08/04/2024

CODE-A

Aakash

Medical | IIT-JEE | Foundations

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

AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

MM : 720

CST – 4

Time : 3 Hrs. 20 Mins.

Complete Syllabus of NEET

Instructions:

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

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

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

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

(v) Dark only one circle for each entry.

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

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

PHYSICS

SECTION-A

1. A travelling wave is established on a string. If the tension in the string is changed by 1%, then the change in transverse wave velocity is

   (1) 0.5% (2) 1%

   (3) 2% (4) 1.5%

2. The displacement equation of a particle in SHM is $y = 10\sin\left(2\pi t + \frac{\pi}{6}\right)$. The initial position of the particle from mean position is

   (1) $5\sqrt{3}$ m (2) 5 m

   (3) 10 m (4) $2.5\sqrt{3}$ m

3. The value of dielectric constant K of a conductor is

   (1) Zero

   (2) 4

   (3) 9

   (4) Infinite

4. When a charge of 10 coulomb is taken very slowly from one point to another point separated by a distance of 0.4 m, work of 4 J is required to be done. What will be the potential difference between two points?

   (1) 0.8 volt (2) 0.2 volt

   (3) 0.4 volt (4) 1 volt

5. A rectangular boat having a length of 5 m and width of 4 m is floating in water. The boat sinks by 3 mm when a man gets on it. The mass of the man is

   (1) 24 kg (2) 60 kg

   (3) 72 kg (4) 10 kg

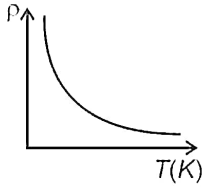
6. The percentage increase in length of a rectangular thick sheet is 0.20% when it is heated from 0°C to 100°C. The percentage increase in its volume is

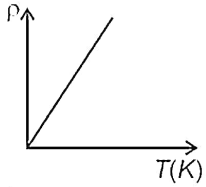
   (1) 0.3% (2) 0.6%

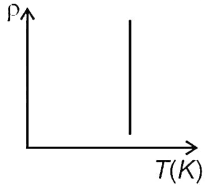
   (3) 0.7% (4) 0.9%

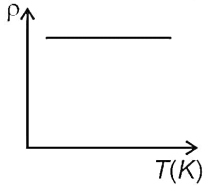
7. The molecule of a N_2 gas possess
   (1) 3 translational degrees of freedom
   (2) 5 degrees of freedom ignoring vibration
   (3) 9 degrees of freedom if it is free to vibrate
   (4) Both (1) and (2)

8. For a given mass of an ideal gas, the correct curve between density of gas and temperature at constant pressure is

(1) 

(2) 

(3) 

(4) 

9. The magnetic field of an electromagnetic wave is given by $B_y = 3 \times 10^{-5}\sin(10^3 x + 6.29 \times 10^{10} t)$. Here x is in (m) and t is in (s). The wavelength of the electromagnetic wave nearly is
   (1) 6.28 cm (2) 3.14 cm
   (3) 0.63 cm (4) 0.32 cm

10. The image I of a real object O formed by a lens is as shown in figure, this is possible if

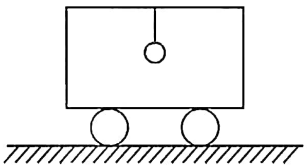
   (1) A convex lens is placed to the left of O
   (2) A concave lens is placed to the left of O
   (3) A convex lens is placed between O and I
   (4) A concave lens is placed to the right of I

11. In Young's double slit experiment, the wavelength of the light used is doubled and distance between two slits is halved, the resultant fringe width becomes
   (1) 2 times (2) 3 times
   (3) 4 times (4) 1/2 times

12. Wavelengths of a given light wave in air and in a medium are 4000 Å and 2000 Å respectively. The critical angle for the given pair of media is
   (1) 45° (2) 60°
   (3) 30° (4) 37°

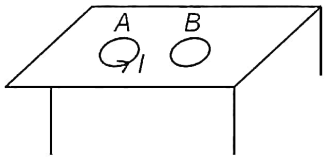
13. A motor is capable of raising 200 kg of water in 5 minutes from a well at 60 m deep. If $g = 10$ m s^{-2}, then minimum value of average power of the motor is
   (1) 400 W (2) 200 W
   (3) 600 W (4) 300 W

14. A bob of mass 2 kg is tied with light rope whose other end is fixed at the roof of a cart as shown. If the cart suddenly starts with horizontal acceleration of 5 m s^{-2}, then maximum angle subtended with vertical is



   (1) 45° (2) $\tan^{-1}\left(\frac{1}{2}\right)$
   (3) $2\tan^{-1}\left(\frac{1}{2}\right)$ (4) 90°

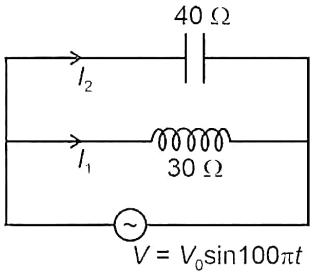
15. Two identical circular loops of copper wire are lying close on a smooth horizontal table without touching each other as shown. Loop A carries a current which decreases with time. In response, the loop B



   (1) Will remain stationary
   (2) Is attracted by the loop A
   (3) Is repelled by the loop A
   (4) Will start revolving around A

Space for Rough Work

16. An AC voltage source is connected to a capacitor C and inductor L as shown.



The phase difference between the current I_1 and I_2 is

(1) 37° (2) 53°

(3) 90° (4) 180°

17. A ball of mass m is dropped from a height H, strikes the ground and rebounds to half the height from which it was dropped. The magnitude of impulse imparted to the ball is

(1) $\left(\sqrt{2}-1\right)m\sqrt{gH}$ (2) $\left(\sqrt{2}+1\right)m\sqrt{gH}$

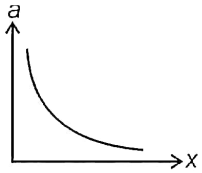
(3) $m\sqrt{2gH}$ (4) $m\sqrt{\frac{2gH}{2}}$

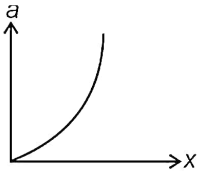
18. A ball is projected with velocity 30 m s^{-1} at an angle of 60° with the horizontal direction. The speed of the ball at highest point of its trajectory will be

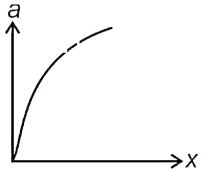
(1) 5 m s^{-1} (2) 10 m s^{-1}

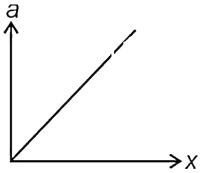
(3) 18 m s^{-1} (4) 15 m s^{-1}

19. The acceleration 'a' of a particle moving along x-axis is given as $a = 2x^2$. The acceleration versus position (a – x) graph for the particle is best represented by

(1) 

(2) 

(3) 

(4) 

20. The distance travelled by a particle starting from rest and moving with uniform acceleration of $\frac{3}{5}\,ms^{-2}$ in the fourth second is

(1) 3.2 m (2) 2.3 m

(3) 2.1 m (4) 1.2 m

21. If pressure of a gas is tripled, then average kinetic energy per unit volume of gas will be

(1) Half of its initial value

(2) Triple of its initial value

(3) One third of its initial value

(4) One fourth of its initial value

22. Monochromatic light of frequency 8×10^{15} Hz is produced by a laser. The power emitted is 5×10^{-3} W. The number of photons emitted per second is

(1) 3.5×10^{14} (2) 9.5×10^{14}

(3) 9.5×10^{18} (4) 6×10^{14}

23. The radius of a spherical nucleus as measured by electron scattering is 4.8 fm. What is the mass number of the nucleus most likely to be? Given average radius (R_0) of nucleus is 1.2×10^{-15} m.

(1) $(4)^{1/3}$ (2) 8

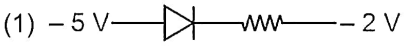
(3) 27 (4) 64

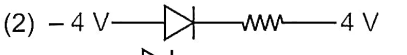
24. Mobilites of electrons and holes in a sample of intrinsic semiconductor at room temperature are 0.72 $m^2\,V^{-1}\,s^{-1}$ and 0.24 $m^2\,V^{-1}\,s^{-1}$ respectively. If the electron and hole densities are equal to 5.4×10^{19} m^{-3} the semiconductor conductivity is

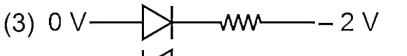
(1) 8.3 S m^{-1} (2) 4.2 S m^{-1}

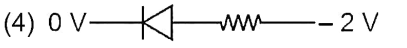
(3) 1.32 S m^{-1} (4) 2.24 S m^{-1}

25. Choose the option among the following which represents forward biased diode.

(1) 

(2) 

(3) 

(4) 

26. The angular velocity of a rod is 10 rad/s. It is subjected to an angular acceleration of 2 rad/s^2. The angular velocity of the rod after 4 seconds will be

(1) 18 rad/s (2) 26 rad/s

(3) 8 rad/s (4) Zero

Space for Rough Work

27. A body of mass m is to be projected vertically upwards from the surface of earth such that it never returns to the surface. The minimum kinetic energy that should be imparted to the body for this will be (Radius of earth = R)

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

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

28. Metal wire of length 40 m and area of cross-section 2 cm^2 when subjected to longitudinal force of 1000 N (acting opposite to each other along its ends) stretches by 10 cm. Young's modulus of the metal is

(1) 8 GPa (2) 4 GPa

(3) 2 GPa (4) 1 GPa

29. **Assertion (A):** If a particle is moving on a straight line with constant speed, then angular momentum of this particle about any point remains constant.

Reason (R): Angular momentum of a particle is independent of the point of observation.

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

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

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

(4) Both (A) and (R) are false

30. The relaxation time of electrons in conductors

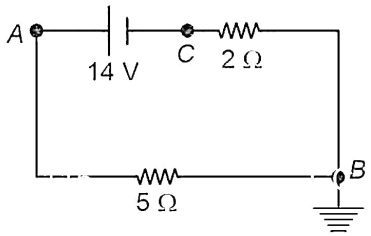
(1) Increases with increase in temperature

(2) Decreases with increase in temperature

(3) Is independent of temperature

(4) Changes suddenly at 100°C

31. The potential of the point C in the following circuit is



(1) 4 V (2) – 4 V

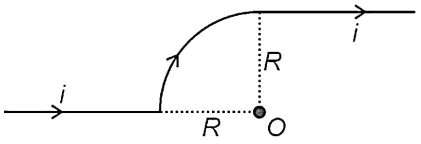
(3) – 14 V (4) 0 V

32. The unit Wb/m^2 is equal to

(1) joule (2) henry

(3) volt (4) tesla

33. An infinite current carrying wire is bent as shown in figure. The magnetic field due to the wire at point O is



(1) $\frac{\mu_0 i}{4R}\left(1+\frac{1}{\pi}\right)$ (2) $\frac{\mu_0 i}{2R}\left(\frac{1}{2}+\frac{1}{\pi}\right)$

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

34. A superconductor exhibits perfect

(1) Diamagnetism (2) Paramagnetism

(3) Ferromagnetism (4) None of these

35. Which of the following data consists of highest number of significant figures?

(1) 8.003 (2) 0.00456

(3) 0.02345 (4) 0.12400

SECTION-B

36. When an electron of hydrogen atom jumps from its third orbit to the first orbit, one gets the

(1) First line of Lyman series

(2) First line of Paschen series

(3) Second line of Balmer series

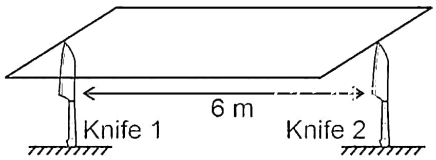
(4) Second line of Lyman series

37. Dimensional formula of $(\mu_0\varepsilon_0)^{\frac{1}{2}}$ is

(1) $[L^{-1/2}T^{1/2}]$ (2) $[L^{1/2}T^{-1/2}]$

(3) $[L^{-1}T]$ (4) $[LT^1]$

38. A wooden plank of mass 4 kg and length 6 m is supported on two knife edges fixed at the ends of the plank. If the reaction at knife 1 is three times that at knife 2 (as shown), then centre of mass of plank will be at



(1) 4.5 m from knife 1 (2) 2.5 m from knife 1

(3) 4.5 m from knife 2 (4) 1.5 m from knife 2

Space for Rough Work

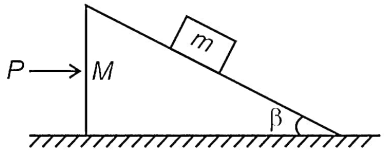
39. Two particles of mass 4 kg and 6 kg are placed 100 m apart and the particle of 6 kg is fixed. If 4 kg starts approaching towards 6 kg then its speed when the distance between them becomes 10 m, will be

(1) $\frac{3\sqrt{3G}}{5}$ (2) $\frac{\sqrt{24G}}{5}$

(3) $\frac{\sqrt{48G}}{5}$ (4) $\frac{3\sqrt{6G}}{5}$

40. A block of mass m is kept on a wedge of mass M as shown in figure. The wedge is moved by applying force P such that mass m remains stationary w.r.t. wedge. The magnitude of force P is

[Assuming all surfaces to be frictionless]



(1) Zero (2) $Mg\tan\beta$

(3) $mg\tan\beta$ (4) $(M+m)g\tan\beta$

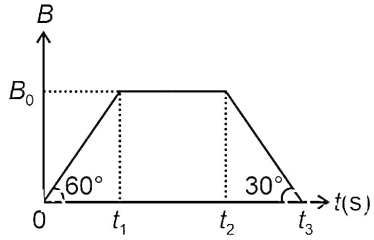
41. In the context of alternating current, which of the following is incorrectly matched?

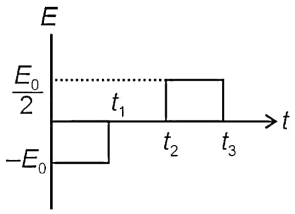
A.	In purely capacitive circuit	Current leads voltage by $\frac{\pi}{2}$
B.	In purely resistive circuit	Current and voltage are in phase
C.	In series LCR circuit, if $X_C = X_L$ then	Power factor of the circuit is equal to 1
D.	In purely inductive circuit	Voltage lags current by $\frac{\pi}{2}$

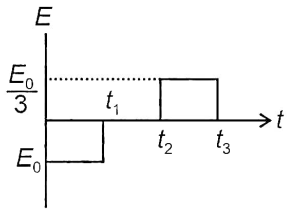
(1) A (2) B

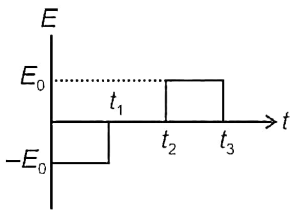
(3) C (4) D

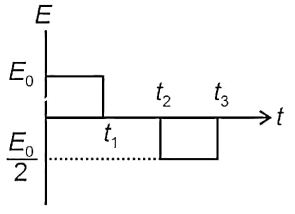
42. The magnetic field through a conducting circular loop of area A varies with time as shown below. The field is perpendicular to the loop. Plot between the induced emf (E) in the loop as the function of time (t) is best described by (Given B_0 and E_0 are constant)



(1) 

(2) 

(3) 

(4) 

Space for Rough Work

43. The objective lens of a compound microscope produces magnification of 20. In order to get an overall magnification of 120 when image is formed at 25 cm from the eye-piece lens, the focal length of the eye lens should be
(1) 150 cm (2) 10 cm
(3) 6 cm (4) 5 cm

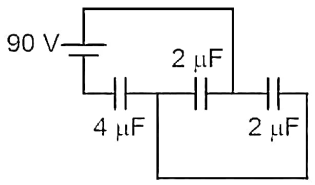
44. In a Fraunhoffer diffraction at single slit of width d with incident light of wavelength 5000 Å, if the first minimum is observed at angle 30°, then value of d is (Symbols have usual meaning)
(1) 5 μm (2) 1 μm
(3) 10 μm (4) 1 mm

45. An aeroplane of weight 8×10^5 N and total wing area of 400 m^2 is in a level flight at some height. The difference in pressure between the upper and lower surfaces of its wings are (g = 10 m/s^2)
(1) 2 kPa (2) 30 kPa
(3) 20 kPa (4) 15 kPa

46. 28 gm of N_2 at 27°C is mixed with 32 gm of O_2 at 57°C. The temperature of the mixture in equilibrium is equal to
(1) 50°C (2) 42°C
(3) 61°C (4) 75°C

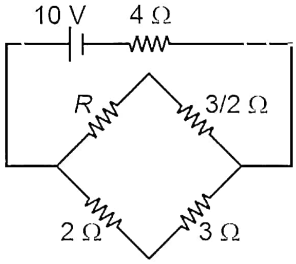
47. Electric field in a region is uniform and is given by $\vec{E} = \left(2\hat{i} + 3\hat{j} + \hat{k}\right)$N/C. The value of electric flux associated with surface of area $\vec{A} = \left(\pi R^2 \hat{i}\right) m^2$ is
(1) πR^2 (2) $3\pi R^2$
(3) $2\pi R^2$ (4) Zero

48. The energy stored in 4 μF capacitor in the circuit shown is



(1) 4050 μJ (2) 2000 μJ
(3) 3030 μJ (4) 1050 μJ

49. In the given circuit, find the value of resistance R so that the power dissipation in 4 Ω resistor is maximum



(1) $\frac{15}{2}\Omega$ (2) $\frac{17}{2}\Omega$
(3) $\frac{37}{2}\Omega$ (4) Zero

50. If an electron approaches the p-n junction from the n-side with a speed of 8×10^5 m s^{-1}, with what speed will it enter the p-side? Assume the potential barrier of the p-n junction to be 0.6 V
(1) 6.2×10^6 m/s (2) 3.4×10^6 m/s
(3) 6.5×10^5 m/s (4) 7.7×10^6 m/s

BOTANY

SECTION-A

51. Select the **correct** statement w.r.t prokaryotic DNA replication.
(1) The average rate of polymerization in *E.coli* is 1000 bp per second.
(2) The replication occurs within a small opening of the DNA helix.
(3) DNA polymerase on their own can initiate the process of replication.
(4) Ribonucleoside triphosphates provide energy for polymerisation reaction.

52. Sequence annotation refers to
(1) Introduction of vector DNA into the host
(2) Identifying genes expressed as RNA
(3) Finding chromosomes where disease-associated sequences are present
(4) Blind approach of sequencing the whole set of genome and later assigning different regions in the sequence with functions.

Space for Rough Work

53. Cistron is
(1) Sequence of bases that appears in mature rRNA
(2) Composed of only promoter and regulatory sequences
(3) Single base DNA differences
(4) A segment of DNA coding for a polypeptide

54. In the nucleus, repeating unit of 'beads-on-string' structure is composed of
(1) Histone octamer and DNA
(2) Only non-histone chromosomal proteins and RNA
(3) Only H1 histone and DNA
(4) Only RNA and DNA

55. RuBisCO
(1) Is a bifunctional enzyme
(2) Requires NADPH to perform its function
(3) Uses a 2C compound as its substrate
(4) Is present in mesophyll cells of maize plant

56. Which of the following cycle/pathway occurs in all photosynthetic plants?
(1) Hatch and Slack pathway
(2) Calvin pathway
(3) C_4 pathway
(4) CAM pathway

57. In grasses, certain adaxial epidermal cells along the veins modify themselves into large, empty and colourless cells. These cells are called
(1) Subsidiary cells (2) Bulliform cells
(3) Lenticels (4) Companion cells

58. Select the **incorrectly** matched pair.
(1) Secondary cortex – Phellogen
(2) Interfascicular cambium – Lateral meristem
(3) Cork – Phellem
(4) Secondary xylem – Wood

59. Which plant hormone was first isolated from human urine?
(1) Kinetin (2) Ethylene
(3) Auxin (4) Gibberellin

60. *Hydrilla* and *Zostera* are pollinated by
(1) Wind (2) Insects
(3) Water (4) Lemur

61. Match the **column-I** with **column-II**.

	Column-I	**Column-II**
a.	Aleurone layer	(i) Diploid
b.	Nucellus	(ii) Triploid
c.	Antipodal cells	(iii) Polyploid
d.	Tapetal cells	(iv) Haploid

Select the **correct** option
(1) a(ii), b(i), c(iv), d(iii) (2) a(iv), b(i), c(iii), d(ii)
(3) a(ii), b(iii), c(i), d(iv) (4) a(i), b(iv), c(ii), d(iii)

62. Choose the **incorrect** match.
(1) Alexander von Humboldt – Observed that species richness increased with increasing explored area up to a limit
(2) Edward Wilson – Popularised the term Biodiversity
(3) Robert May – Estimated the global species diversity at about 1.5 million
(4) David Tilman – Found that increased diversity contributed to higher productivity

63. When red flower of *Antirrhinum* was crossed with its white flower, in F_1 generation all the progenies obtained were pink flowered. What would be the probability of getting progenies with atleast one recessive allele for flower colour in the F_2 generation if the pink flowered plant is selfed?
(1) $\frac{1}{2}$ (2) $\frac{3}{4}$
(3) $\frac{1}{4}$ (4) Zero

Space for Rough Work

64. Which among the following genetic disorders is the result of non-disjunction of pair of a particular autosomes during gamete formation and its fusion?
(1) Klinefelter's syndrome
(2) Haemophilia
(3) Turner's syndrome
(4) Down's syndrome

65. Given below are two statements.
Assertion (A): Dominance is an autonomous feature of a gene or the product that it has information for.
Reason (R): Dominant genes stop the activities of mutant genes.
In the light of above statements choose the **correct** answer from the options given below.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are false
(3) (A) is true and (R) is false
(4) Both (A) and (R) are true but (R) is not the correct explanation of (A)

66. Which among the following is **not** an *ex-situ* conservation strategy?
(1) Wildlife sanctuary (2) Botanical garden
(3) Zoological park (4) Wildlife safari park

67. In eukaryotes, the pyruvate undergoes oxidative decarboxylation in A and this complex set of reactions is catalysed by B .
Choose the **correct** option for A and B.

	A	B
(1)	Inner mitochondrial membrane	Pyruvate dehydrogenase
(2)	Cytosol	Phosphofructokinase
(3)	Mitochondrial matrix	Pyruvate dehydrogenase
(4)	Cytoplasm	Alcohol dehydrogenase

68. Which among the following characters was **not** studied by Mendel in pea plant for his experiment?
(1) Stem height (2) Flower shape
(3) Pod shape (4) Seed shape

69. Which of the following structures plays a role in the origin of plasmodesmata?
(1) Cell wall
(2) Cell membrane
(3) Mesosome
(4) Endoplasmic reticulum

70. Lysosome maintains its acidic condition by
(1) Pumping protons out of it
(2) Pumping protons into its interior
(3) Operating Na^+/K^+ exchange pump
(4) Pumping CO_2 inside it

71. Select the **incorrect** match.
(1) Columnar epithelial cells – Long and narrow
(2) White blood cells – Amoeboid structure
(3) Nerve cell – Branched and long
(4) Mesophyll cells – Branched and elongated

72. If there are 40 chromosomes and 20 pg DNA in G_1 phase of a cell then what will be the chromosome number and amount of DNA respectively in G_2 phase of this cell?
(1) 40 and 20 pg (2) 80 and 40 pg
(3) 40 and 40 pg (4) 80 and 20 pg

73. Resting phase of cell cycle represents the phase between
(1) M phase and G_1 phase
(2) G_1 phase and S phase
(3) G_2 phase and M phase
(4) Two successive M phases

74. In a typical human cell, cell division proper lasts for only about
(1) 24 hours (2) 90 minutes
(3) 1 hour (4) 23 hours

Space for Rough Work

75. Read the following statements and select the **correct** option.

Assertion (A): Cytotaxonomy is based on cytological information like chromosome number, structure, and behaviour.

Reason (R): Cytotaxonomy uses the chemical constituents of the plant for classification.

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

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

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

(4) Both (A) and (R) are false

76. Which of the following statements is **incorrect**?

(1) Algae are chlorophyll bearing, simple, thalloid autotrophic and largely aquatic organisms.

(2) Some of the algae also occur in association with fungi and animals.

(3) Anisogamous sexual reproduction is present in some species of *Chlamydomonas*.

(4) Oogamous sexual reproduction is present in *Volvox* but not in *Fucus*.

77. Mark the **incorrectly** matched pair.

(1) Citric acid – Employed in dyeing, inks, medicines, flavouring and preservation of food

(2) Acetic acid – Used in preparation of vinegar

(3) Butyric acid – Used for making rancid butter

(4) Lactic acid – Contains a number of vitamins especially vitamin A

78. Organisms which are tolerant of a wide range of salinities are called

(1) Stenothermal

(2) Eurythermal

(3) Euryhaline

(4) Stenohaline

79. Which of the following statements is **correct**?

(1) Ten percent law of energy transfer in ecosystem was proposed by Lindeman in 1942.

(2) Standing crop is the amount of all the inorganic substances present in an ecosystem per unit area at a given time.

(3) Standing state is amount of living material present in different trophic levels at a given time.

(4) Occurrence of food webs do not provide stability to ecosystem

80. Read the following statements.

Statement-A: Families are characterised on the basis of both vegetative and reproductive features of plant species.

Statement-B: With increase in taxonomic hierarchy there is decrease in number of common characteristics.

Select the **correct** option.

(1) Only statement A is incorrect

(2) Only statement B is incorrect

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

81. The two kingdom classification system did not consider which of the following characteristics?

(1) Presence or absence of cell wall

(2) Response to external stimulus

(3) Locomotion

(4) Body organisation

82. Mark the **mis-matched** pair.

(1) *Rhizobium* – Symbiotic N_2 fixing bacteria

(2) *Nitrosomonas* – Nitrifying bacteria

(3) *Chlorobium* – Perform oxygenic photosynthesis

(4) *Anabaena* – Associated with coralloid roots

Space for Rough Work

83. Which of the following features is/are common to both stilt roots and prop roots?
a. Assimilatory in function
b. Modified adventitious roots
c. Provide mechanical support
The **correct** one(s) is/are
(1) a and b (2) Only b
(3) b and c (4) Only c

84. In maize seed, the outer covering of endosperm separates the embryo by a proteinaceous layer, called
(1) Radicle (2) Plumule
(3) Scutellum (4) Aleurone layer

85. The floral formula $\oplus \male\!\!\female K_{(5)} \overset{\frown}{C_{(5)}} A_5 \underline{G}_{(2)}$ is of
(1) *Aloe* and tulip
(2) Tomato and brinjal
(3) *Sesbania* and *Trifolium*
(4) Mustard and cabbage

SECTION-B

86. Which of the following enzymes joins the discontinuously synthesized fragments during DNA replication?
(1) DNA polymerase
(2) DNA ligase
(3) Polynucleotide phosphorylase
(4) Aminoacyl tRNA synthetase

87. Which of the following features is **not** exhibited by most genetic codes?
(1) Ambiguous (2) Degenerate
(3) Non-overlapping (4) Nearly universal

88. State **true(T)** or **false(F)** to the given statements and mark the **correct** option.
a. Epidermal hairs on the stem are always multicellular.
b. In roots, cuticle is absent.
c. Subsidiary cells regulate the opening and closing of stomata.
d. Walls of guard cells towards the stomatal pore are thin and the walls away from the stomatal pore are highly thickened.
e. Trichomes are soft or stiff, help in preventing water loss due to transpiration and may be branched or unbranched.

	a	b	c	d	e
(1)	T	T	F	F	T
(2)	T	F	T	T	F
(3)	F	T	F	F	T
(4)	F	F	F	T	F

89. A shows apical dominance which is inhibited by B, showing C effects.
Fill in the blanks with **correct** option.
(1) B – Cytokinin, C – Synergistic
(2) A – Auxin, C – Antagonistic
(3) B – Auxin, C – Synergistic
(4) A – Cytokinin, C – Antagonistic

90. Given below are two statements
Statement-A: Double fertilisation includes syngamy and triple fusion.
Statement-B: After triple fusion, central cell becomes the primary endosperm cell (PEC).
In the light of above statements, choose the **correct** option.
(1) Both statements A and B are correct
(2) Only statement A is correct
(3) Only statement B is correct
(4) Both statements A and B are incorrect

91. If a female, who is a carrier of colourblindness marries a colourblind male.
Considering this which of the following statements is said to be **false**?
(1) It is a sex-linked recessive disorder and it is transmitted from carrier female to male progeny
(2) Probability of their children to be affected with this disorder is 25%
(3) 50% of male progenies will be affected
(4) Half of the female progenies will be carrier of this trait

92. How many decarboxylation reaction(s) will occur in one Krebs cycle?
(1) Four (2) One
(3) Three (4) Two

Space for Rough Work

93. Single membrane bound structures involved in photorespiration in plant cells are

(1) Glyoxysomes (2) Peroxisomes

(3) Spherosomes (4) Mitochondria

94. If a cell has twice as much DNA as in a normal functional cells, it means the cell

(1) Has completed division

(2) Has ceased to function

(3) Is preparing to divide

(4) Has entered in quiescent phase

95. In which of the following algae floridean starch is present as stored food?

(1) *Volvox* (2) *Ectocarpus*

(3) *Sargassum* (4) *Porphyra*

96. Which of the following statements is **incorrect** w.r.t. to exponential growth?

(1) The intrinsic rate of natural increase is called biotic potential (r)

(2) The integral form of exponential growth equation will be $N_t = N_0e^{rt}$

(3) $\frac{dN}{dt} = rN$ describes geometric growth

(4) This type of population growth does not result in J shaped curve

97. Read the following statements and select the **correct** option.

Statement-A: The entire series of communities that successively change in a given area is called sere.

Statement-B: Xerarch succession takes place in dry areas like rock, sand and saline conditions.

(1) Only statement A is correct

(2) Only statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

98. Which of the following statements is **true** regarding secondary treatment of sewage?

(1) It removes grit and large amount of organic matter

(2) It involves shredding, churning, filtration and sedimentation

(3) It does not require aeration

(4) It involves microbial digestion of organic matter.

99. Match the column-I with column-II and choose the **correct** option.

Column-I	Column-II
a. Flagellated protozoans	(i) *Plasmodium* a malarial parasite in humans
b. Ciliated protozoans	(ii) Silica shells in some forms
c. Sporozoans	(iii) Fresh water or marine, few parasite
d. Amoeboid protozoans	(iv) The parasitic forms cause diseases, such as sleeping sickness

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

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

100. Identify the following statements as true**(T)** or false**(F)** and choose the **correct** option.

A. In vexillary aestivation, the large posterior petal is called–standard, two lateral ones are wings and two small anterior petals are termed keel.

B. Leaves originate from shoot apical meristems and are arranged in an acropetal order.

C. In some plants such as bean, gram and pea, the endosperm is present in mature seeds and such seeds are called endospermic seed.

D. The opposite type of phyllotaxy is seen in *Calotropis* and guava plants.

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

Space for Rough Work

ZOOLOGY

SECTION-A

101. *Crocodilus* and *Ornithorhynchus* are similar to each other in all of the following features, **except**
(1) Presence of four chambered heart
(2) Internal fertilisation
(3) Oviparity
(4) Homeothermy

102. In humans, the type of specialised connective tissue named 'X' is present in the tip of nose. The intercellular material of 'X' is
(1) Hard and non-pliable
(2) Solid and non-pliable
(3) Solid and pliable
(4) Calcified and pliable

103. All of the following are probable reasons for increased growth rate of human population, **except**
(1) Decline in maternal mortality rate
(2) Decline in infant mortality rate
(3) Rapid decline in death rate
(4) Decline in number of people in reproducible age

104. **Assertion (A):** DNA ligase acts on cut DNA molecules and joins their ends.
Reason (R): DNA ligase is called molecular glue.
In the light of above statements, select the **correct** option.
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
(3) (A) is true, (R) is false
(4) (A) is false, (R) is true

105. Which of the following statements is not **true** w.r.t. cancer?
(1) Computed tomography uses X-rays to generate a 3-D image of the internals of an object and is very useful to detect cancers of the internal organs.
(2) Neoplastic cells compete with normal cells for nutrients.
(3) The physical carcinogens present in tobacco smoke have been identified as a major cause of lung cancer.
(4) *c-onc* have been identified in normal cells which, when activated under certain conditions, could lead to oncogenic transformation of the cell

106. Match the following columns and select the **correct** option.

	Column I		Column II
a.	Arachidonic acid	(i)	Homopolymer of glucose
b.	RuBisCO	(ii)	Amino sugar
c.	N-acetyl galactosamine	(iii)	20 carbon fatty acid
d.	Cellulose	(iv)	Most abundant protein in of the biosphere

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

107. Choose the **incorrect** match.
(1) Allergy – IgE antibodies
(2) MALT – Constitute 20 per cent of total lymphoid tissue in humans
(3) HIV – RNA acts as genetic material
(4) Bone marrow – Primary lymphoid organ

108. In humans, when the muscle fibres are in maximally contracted state
(1) The length of 'A' bands get reduced
(2) 'H' zone disappears
(3) The size of 'I' bands increases
(4) 'Z' line attached to actins are pulled outwards

Space for Rough Work

109. Neurons are excitable cells because their membranes are in a
(1) Polarised state (2) Depolarised state
(3) Hyperpolarised state (4) Repolarised state

110. What is the pitch of B-DNA?
(1) 34 Å (2) 3.4 Å
(3) 34 nm (4) 0.34 Å

111. The cutting of DNA at specific locations became possible with the discovery of so called
(1) DNA polymerases (2) Restriction enzymes
(3) DNA ligases (4) *Taq* polymerases

112. Match the column I with column II and select the **correct** option w.r.t. pBR322.

Column I	Column II
a. *ori*	(i) Codes for the proteins involved in replication of the plasmid
b. *rop*	(ii) Acts as selectable marker
c. *Bam*HI	(iii) Controls copy number of the linked DNA
	(iv) Present at the site of tetracycline resistance gene

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

113. Complete the analogy and select the **correct** option.
Ketonuria : Ketone bodies in urine :: Glycosuria : _____
(1) Glycogen in urine (2) Glucose in urine
(3) Glucose in blood (4) Glycogen in blood

114. All of the following hormones are steroidal in nature, **except**
(1) Cortisol
(2) Epinephrine
(3) Testosterone
(4) Progesterone

115. Darwin was influenced by the work of Malthus. According to Thomas Malthus,
(1) The populations remain nearly stable in size except for seasonal fluctuations.
(2) Theoretically not all population have an inherent capacity to increase its number exponentially when everybody in the population reproduces maximally.
(3) Natural resources are unlimited in the nature.
(4) Nature does not keep a control over the size of population.

116. Select the **incorrect** option w.r.t. functions of androgens in humans.
(1) Regulate development, maturation and functions of the male accessory sex organs.
(2) They play a major regulatory role in the process of spermatogenesis.
(3) They act on the central neural system and influence the male sexual behaviour.
(4) They have catabolic effects on proteins.

117. Read the following features.
a. Alveolar walls are damaged
b. Allergic inflammation of bronchi and bronchioles
c. Respiratory surface area is decreased
Which of the above given features is/are related to disorder whose one of the major cause is cigarette smoking?
(1) a and b (2) only a
(3) a and c (4) only c

118. The penis is the male external genitalia, made up of special tissue that helps in erection of penis to
(1) Facilitate spermiation
(2) Prevent fertilization
(3) Facilitate insemination
(4) Decrease libido

119. Consider the following features.
a. Sexes are not separate
b. Shows endoparasitism
c. Absence of coelomic cavity
All of the above mentioned features belong to
(1) *Planaria* (2) *Taenia*
(3) *Ascaris* (4) *Hirudinaria*

Space for Rough Work

120. Which of the following structures leave the testis and open into epididymis located along the posterior surface of each testis?
(1) Vas deferens (2) Seminiferous tubule
(3) Vasa efferentia (4) Ejaculatory duct

121. Choose the **odd** one w.r.t. parts of *Cannabis sativa* used in preparation of various types of drugs.
(1) Flower tops (2) Leaves
(3) Resins (4) Roots

122. In the blood vascular system of frog, the ventricle opens into which of the following structures?
(1) Sinus venosus (2) Conus arteriosus
(3) Right atrium (4) Left atrium

123. Which of the following is **incorrect** w.r.t. diaphragms used for contraception?
(1) They are used only by females
(2) They are reusable
(3) They are barriers made of rubber
(4) They protect the user from STIs

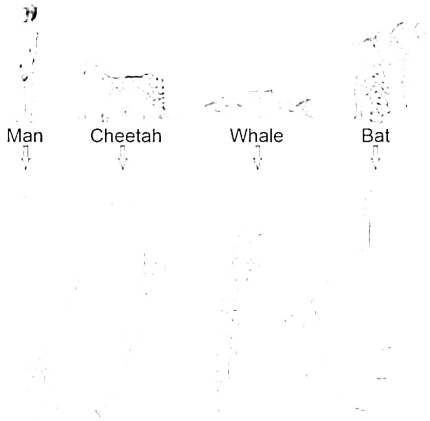
124. In which year, an American company got patent rights on Basmati rice through the US Patent and Trademark Office?
(1) 1997 (2) 1951
(3) 1947 (4) 1999

125. Choose the **correct** pathway of gases during the expiration in humans.
(1) Pharynx → Larynx → Bronchi → Bronchiole → Alveoli
(2) Alveoli → Larynx → Bronchi → Pharynx → Nasal chamber
(3) Alveoli → Bronchioles → Bronchi → Larynx → Pharynx
(4) Pharynx → Larynx → Bronchi → Secondary bronchioles → Terminal bronchioles → Alveoli

126. Which of the following structures have ploidy '2n' and 'n' respectively?
(1) Spermatids, spermatozoa
(2) Spermatids, secondary spermatocytes
(3) Spermatogonium, primary spermatocytes
(4) Primary spermatocytes, secondary spermatocytes

127. What is the prosthetic group of an enzyme that catalyses the breakdown of H_2O_2?
(1) Zinc (2) Haem
(3) Niacin (4) Magnesium

128. Consider the given diagram and select the **correct** option w.r.t. it.



(1) Represents example of analogous structure
(2) Structures given perform similar function *i.e.*, locomotion but have anatomical dissimilarities
(3) Given structures are result of convergent evolution
(4) Given forelimbs indicate common ancestory

129. Which of the following is the common characteristic of all vertebrates without any exception?
(1) Presence of paired appendages
(2) Presence of external fertilization
(3) Pelvic fins bear claspers
(4) Presence of ventral heart

130. The cranial capacity of A was more than that of B .

Select the option that **correctly** identifies 'A' and 'B'.

	A	B
(1)	*Homo habilis*	Neanderthal man
(2)	*Homo erectus*	*Homo habilis*
(3)	*Homo habilis*	*Homo erectus*
(4)	*Homo erectus*	Neanderthal man

Space for Rough Work

131. What is the number of documented varieties of Basamati rice that are grown in India?
(1) 200,000 (2) 27
(3) 270 (4) 200

132. Which of the following organisms belongs to the largest phylum of kingdom Animalia and is not economically beneficial?
(1) *Laccifer* (2) *Chaetopleura*
(3) *Locusta* (4) *Cucumaria*

133. A 24 kb circular plasmid has two restriction sites for *Eco*RI and one restriction site for *Hin*dIII. The plasmid is digested using the *Eco*RI. The number of fragment(s) obtained will be equal to
(1) Three (2) Four
(3) Two (4) One

134. Complete the analogy by selecting the **correct** option.
Low temperature : Preserves the enzyme :: High temperature : _____
(1) Temporarily inactivates the enzyme
(2) Optimum activity shown by the enzyme
(3) Denatures the enzyme
(4) Enzymes become hyperactive

135. **Assertion (A):** The total number of tarsals in one limb of an adult human is equal to the total number of carpals in one limb.
Reason (R): The total number of both tarsals and carpals in one limb of an adult human is eight.
In the light of above statements, select the **correct** option.
(1) Both (A) and (R) are true, (R) is the correct explanation of (A)
(2) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
(3) (A) is true, (R) is false
(4) Both (A) and (R) are false

SECTION-B

136. How many of the contraceptive devices mentioned in the box below are not copper releasing IUDs?

CuT, LNG-20, Lippes loop, Multiload 375, Vaults, Progestasert

Select the **correct** option.
(1) Four (2) Two
(3) Five (4) Three

137. Which of the following hormones acts mainly on hepatocytes and adipocytes and enhances cellular glucose uptake?
(1) Insulin (2) Glucagon
(3) Epinephrine (4) Glucocorticoids

138. Arrange the following blood cells in increasing order of their percentage count in blood of an adult healthy man.
a. Neutrophils b. Monocytes
c. Basophils d. Erythrocytes
Select the **correct** option.
(1) c < b < d < a (2) a < c < b < d
(3) c < b < a < d (4) a < b < c < d

139. What is the duration of each cardiac cycle in an adult human under normal conditions?
(1) 0.1 second (2) 0.8 seconds
(3) 0.3 seconds (4) 0.2 seconds

140. Which of the following structures in human respiratory system is the common passage for both food and air?
(1) Nasal chamber (2) Trachea
(3) Pharynx (4) Larynx

141. $\underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{Water}}{H_2O} \overset{\text{'X'}}{\rightleftharpoons} \underset{\text{Carbonic acid}}{H_2CO_3}$
In the above given reaction, enzyme 'X' dramatically increases the speed of reaction with about 600,000 molecules being formed every second. Identify 'X' and select the **correct** option.
(1) Peroxidase (2) Catalase
(3) Carbonic anhydrase (4) Carboxypeptidase

142. Read the given statements and choose the **correct** option.
Statement A: The number of cervical vertebrae are seven in all mammals including humans.
Statement B: The sacral vertebrae are fused in adult humans.
Statement C: The vertebral column protects spinal cord and supports the head.
(1) All statements A, B and C are incorrect
(2) Both statements B and C are incorrect
(3) Only statement A is incorrect
(4) Both statements A and C are correct

Space for Rough Work

143. Which of the following is a characteristic of an ideal contraceptive?
(1) It should not be user friendly
(2) It should interfere with the sexual drive of the user
(3) It should be effective and reversible
(4) It should have side effects

144. Match column I and column II w.r.t. neural system in humans.

	Column I		Column II
a.	Afferent nerve fibres	(i)	Transmit regulatory impulses from CNS to peripheral organs
b.	Synaptic vesicles	(ii)	Present in myelinated neurons of PNS
c.	Efferent nerve fibres	(iii)	Transmit impulses from organs to CNS
d.	Nodes of Ranvier	(iv)	Contain neurotransmitters

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

145. The RBC of a frog is similar to the RBC of a human in which of the following aspects?
(1) Both are nucleated and contain haemoglobin
(2) Both are enucleated and contain haemoglobin
(3) Both contain haemoglobin
(4) Both are enucleated and do not contain haemoglobin

146. Read the following statements and select the **incorrect** one.
(1) Collecting duct extends from the cortex of kidney to the inner parts of the medulla.
(2) The Henle's loop and vasa recta mainly play a significant role in counter current mechanism.
(3) Osmoreceptors in the body are activated by changes in blood volume, body fluid volume and ionic concentration.
(4) The tubular epithelial cells in different segments of nephron perform reabsorption by active mechanism only.

147. If guanine makes 32% of the double stranded DNA molecule, what will be the percentage of thymine and adenine in it?

	Thymine	Adenine
(1)	42%	64%
(2)	18%	42%
(3)	42%	42%
(4)	18%	18%

148. Read the following statements carefully.
a. The replication of the plasmid is dependent upon the coding strand of genomic DNA.
b. Each restriction endonuclease functions by inspecting the length of a DNA sequence.
c. The disarmed *Ti* plasmid used as vector is pathogenic to plants.
Select the **correct** option.
(1) a, b and c are correct
(2) a and b are incorrect
(3) a, b and c are incorrect
(4) a and c are incorrect

149. In Hardy-Weinberg equation, the frequency of homozygous dominant individual is represented by
(1) 2pq (2) pq
(3) q^2 (4) p^2

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

	Column I		Column II
a.	Tetanus	(i)	Hallucinogen
b.	Morphine	(ii)	Viral disease
c.	*Amanita muscaria*	(iii)	Antitoxin that provides passive immunity
d.	Common cold	(iv)	Used as sedative

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

Space for Rough Work

CHEMISTRY

SECTION-A

151. Hybridisation and shape of BrF_5 is
(1) sp^3d and trigonal bipyramidal
(2) sp^3d^2 and square pyramidal
(3) sp^3d and square pyramidal
(4) sp^3d^2 and octahedral

152. The correct order of stability for N_2 and its ions is
(1) $N_2 > N_2^+ = N_2^- > N_2^{2-}$ (2) $N_2^{2-} > N_2^- = N_2^+ > N_2$
(3) $N_2 > N_2^+ > N_2^- > N_2^{2-}$ (4) $N_2^{2-} > N_2^- > N_2^+ > N_2$

153. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A): Boiling point of 1 molal NaCl solutions is same as 1 molal urea solution.
Reason (R): Elevation in boiling point is directly proportional to number of solute particles.
In the light of the above statements, choose the most appropriate answer from the options given below.
(1) Both (A) and (R) are correct and (R) is the correct explanation of (A)
(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(3) (A) is correct but (R) is incorrect
(4) (A) is incorrect but (R) is correct

154. The vapour pressure of pure liquids A and B are 400 mm Hg and 600 mm Hg respectively at 350 K, then the composition of the liquid mixture will be (Total vapour pressure = 450 mm Hg and X_A and X_B are the mole fraction of component A and B respectively in liquid mixture)
(1) $X_A = 0.5, X_B = 0.5$ (2) $X_A = 0.75, X_B = 0.25$
(3) $X_A = 0.25, X_B = 0.75$ (4) $X_A = 0.8, X_B = 0.2$

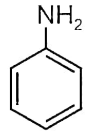
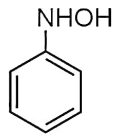
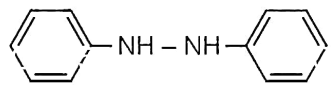
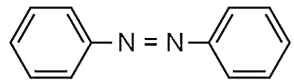
155. An element with atomic number 37 belongs to
(1) *s*-block (2) *p*-block
(3) *d*-block (4) *f*-block

156. Match list-I with list-II

	List-I (Molecules)		List-II (shape)
a.	SO_2	(i)	Square planar
b.	XeF_4	(ii)	T-shape
c.	ClF_3	(iii)	Trigonal bipyramidal
d.	PF_5	(iv)	Bent

Choose the correct answer from the options given below.
(1) a(iv), b(i), c(ii), d(iii) (2) a(i), b(iv), c(ii), d(iii)
(3) a(i), b(iv), c(iii), d(ii) (4) a(iv), b(i), c(iii), d(ii)

157. At 25°C, molar conductance of 0.1 molar aqueous solution of acetic acid is 8.54 $ohm^{-1}\ cm^2\ mol^{-1}$ and at infinite dilution the molar ionic conductance of acetate ion and H^+ ion are 349.6 $ohm^{-1}\ cm^2\ mol^{-1}$ and 40.9 $ohm^{-1}\ cm^2\ mol^{-1}$ respectively. The percentage degree of ionisation of acetic acid is
(1) 2.186% (2) 1.093%
(3) 0.021% (4) 0.109%

158. Nitrobenzene on reaction with lithium aluminium hydride majorly gives
(1) 
(2) 
(3) 
(4) 

Space for Rough Work

159. Solubility product of AB, AB_2 and A_2B_3 type of salts at same temperature are 1×10^{-12}, 4×10^{-9} and 1.08×10^{-23}respectively. The salt having maximum solubility in water is

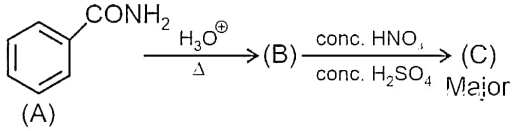
(1) AB

(2) AB_2

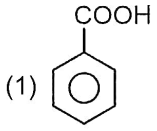
(3) A_2B_3

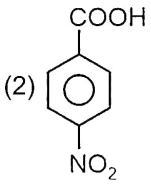
(4) All are of same solubility

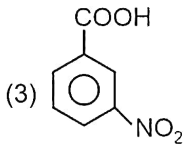
160. Consider the following reaction

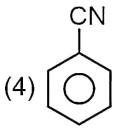


The product (C) is

(1) 

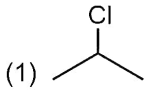
(2) 

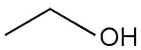
(3) 

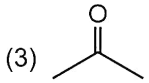
(4) 

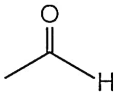
161. 2,2-Dichloropropane on reaction with aqueous alkali forms compound X which gives positive iodoform test.

The compound X is

(1) 

(2) 

(3) 

(4) 

162. Given below are the two statements

Statement-I: Amylose is water soluble component of starch.

Statement-II: Chemically amylose is branched chain polymer of α-D-glucose units.

In light of the above statements, choose the correct option.

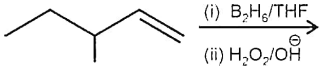
(1) Statement I is correct but statement II is incorrect

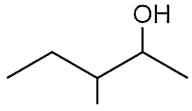
(2) Statement I is incorrect but statement II is correct

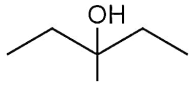
(3) Both statement I and statement II are correct

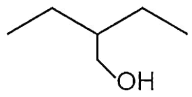
(4) Both statement I and statement II are incorrect

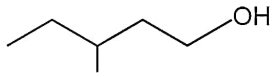
163. Major product of the given reaction is



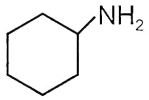
(1) 

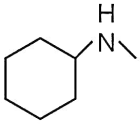
(2) 

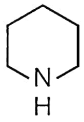
(3) 

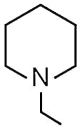
(4) 

164. An organic compound (A) on reaction with Hinsberg's reagent forms compound (B). Compound (B) dissolves in aqueous alkali. Compound (A) could be

(1) 

(2) 

(3) 

(4) 

165. Consider the following statements

a. 1,2-Dichloroethene shows geometrical isomerism

b. trans-But-2-ene is a polar molecule.

c. Boiling point of cis-But-2-ene is higher than trans-But-2-ene

The correct statement(s) are

(1) a and b only (2) b and c only

(3) a and c only (4) a, b and c

Space for Rough Work

166. What mass of 40% pure $CaCO_3$ will be required to neutralise 50 mL of 0.5 N HCl solution according to the following reaction?

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(\ell)$

(1) 6.25 g (2) 3.125 g
(3) 25.0 g (4) 15 g

167. The number of moles of oxygen molecule required to produce 32 moles of nitric oxide during Ostwald process is
(1) 30 (2) 40
(3) 50 (4) 20

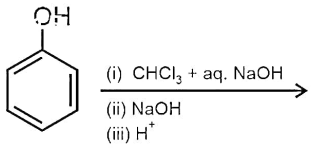
168. Appearance of violet colour on addition of sodium nitroprusside in the sodium fusion extract indicates the presence of
(1) Chlorine (2) Bromine
(3) Carbon (4) Sulphur

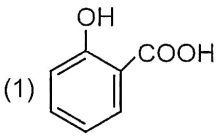
169. Alcoholic compounds on reaction with ceric ammonium nitrate gives
(1) Yellow colour (2) Red colour
(3) Pink colour (4) Blue colour

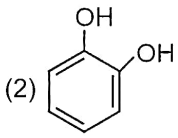
170. Choose the incorrect match.

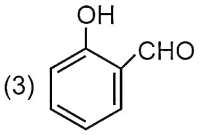
	List-I (Reactions)	List-II (Overall order of the reaction)
(1)	$2NH_3(g) \xrightarrow[\text{Pt catalyst}]{1130\ K} N_2(g) + 3H_2(g)$	0
(2)	$^{226}_{88}Ra \rightarrow {}^{4}_{2}He + {}^{222}_{86}Rn$	1
(3)	$C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$	2
(4)	$2N_2O_5(g) \rightarrow 4NO_2(g) + O_2(g)$	1

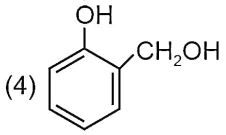
171. The major product in the following reaction is



(1) 

(2) 

(3) 

(4) 

172. Consider the following reaction

$\text{Phenol} \xrightarrow[\Delta]{\text{Zn dust}} X \xrightarrow[\text{Anhy. } AlCl_3]{CH_3Cl} Y \xrightarrow[H_2O/H^+]{\text{Alk. } KMnO_4} Z$

The product Z is
(1) Benzene (2) Toluene
(3) Benzaldehyde (4) Benzoic acid

173. The correct order of melting point of the following is
(1) HF < HCl < HBr < HI
(2) HI < HBr < HCl < HF
(3) HCl < HBr < HF < HI
(4) HBr < HCl < HI < HF

174. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$ and $H_4P_2O_7$ respectively are
(1) +3, +4 and +5 (2) +3, +5 and +4
(3) +4, +5 and +3 (4) +5, +4 and +3

175. In Carius method of estimation of halogen, 0.56 g of an organic compound gave 0.4 g of AgBr. The percentage of bromine in the compound is
(Atomic mass of Ag = 108u and Br = 80u)
(1) 28.8% (2) 32.4%
(3) 31.4% (4) 30.4%

176. Consider the following statements

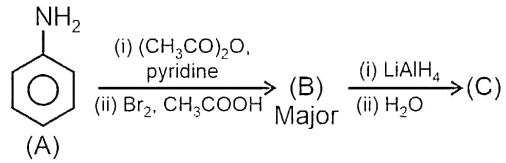
Statement-I: Thin layer chromatography is another type of partition chromatography.

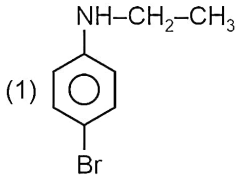
Statement-II: In thin layer chromatography, amino acids may be detected by spraying the plate with ninhydrin solution.

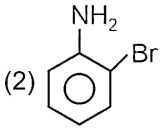
In the light of above statements, choose the correct option.
(1) Statement I is correct but statement II is incorrect
(2) Statement I is incorrect but statement II is correct
(3) Both statement I and statement II are correct
(4) Both statement I and statement II are incorrect

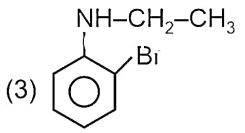
Space for Rough Work

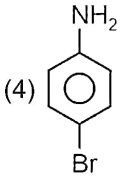
177. The product (C) formed from the following reaction sequence is



(1) 

(2) 

(3) 

(4) 

178. Which of the following reactions is not disproportionation redox reaction?

(1) $P_4 + 3OH^- + 3H_2O \rightarrow PH_3 + 3H_2PO_2^-$

(2) $S_8 + 12OH^- \rightarrow 4S^{2-} + 2S_2O_3^{2-} + 6H_2O$

(3) $F_2 + 2OH^- \rightarrow 2F^- + OF_2$

(4) $Cl_2 + OH^- \rightarrow ClO^- + Cl^- + H_2O$

179. The correct order of atomic radius of group-13 elements is

(1) B < Al < Ga < In < Tl (2) B < Tl < Ga < In < Al

(3) B < In < Al < Ga < Tl (4) B < Ga < Al < In < Tl

180. The correct order of reactivity towards S_N2 reaction is

(1) 1-Bromo-2-methylbutane > 1-Bromo-3-methylbutane > 1-Bromobutane > 1-Bromo-2,2-dimethylpropane

(2) 1-Bromo-2,2-dimethylpropane > 1-Bromo-3-methylbutane > 1-Bromo-2-methylbutane > 1-Bromobutane

(3) 1-Bromo-3-methylbutane > 1-Bromobutane > 1-Bromo-2-methylbutane > 1-Bromo-2,2-dimethylpropane

(4) 1-Bromobutane > 1-Bromo-3-methylbutane > 1-Bromo-2-methylbutane > 1-Bromo-2,2-dimethylpropane

181. Consider the following statements.

Statement-I: In case haloarenes, the phenylcation formed as a result of self-ionisation will not be stabilised by resonance.

Statement-II: The presence of an electron withdrawing group at ortho and para-positions increases the reactivity of haloarenes towards nucleophilic substitution reaction.

In the light of above statements, choose the correct option.

(1) Both statement I and statement II are correct

(2) Statement I is correct but statement II is incorrect

(3) Statement I is incorrect but statement II is correct

(4) Both statement I and statement II are incorrect

182. Which of the following is an outer orbital complex and exhibits paramagnetic behaviour?

(1) $[Co(CN)_6]^{3-}$ (2) $[Co(C_2O_4)_3]^{3-}$

(3) $[CoF_6]^{3-}$ (4) $[Co(NH_3)_6]^{3+}$

183. If one of the hydrogen atom is replaced by chlorine atom in diphenylmethane then total number of structural isomers will be

(1) 4 (2) 5

(3) 6 (4) 8

184. If the value of (n + l) is more than 2 and less than 5. The maximum number of orbitals possible will be

(1) 13 (2) 5

(3) 4 (4) 8

185. The correct order of increasing acidic character of oxides of manganese is

(1) $Mn_2O_7 < Mn_3O_4 < MnO_2 < MnO$

(2) $MnO < Mn_3O_4 < MnO_2 < Mn_2O_7$

(3) $Mn_2O_7 < MnO_2 < Mn_3O_4 < MnO$

(4) $MnO < MnO_2 < Mn_3O_4 < Mn_2O_7$

Space for Rough Work

SECTION-B

186. Consider the following statements about resonance.

a. Resonance stabilizes the molecule as the energy of the resonance hybrid is less than the energy of any single canonical structure.

b. Resonance averages the bond characteristic as a whole.

c. There is equilibrium between the canonical forms.

d. The canonical forms have real existence.

The correct statements are

(1) a and b only (2) b and c only

(3) c and d only (4) a, b, c and d

187. Two columns I and II has been given below. Column I has cell notation and column II has number of electrons involved in cell reaction. Match column I with column II and choose the correct option.

	Column I		Column II
a.	$Zn(s)\|Zn^{2+}(aq)\|\|Cu^{2+}(aq)\|Cu(s)$	(i)	6
b.	$Cr(s)\|Cr^{3+}(aq)\|\|Fe^{2+}(aq)\|Fe(s)$	(ii)	2
c.	$Al(s)\|Al^{3+}(aq)\|\|Ag^{+}(aq)\|Ag(s)$	(iii)	1
d.	$Li(s)\|Li^{+}(aq)\|\|K^{+}(aq)\|K(s)$	(iv)	3

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

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

188. Consider the following reactions

$$H_2(g)+\frac{1}{2}O_2(g) \rightleftharpoons H_2O(g);\ K_1$$

$$N_2(g)+O_2(g) \rightleftharpoons 2NO(g);\ K_2$$

$$N_2(g)+3H_2(g) \rightleftharpoons 2NH_3(g);\ K_3$$

Equilibrium constant for the following reaction is

$$2NH_3(g)+\frac{5}{2}O_2(g) \rightleftharpoons 2NO(g)+3H_2O(g)$$

(1) $\frac{K_3}{K_1K_2^2}$ (2) $\frac{K_2K_1^3}{K_3}$

(3) $\frac{K_1^3K_3}{K_2}$ (4) $\frac{K_2K_1^2}{K_3^2}$

189. Which among the following reactions will not give chiral product?

a. $CH_3-\overset{O}{\overset{\|}{C}}-Ph \xrightarrow[(ii)\ H_2O]{(i)\ LiAlH_4}$

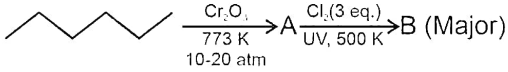
b. $CH_3-CH_2-\overset{O}{\overset{\|}{C}}-H \xrightarrow[(ii)\ H_2O]{(i)\ C_2H_5MgBr}$

c. $CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[(ii)\ H_2O]{(i)\ CH_3MgBr}$

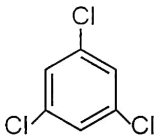
(1) a and b only (2) a and c only

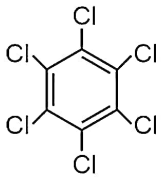
(3) b and c only (4) a, b and c

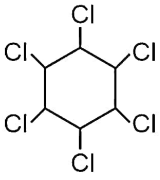
190. Consider the following reaction sequence

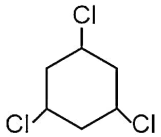


Major product B is

(1) 

(2) 

(3) 

(4) 

191. The pH of 0.5 M aqueous sodium hydroxide solution is (log5 = 0.69)

(1) 9.8

(2) 0.3

(3) 13.7

(4) 5.1

Space for Rough Work

192. Match column-I with column-II

	Column I		Column II
a.	Basic amino acid	(i)	Cysteine
b.	Sulphur containing amino acid	(ii)	Proline
c.	Cyclic amino acid	(iii)	Glutamine
d.	Amino acid having $-\underset{\underset{O}{\|\|}}{C}-NH_2$ group	(iv)	Lysine

Choose the correct answer from the options given below.

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

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

193. Consider the following statements about catalyst

a. A catalyst does not alter Gibbs energy, ΔG of a reaction.

b. A catalyst catalyses both spontaneous as well as non-spontaneous reaction.

c. Catalyst helps in attaining the equilibrium faster.

d. A small amount of catalyst can catalyse a large amount of reactants.

The correct statement are

(1) a, b and d only (2) a, b and c only

(3) a, b, c and d (4) a, c and d only

194. Which of the following statement is not correct for oxoacids of phosphorous?

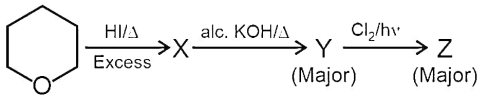
(1) Oxoacids which contain P–H bond have strong reducing properties.

(2) Pyrophosphoric acid contains four P – OH, two P = O and one P – O – P bonds.

(3) Orthophosphous acid on heating disproportionates to give hypophosphoric acid and phosphine

(4) oxidation state of phosphorous in orthophosphours acid is +3

195. The product 'Z' in the following reaction is



(1) Vinyl chloride

(2) Vinyl iodide

(3) Allyl iodide

(4) Allyl chloride

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

Assertion (A): Boiling points of propan-1-ol is higher than the acetone.

Reason (R): In propan-1-ol, intermolecular hydrogen bonding is present.

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

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

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

(3) (A) is correct but (R) is incorrect

(4) (A) is incorrect but (R) is correct

197. Choose the incorrect statement among the following

(1) $[Co(en)_2(NH_3)_2]^{3+}$ is a more stable complex than $[Co(NH_3)_6]^{3+}$

(2) $[Co(en)_3]^{3+}$ does not show geometrical isomerism

(3) Cis-$[PtCl_2(NH_3)_2]$ is used as an anticancer agent

(4) $[Ni(H_2O)_6]^{2+}$ is colourless whereas $[Ni(CN)_4]^{2-}$ is green in colour

Space for Rough Work

198. The standard molar enthalpy of formation of ethane, carbon dioxide and water are –20 kcal mol^{-1}, –80 kcal mol^{-1} and –60 kcal mol^{-1} respectively. The standard molar enthalpy of combustion of ethane is

(1) 320 kcal mol^{-1} (2) –372 kcal mol^{-1}

(3) 372 kcal mol^{-1} (4) –320 kcal mol^{-1}

199. Given below are two statements with respect to photoelectric effect.

Statement-I: The number of electrons ejected is proportional to the intensity of light.

Statement-II: The kinetic energies of ejected electrons increases with increase in intensity of light used

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

(1) Statement I is correct but statement II is incorrect

(2) Statement I is incorrect but statement II is correct

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect

200. For the redox reaction

$$MnO_4^- + Br^{\ominus} + H_2O \rightarrow MnO_2 + BrO_3^- + OH^{\ominus}$$

The correct coefficients of the reactants for the balanced equation are

	MnO_4^-	Br^-	H_2O
(1)	2	1	1
(2)	2	3	2
(3)	1	1	2
(4)	1	2	4

❑ ❑ ❑

Space for Rough Work