a nucleotide.  
NCERT 12, Page No. 96
- 123. (3)**  
According to semi-conservative model of replication after one round of replication every new DNA double helix would be hybrid that consist of one strand of old DNA bound to one strand of newly synthesized DNA.  
NCERT 12, Page No. 104-105
- 124. (3)**  
Sequence of bases on complementary strand is TACGTACGT.  
NCERT 12, Page No. 97
- 125. (4)**  
In Meselson and Stahl's experiments, heavy DNA was distinguished from normal DNA by centrifugation in CsCl (cesium chloride) density gradient.  
NCERT 12, Page No. 105
- 126. (4)**  
RNA and DNA both are genetic material and carry genetic information from one generation to other. A virus is a small parasite that cannot reproduce by itself. Most viruses have either RNA or DNA as their genetic material. Once a virus infects a susceptible cell, it can direct the cell machinery to produce more viruses. Some virus have RNA but not DNA, like DNA, RNA can also transmit hereditary information.  
NCERT 12, Page No. 103
- 127. (1)**  
Adenine and guanine are the purines which are found both in DNA and RNA. Cytosine and thymine are the pyrimidines which are found in DNA. In case of RNA, thymine is replaced by uracil.  
NCERT 12, Page No. 96
- 128. (3)**  
Alfred Hershey and Martha Chase (1952) experimentally proved that DNA is the sole genetic material in bacteriophage.  
On the other hand, Beadle and Tatum (1940s) experimentally showed one gene-one enzyme hypothesis using Neurospora. Meselson and Stahl first showed that DNA replicates semiconservatively through experiments on E. coli. Jacob and Monod were first to explain lac operon.  
NCERT 12, Page No. 102
- 129. (3)**  
Since strain R bacteria do not harm the mouse, this experiment is the equivalent of injecting the virulent strain S only. Thus the mouse will die, and you will find living strain S bacteria in its blood.  
NCERT 12, Page No. 100
- 130. (3)**  
These researchers were able to isolate nearly pure DNA samples. It was only these samples that provided transformation activity. Digestion with DNase did inhibit transformation, suggest that DNA causes the transformation.  
NCERT 12, Page No. 101
- 131. (1)**  
DNA polymerase adds nucleotides to 3' end of growing strand.  
NCERT 12, Page No. 106
- 132. (4)**  
Okazaki fragments are short pieces of newly synthesized DNA. The production of each of these fragments is dependent on a beginning RNA primer. The small fragments are ultimately ligated connected together to form the lagging strand.  
NCERT 12, Page No. 106-107
- 133. (1)**  
DNA polymerase can add nucleotide to 3'-OH group of an existing strand. DNA polymerase cannot initiate the process of replication. RNA primers are necessary to begin DNA synthesis. Also, replication does not initiate randomly at any place in DNA.  
NCERT 12, Page No. 90
- 134. (3)**  
Both deoxyribose and ribose belong to the class pentoses as it contains '5' carbon atoms.  
NCERT 12, Page No. 96

- 135. (4)**  
The best coordinated pair is (4), i.e. primase is involved in the synthesis of RNA primers. The other three enzymes and their functions are as follows  
(a) Helicase – unwinds the double helix  
(b) DNA polymerase-I – major repair enzyme and has 5' → 3' exonuclease activity  
(c) DNA polymerase-II – minor repair enzyme  
NCERT 12, Page No. 106
- 136. (2)**  
During DNA replication, breaking of H-bond is required to uncoil the DNA helix of the parent DNA. These bonds occur between the nitrogenous bases of DNA helix. Three H-bonds occur between cytosine and guanine (C ≡ G) and two H-bonds join adenine and thymine (A = T).  
NCERT 12, Page No. 106
- 137. (2)**  
DNA strand which is formed continuously in 5' → 3' direction is called leading strand. The polarity of this strand is 3' → 5' and DNA polymerase polymerises nucleotides only in 5' → 3' direction. DNA strand which is formed in small pieces, i.e. Okazaki fragments of DNA is called lagging strand.  
NCERT 12, Page No. 107 (Fig. No. 6.8)
- 138. (1)**  
Isotopes used by Hershey and Chase were <sup>32</sup>P and <sup>35</sup>S. They grew cultures of *Escherichia coli*. One culture was supplied with radioactive sulphur (<sup>35</sup>S) and the another with radioactive phosphorus (<sup>32</sup>P).  
NCERT 12, Page No. 84, 85
- 139. (1)**  
Each ribonucleotide is made up of a base (Adenine, Cytosine, Guanine, Uracil) a ribose sugar.  
NCERT 12, Page No. 96
- 140. (3)**  
Conceptual based question.  
A – (2)  
B – (4)  
C – (3)  
D – (1)  
NCERT 12, Page No. 97, 100, 101
- 141. (4)**  
8 histone molecules are present in each nucleosome core.  
NCERT 12, Page No. 99
- 142. (1)**  
 $A + T = C + G$  is not correct according to Chargaff's rule.  
According to Chargaff's rule, the total amount of adenine is equal to the total amount of thymine and similarly total amount of cytosine is equal to total amount of guanine, i.e.  $A = T$  and  $C = G$ . It also states that in natural DNA, the base ratio A/T is close to unit and C/G is also close to unit ( $A + C = T + G$ ).  
NCERT 12, Page No. 97
- 143. (1)**  
Linker DNA is attached to H1 histone protein (called plugging protein and act as marker protein). It connects two adjacent nucleosomes and together they constitute and chromatosome. The latter gives rise to chromatin fibre condensation.  
NCERT 12, Page No. 99
- 144. (2)**  
At the 5' end, of a polynucleotide chain a phosphate group is attached whereas, at the 3' end of a strand, a free -OH group is present.  
NCERT 12, Page No. 97
- 145. (3)**  
The antiparallel strands of DNA molecule means that the phosphate groups at the start of two DNA strands are in opposite position. JD Watson and FHC Crick (1953) showed that DNA has a double helical structure with two polynucleotide chains joined by hydrogen bonds and running in opposite directions (antiparallel). It means if one chain has polarity 5' → 3' and other has 3' → 5'.  
NCERT 12, Page No. 97
- 146. (1)**  
Methew Meselson and Franklin Stahl (1958) obtained DNA strands, which were 50% radioactive and 50% non-radioactive. To prove semiconservative mode of DNA replication, they grew bacteria in two different media containing <sup>14</sup>N and <sup>15</sup>N. After few minutes, they found that second generation of bacteria contained two types of DNA, 50% non-radioactive (<sup>14</sup>N<sup>14</sup>N) and 50% radioactive (<sup>15</sup>N<sup>14</sup>N).  
NCERT 12, Page No. 105
- 147. (3)**  
All the properties of DNA are correct except (3). DNA is not directly involved in protein synthesis. Rather, it is carried out through mRNA. It is corrected as DNA does not directly participate in protein synthesis but through RNA.  
NCERT 12, Page No. 107

**148. (1)**  
The negatively charge DNA is wrapped around positively charged histone octamer to form a structure called nucleosome.  
NCERT 12, Page No. 99

**149. (3)**  
Transformation was discovered by F Griffith (1928). It involves transfer of genetic material from one bacterial cell into another bacterial cell. Griffith studied this in two strains of *Pneumococcus* bacteria type S III, (smooth) and type II, R (rough) strain, which infect mice.  
NCERT 12, Page No. 84-85

**150. (1)**  
Diameter of DNA remains constant due to the hydrogen bonds between base pairs.  
A large-sized purine lies opposite to the smaller-sized pyrimidine. Three H-bonds occur between cytosine and guanine and two H-bonds occur between adenine and thymine.  
NCERT 12, Page No. 97

### SECTION – IV (ZOOLOGY)

**151. (1)**  
William Harvey discovered blood circulation.  
(NCERT, Page No.145)

**152. (3)**  
*Salmonella typhi* is a pathogenic bacterium that causes typhoid fever in human beings. These pathogens generally enter the small intestine through food and water contaminated with them and migrate to other organs through blood.  
(NCERT, Page No.146)

**153. (2)**  
A classic case in medicine, that of Mary Mallon nicknamed Typhoid Mary, is worth mentioning here. She was a cook by profession and was a typhoid carrier who continued to spread typhoid for several years through the food she prepared.  
(NCERT, Page No. 147)

**154. (4)**  
Vector is an organism which transmits parasites i.e. carries a disease from one organism to another, e.g. mosquitoes are vectors of malaria parasite.  
Host is an organism infected by a parasite. Inoculation is introduction of microorganisms, infective material, serum or other substances into tissues of living organisms or culture media. Sterilisation is the complete elimination of microbial activity.  
(NCERT, Page No.147)

**155. (1)**  
Cancer is a non-infectious disease. It is the major cause of death in human population.  
(NCERT, Page No.146)

**156. (4)**  
Symptoms of amoebiasis disease include constipation, abdominal pain and cramps, weakness, stools with excess mucus and blood clots.  
(NCERT, Page No.149)

**157. (2)**  
Amoebic dysentery is caused by an intestinal endoparasite, *Entamoeba histolytica*, found in large intestine of humans. Infection takes place through food and water contaminated by faecal matter.  
(NCERT, Page No. 148 & 149)

**158. (1)**  
*Plasmodium falciparum*, the causative agent of malignant malaria, is among the most severe human infectious diseases.  
(NCERT, Page No. 147)

**159. (1)**  
Statement (i), (ii) and (iii) are correct, while statement (iv) is incorrect. Polymorphonuclear leucocytes and natural killer cells are involved in innate immunity. These cells phagocytose and destroy microbes.  
(NCERT, Page No.150 & 151)

**160. (3)**  
Factual based question.  
(NCERT, Page No.156)

**161. (2)**  
The body is normally able to distinguish its own self-antigens from foreign non-self antigens and does not attack (immunologic) against itself. At times, the body loses tolerance and mounts an

abnormal immune attack. Autoimmune disease results from the activation of self-reactive T and B cells. Rheumatoid arthritis is an example of autoimmune disease.

(NCERT, Page No.153)

162. (3)

Both statements I and II are correct.

The T-lymphocytes mediate cell mediated immune system (CMIS). The B-lymphocytes produce antibodies.

The T-cells themselves do not secrete antibodies but help B-cells to produce them.

(NCERT, Page No. 163)

163. (2)

We are not susceptible to all diseases due to the various mechanisms of our immune system that protects us. Immunity is the ability of the body to fight against diseases.

(NCERT, Page No.150)

164. (4)

Organ rejection after transplantation is an adaptive immune response via cellular immunity (mediated by killer T-cells also known as cytotoxic T-cells inducing apoptosis of target cells).

(NCERT, Page No.152)

165. (2)

Bone marrow and thymus are primary lymphoid organs, where maturation of lymphocytes takes place.

(NCERT, Page No.153)

166. (1)

The MALT (Mucosa Associated Lymphoid Tissues) include the tonsils and all the tissues associated with the mucosal surfaces of the respiratory tract, of the intestinal tract, referred to as the gut-associated lymphoid tissue (GALT), and including the Peyer's patches of the ileum and of the genitourinary tract. MALT constitutes about 50% of the lymphoid tissue in human body.

(NCERT, Page No.154)

167. (3)

Antigen binding site, also known as paratope is a part of an antibody which recognises and binds to an antigen. It is a small region of 5 to 10 amino acids of the antibody's (variable region), part of the fragment antigen-binding (Fab region) and contains parts of the antibody's heavy and light chains. Paratope is present in each arm of Y-shaped antibody between one heavy chain and one

light chain. Antigen binding site in antibody is found between one heavy and one light chain.

(NCERT, Page No. 151 fig. 8.4)

168. (4)

Statements I and IV are correct, while II and III are incorrect. Colostrum, the first milk secreted by mother is rich in IgA antibody. It provides protection against bacteria and virus. B-lymphocytes mediate humoral immune response whereas cell-mediated immunity is mediated by T-lymphocytes.

(NCERT, Page No.151, 152 &153)

169. (4)

Immunoglobulin A is the major immunoglobulin in human colostrum and milk.

(NCERT, Page No. 152)

170. (1)

Factual based question.

(NCERT, Page No.155 fig 8.6)

171. (2)

Oncology is the study of cancer. An oncologist is a doctor who treats cancer and provides medical care for a person diagnosed with cancer.

(NCERT, Page No.157)

172. (4)

The malignant tumors are the mass of proliferating cells called neoplastic or tumor cells. These cells grow very rapidly, invade and damage the surrounding normal tissues. As these cells actively divide and grow, they also starve the normal cells by competing for vital nutrients. Cells separated from such tumors reach distant sites through blood and wherever they get lodged in the body, they develop a new tumor there. This property called metastasis is the most feared property of malignant tumors.

(NCERT, Page No.157)

173. (1)

Metastasis is the ability of cancer cells to move from one part of the body to the other. This results in the manifestation of a malignancy as a secondary growth from the primary growth in a new location.

(NCERT, Page No.157)

174. (2)

Emphysema is a type of chronic obstructive pulmonary disease (COPD) involving damage to the air sacs (alveoli) in the lungs.

(NCERT, Page No.160)

175. (1)  
Factual based question.  
(NCERT, Page No.150 &151)

176. (2)  
Factual based question.  
(NCERT, Page No.146)

177. (2)  
Symptoms of pneumonia:  
The alveoli filled with fluid  
Lips, finger nails may turn gray to bluish in colour.  
(NCERT, Page No.147)

178. (1)

Disease	Causative agent	Type of microorganism
Cholera	<i>Vibrio cholerae</i>	Bacteria
Tetanus	<i>Clostridium tetani</i>	Bacteria
Typhoid	<i>Salmonella typhi</i>	Bacteria
Smallpox	<i>Variola virus</i>	Virus
Mumps	<i>Paramyxovirus</i>	Virus
Influenza	<i>Influenza virus</i>	Virus

(NCERT, Page No. 150)

179. (4)  
Pneumonia is an inflammatory condition of the lung affecting primarily the small air sacs known as alveoli. Typically symptoms include some combination of a productive or a dry cough, chest pain, fever and trouble breathing. The common cold, also known simply as a cold is a viral infectious disease of the upper respiratory tract that primarily affects the nose. The throat, sinuses and larynx may also be affected.  
(NCERT, Page No.147)

180. (3)  
Thymus gland located in the chest, in between the lungs behind the sternum are the primary lymphoid organs. The T cells undergo maturation in the thymus. As age advances, the size of the thymus is reduced. This causes decreased immunity in the elderly and aged persons.  
(NCERT, Page No.154)

181. (3)  
Ringworms are generally acquired from soil or by using towels, clothes, or even the comb of infected individuals.  
Recombinant DNA technology has allowed the production of antigenic polypeptides of pathogens in bacteria or yeast.

There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive, and urogenital tracts) called mucosa-associated lymphoid tissue (MALT).  
(NCERT, Page No.149, 152 & 154)

182. (1)  
The symptoms of an allergic reaction develop in response to histamine. Mast cells release a large amount of histamine into the bloodstream and it also acts as initiator of the inflammatory response, which aids the arrival of leucocytes at a site of infection. Histamine stimulates capillary dilation, increased capillary permeability, closure of bronchial tubes, mucus secretion, pain, and swelling. Hence, both Assertion and Reason are true and Reason is the correct explanation of Assertion.  
(NCERT, Page No.153)

183. (4)  
HIV is a sexually transmitted infection and can be spread by contact with infected blood through intravenous drug addiction, during unsafe repeated blood transfusions, individuals who have multiple sexual partners or from HIV infected mother to child during pregnancy, childbirth and breast-feeding.  
(NCERT, Page No.154 & 155)

184. (4)  
The genetic material of HIV is ssRNA.  
(NCERT, Page No.154)

185. (4)  
Transmission of HIV infection generally occurs by sexual contact with infected person, by transfusion of contaminated blood and blood products, by sharing infected needles as in the case of intravenous drug abusers and from infected mother to her baby through placenta.  
(NCERT, Page No.155)

186. (2)  
Pneumonia is caused by *Streptococcus pneumoniae*. Transmission of *Streptococcus pneumoniae* occurs through direct person-to-person contact via respiratory droplets.  
(NCERT, Page No.147)

187. (4)  
There is always a time lag between the infection and the appearance of full-blown AIDS symptoms. This period may vary from a few months to many years (usually 5-10 years).  
(NCERT, Page No.155)

188. (4)

Techniques like radiography (use of X-rays), CT (Computed tomography) and MRI (Magnetic resonance imaging) are very useful to detect cancers of the internal organs. Computed tomography uses X-rays to generate a three-dimensional image of the internals of an object. It provides a different form of imaging known as cross-sectional imaging. MRI uses strong magnetic fields and non-ionizing radiations to accurately detect pathological and physiological changes in the living tissue.

(NCERT, Page No. 157)

189. (1)

Smack is obtained by acetylation of morphine which is extracted from the latex of poppy plant *Papaver somniferum*.

(NCERT, Page No.158 & 159)

190. (2)

Natural cannabinoids are obtained from the inflorescences of the plant *Cannabis sativa*.

(NCERT, Page No.158 &159)

191. (2)

Innate immunity is non-specific type of defence, which is present at the time of birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body. Four barriers are physical, physiological, cellular and cytokine barriers.

(NCERT, Page No.150)

192. (3)

Smoking increases carbon monoxide (CO) content in the blood and reduces the concentration of free haemoglobin that can binds to oxygen. This causes oxygen deficiency in the body tissues.

(NCERT, Page No.160)

193. (2)

The human-infective stage is sporozoites from the salivary gland of a mosquito. The sporozoites grow and multiply in the liver to become merozoites. These merozoites invade the erythrocytes (RBCs) to form trophozoites, schizonts and gametocytes, during which the symptoms of malaria are produced.

(NCERT, Page No.143 fig. 8.1)

194. (1)

The mature infective stages of malarial parasite which are transferred from mosquito to man are sporozoites. The nucleus of oocyst divides first by meiosis and subsequently by mitosis forming a large number of small haploid nuclei. The tiny nuclei and cytoplasmic masses form elongated and spindle-shaped bodies called sporozoites. Each oocyst produces about 1,000 sporozoites, these are found in the saliva of infected female *Anopheles* mosquito.

When the female *Anopheles* mosquito bites a healthy person, the sporozoites are injected into his/her blood along with saliva. These sporozoites start the cycle again in the human body.

(NCERT, Page No.148)

195. (2)

*Gambusia affinis* and *Poecilia reticulata* are the two most important larvivorous fish which have been used extensively as biological agents for the control of mosquito breeding. These fish species consume mosquito larvae and prevent mosquito borne diseases like malaria and dengue.

(NCERT, Page No.150)

196. (2)

During erythrocytic schizogony (life phase in human), Trophozoite stage feeds on the haemoglobin molecules and produces a by-product called hemozoin which is responsible for the reoccurrence of fever. It is released in every 48 hours in the blood.

(NCERT, Page No.147)

197. (2)

The gametocytes or sexual stage is developed in human RBCs. The gametocytes fuse to form sporozoites in gut of female *Anopheles* mosquito.

(NCERT, Page No.148)

198. (1)

The sexual cycle of Plasmodium completes in female *Anopheles* mosquito. When female *Anopheles* sucks the blood of infected human, it takes up gametocytes (sexual stages of parasite) with blood meal.

(NCERT, Page No.148)



**199. (4)**

All given statements depict accurate reason for alcohol abuse in adolescents. Curiosity, need for adventure and excitement and experimentation, social pressure constitute common causes which motivate youngsters towards drug and alcohol use. Thus, the initial use of drugs or alcohol may be out of curiosity or experimentation but later, the child starts using these to escape facing problems.

Of late stress from pressures to excel in academics or examinations, has played a significant role in persuading the youngsters to try alcohol and drugs.

**(NCERT, Page No.160)**

**200. (1)**

Immunoglobulins, also known as antibodies, are glycoprotein molecules produced by plasma cells (white blood cells). The Ig monomer is a “Y”-shaped molecule that consists of four polypeptide chains; two identical heavy chains and two identical light chains connected by disulfide bonds.

**(NCERT, Page No.151)**