29/05/2024

CODE-A

Aakash
Medical | IIT-JEE | Foundations
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AIM – 720

(*Advanced* INTENSIVE *Mastery for* 720)

MM : 720 **CST – 16** **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

Choose the correct answer:

SECTION-A

1. A car is moving at a speed of 20 m/s. The diameter of its wheels are 0.5 m. If the wheels are stopped in 20 rotations by applying brakes. then angular retardation produced by the brakes is

(1) $\frac{80}{\pi}$ rad/s^2 (2) 80 rad/s^2

(3) $\frac{40}{\pi}$ rad/s^2 (4) 40 rad/s^2

2. Let $\vec{F}$ be the force acting on a particle having position vector $\vec{r}$ and $\vec{\tau}$ be the torque of this force on the particle about origin. Then

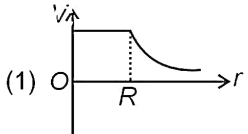
(1) $\vec{r}\cdot\vec{\tau}=0$ and $\vec{F}\cdot\vec{\tau}=0$

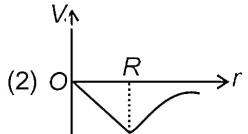
(2) $\vec{r}\cdot\vec{\tau}=0$ and $\vec{F}\cdot\vec{\tau}\neq 0$

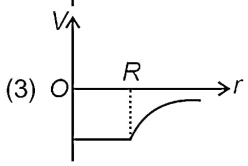
(3) $\vec{r}\cdot\vec{\tau}\neq 0$ and $\vec{F}\cdot\vec{\tau}=0$

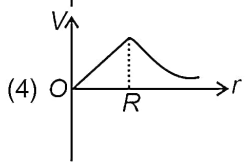
(4) $\vec{r}\cdot\vec{\tau}\neq 0$ and $\vec{F}\cdot\vec{\tau}\neq 0$

3. Which of the following curve represents the variation of gravitational potential of a hollow sphere of uniform mass density of radius R with distance r from the centre?

(1) 

(2) 

(3) 

(4) 

4. A steel wire of length 4.9 m and cross-section 3.0×10^{-5} m^2 stretches by the same amount as a copper wire of length 3.5 m and cross-section 4.0×10^{-5} m^2 under a given load. The ratio of the young's modulus of steel to that of copper is nearly

(1) 1 (2) 1.9

(3) 2.6 (4) 4.2

5. A convex lens of power +6 D is placed in contact with a concave lens of power –4 D. The nature and focal length of this combination will be
   (1) Diverging, 25 cm (2) Converging, 50 cm
   (3) Diverging, 50 cm (4) Converging, 200 cm

6. **Assertion (A):** Focal length of a convex mirror of radius of curvature R is equal to $f = \frac{R}{2}$

   Reason (R): The focal length of a convex mirror will increase, if the mirror is placed in water

   In the light of above statements, choose the correct option.
   (1) Both (A) and (R) are true but (R) is not the correct explanation of (A)
   (2) Both (A) and (R) are true and (R) is the correct explanation of (A)
   (3) (A) is true but (R) is false
   (4) Both (A) and (R) are false

7. A capacitor has a capacity of 4 pF. If electric potential across this capacitor is changing at a rate of 10^{11} Vs^{-1}. The displacement current is
   (1) 0.4 A (2) 4 A
   (3) 0.2 A (4) 2 A

8. A parallel beam of light of wavelength 4000 Å gets diffracted by a single slit of width 0.2 mm. The angular position of the first minima of diffracted light is
   (1) 2×10^{-4} radian (2) 2×10^{-3} radian
   (3) 4×10^{-7} radian (4) 4×10^{-3} radian

9. Electron volt is a unit of
   (1) Potential difference (2) Electric current
   (3) Energy (4) Resistance

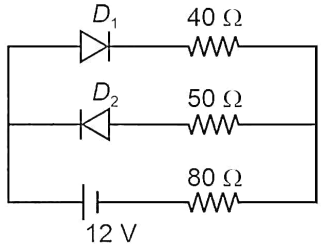
10. The sun delivers about 1.5 kW/m^2 of electromagnetic flux to the earth's surface, then (assuming the roof to be a perfect absorber)
    a. The total power incident on a roof of dimensions 6 m × 14 m is 126 kW
    b. The solar energy in joules incident on roof in 2 hour is 800 MJ
    c. The radiation pressure is 5×10^{-6} N/m^2
    d. The force on surface of roof of dimension 6 m × 14 m is 4. 2×10^{-4} N

    Based on above information choose the correct option.
    (1) a, b, c and d all are correct
    (2) Only b and c are correct
    (3) Only a and c are correct
    (4) Only a, c and d are correct

11. The energy released per fission of nucleus of ^{240}X is 200 MeV. The energy released if all the atoms in 80 g of pure ^{240}X undergo fission is:
    (Given $N_A = 6 \times 10^{23}$)
    (1) 6×10^{25} MeV (2) 2×10^{25} MeV
    (3) 4×10^{25} MeV (4) 8×10^{25} MeV

12. In a semiconductor, the number density of intrinsic charge carriers at 27°C is $2.5 \times 10^{16}/m^3$. If the semiconductor is doped with impurity atom, the hole density increases to $7.5 \times 10^{22}/m^3$. Then the electron density in the doped semiconductor is
    (1) $2 \times 10^9/m^3$ (2) $5.4 \times 10^9/m^3$
    (3) $3.8 \times 10^9/m^3$ (4) $8.3 \times 10^9/m^3$

13. The circuit shown in figure contains two diodes each with a forward resistance of 40 ohm and with infinite reverse resistance. If the battery voltage is 12 V then current through the 80 ohm resistance is



    (1) 75 A (2) 7.5 mA
    (3) 75 mA (4) 0.1 A

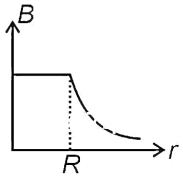
14. **Assertion (A):** The resistivity of a semiconductor decreases with increase in temperature.

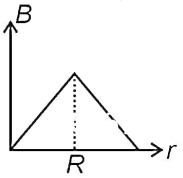
    Reason (R): In semiconductor, rate of collisions between free electrons and ions decreases with increase in temperature.

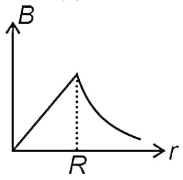
    In the light of above statements, choose the correct option.
    (1) Both (A) and (R) are true and (R) is the correct explanation of (A)
    (2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
    (3) (A) is true but (R) is false
    (4) Both (A) and (R) are false

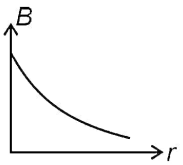
Space for Rough Work

15. A wire of resistance 100 Ω is cut into 10 equal parts and these parts are then connected in parallel. The equivalent resistance of the combination will be
(1) 1 Ω (2) 10 Ω
(3) 100 Ω (4) 1000 Ω

16. The variation of magnetic field due to a long solid cylindrical wire of radius R and carrying a uniform and steady current with r is best represented by (r is the distance from the axis of the wire)
(1) 

(2) 

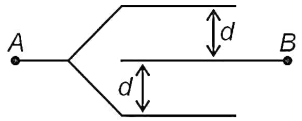
(3) 

(4) 

17. The universal property of all substance is
(1) Ferromagnetism (2) Diamagnetism
(3) Paramagnetism (4) Both (1) and (2)

18. A circular current carrying loop of radius R has magnetic field B at its centre due to itself. The magnetic moment of the loop is
(1) $\frac{\pi BR^3}{\mu_0}$ (2) $\frac{\pi BR^2}{\mu_0}$
(3) $\frac{2\pi BR^3}{\mu_0}$ (4) $\frac{\pi BR^2}{2\mu_0}$

19. **Statement-A:** An electric dipole placed inside the uniform electric field is always in translational equilibrium
Statement-B: Charge is invariant in nature.
In the light of above statements, choose the correct option.
(1) Both statement A and statement B are correct
(2) Both statement A and statement B are incorrect
(3) Statement A is correct and statement B is incorrect
(4) Statement A is incorrect and statement B is correct

20. Consider the given arrangement of plates. If area of each plate is A and the distance between them is d then the net capacitance of the arrangement is


(1) $\frac{A\varepsilon_0}{d}$ (2) $\frac{A\varepsilon_0}{2d}$
(3) $\frac{2A\varepsilon_0}{d}$ (4) $\frac{3A\varepsilon_0}{2d}$

21. Two tuning forks when sounded together produce 4 beats in 2 seconds. The time interval between two successive minimum intensities of sound is
(1) $\frac{1}{2}$ s (2) 1 s
(3) $\frac{3}{4}$ s (4) $\frac{1}{4}$ s

22. A particle moves according to the equation $x = a\cos\frac{\pi t}{2}$. The displacement of the particle in the time interval $t = 0$ to $t = 4$ s is
(1) $4a$ (2) $2a$
(3) Zero (4) a

23. Choose the correct statement with regard to zeroth law of thermodynamics
(1) If two system A and B are in thermal equilibrium with a third system C, then A and B are also in thermal equilibrium with each other
(2) Every object has a certain temperature and two bodies can never have equal temperatures
(3) If two bodies A and B are in thermal equilibrium then the two bodies have equal potential energy
(4) If two system A and B are in thermal equilibrium with a third system C, then A and B are not in thermal equilibrium with each other

Space for Rough Work

24. At 27°C two moles of an ideal monatomic gas occupy a volume of V. The gas expands adiabatically to a volume of $2V$. The final temperature of the gas approximately is

$\left[\text{Take } 2^{\frac{2}{3}} = 1.59\right]$

(1) 91 K (2) 189 K

(3) 63 K (4) 451 K

25. The SI unit of rate of flow of liquid is

(1) cm^3/s (2) m^3/s

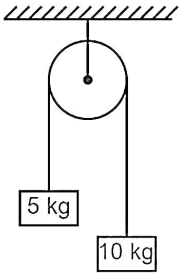
(3) cm^2/s (4) m^2/s

26. If 20 g of ice absorbs 160 cal heat at 0°C, then the final content of ice in the mixture is

(1) 2 g (2) 18 g

(3) 20 g (4) 16 g

27. Two blocks of masses 5 kg and 10 kg are connected to a pulley as shown. Magnitude of acceleration of masses if the pulley is set free is ($g = 10\ m/s^2$)



(1) 3.33 m s^{-2} (2) 10 m s^{-2}

(3) 5.28 m s^{-2} (4) 2.5 m s^{-2}

28. The velocity of a particle moving along x-axis is given by $v = 5x$. The magnitude of acceleration of particle at $x = 2$ is (All the quantities have S.I. unit)

(1) $6\ m/s^2$ (2) $12\ m/s^2$

(3) $50\ m/s^2$ (4) $40\ m/s^2$

29. **Assertion (A):** The path of one projectile as seen from another projectile during air is a straight line.

Reason (R): Two projectiles projected with same speed at angles α and $(90° - \alpha)$ have same range.

In the light of above statements, choose 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 but (R) is false

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

30. In a straight line motion the distance travelled by an object is proportional to the square root of the time taken. Acceleration of the object is proportional to

(1) v (2) v^2

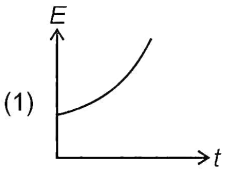
(3) v^3 (4) $\sqrt{v}$

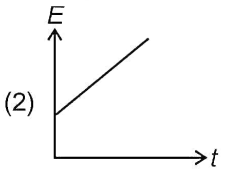
31. Five gas molecules have speeds 4, 3, 7, 5 and 9 m/s. The average speed of these molecules (in m/s) is

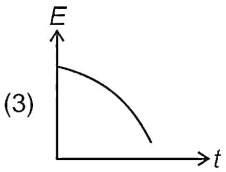
(1) Zero (2) 5.2 m s^{-1}

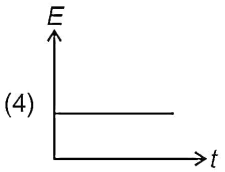
(3) 5.6 m s^{-1} (4) 6 m s^{-1}

32. A ball is thrown horizontally with speed v from a height H above the ground. The graph between kinetic energy (KE) of ball and time t till it reaches the ground is best represented by

(1) 

(2) 

(3) 

(4) 

33. A particle of mass m is initially at rest at the origin. It is subjected to a force and it starts moving along the x-axis. Its kinetic energy (KE) changes with time as $\frac{d(KE)}{dt} = 2t$. Then

(1) Its speed is proportional to $\sqrt{t}$

(2) The force on the mass is constant

(3) Its displacement at any time is proportional to t

(4) Both (1) and (2)

Space for Rough Work

34. In RLC series circuit, the current is found to be maximum when inductance is 0.5 H and capacitance is 32 μF. The angular frequency of the source voltage is

(1) 400 rad/s (2) 500 rad/s

(3) 200 rad/s (4) 250 rad/s

35. A semicircular conducting loop of diameter 0.4 m is moved with a speed of 7 m/s perpendicular to a magnetic field of intensity 0.5 Wb/m^2. The induced emf across the conductor is

(1) 4.1 V (2) 2.2 V

(3) 2.8 V (4) 1.4 V

SECTION-B

36. A wheel of moment of inertia 10 kgm^2 is rotating at 10 rotations per minute. The work done in increasing its angular speed to 5 times its initial value, will be nearly

(1) 100 J (2) 133.3 J

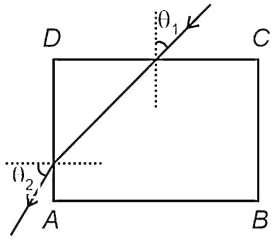
(3) 13.4 J (4) 0.131 J

37. A research satellite of mass 200 kg circles the earth in an orbit of average radius $\frac{3R}{2}$, where R is the radius of the earth. Assuming the gravitational pull on a mass of 1 kg on the earth's surface to be 10 N, the pull on the satellite will be

(1) 880 N (2) 889 N

(3) 1090 N (4) 789 N

38. Light is incident on a glass block *ABCD* as shown in figure. If θ_1 is increased slightly, then θ_2 will



(1) Increase slightly

(2) Remains same

(3) Decrease slightly

(4) May decrease or increase

39. In a young's double slit experiment, λ = 500 nm, d = 1 mm and D = 4 m. The minimum distance from the central maximum on the screen for which the intensity is half of the maximum intensity will be (Symbols have usual meanings)

(1) 0.5 mm (2) 1 mm

(3) 1.5 mm (4) 5 mm

40. The velocity of a particle at time t is given by $v = at + \frac{b}{t^2 + c}$, where a, b and c are constants. The dimensional formula of (abc) will be

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

(3) [L^{-2}T^{-1}] (4) [L^{2}T]

41. Two nuclei have their mass number in the ratio 1 : 8. The ratio of their nuclear densities will be

(1) 1 : 2 (2) 1 : 4

(3) 1 : 1 (4) 1 : 8

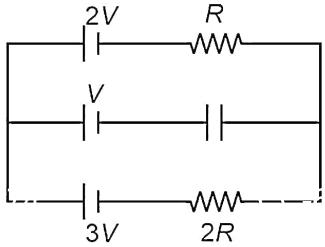
42. To which logic gate does the truth table given below correspond?

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

(1) AND (2) OR

(3) NAND (4) NOR

43. In the given circuit, the steady state current through 3 V battery will be

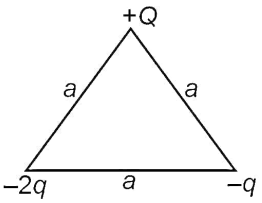


(1) $\frac{V}{3R}$ (2) $\frac{V}{R}$

(3) $\frac{2V}{R}$ (4) $\frac{V}{2R}$

Space for Rough Work

44. Three charges are placed at the vertices of an equilateral triangle as shown in figure. For what value of Q, the electrostatic potential energy of the system is zero?



(1) q (2) $\frac{2}{3}q$

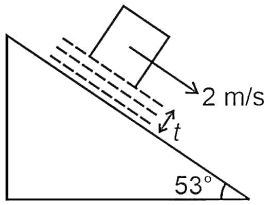
(3) $-q$ (4) $-\frac{2}{3}q$

45. An infinite number of charges, each of charge 2 μC are placed on the x-axis at co-ordinates $x = 1, 2, 4, 8, \ldots\infty$. If a charge 2 C is kept at the origin, then net force acting on 2 C charge will be

(1) 24000 N (2) 36000 N

(3) 12000 N (4) 48000 N

46. A cubical block of side 'ℓ' and density 'ρ' slides over a fixed inclined plane with constant velocity of 2 m/s. There is a thin film of viscous fluid of thickness 't' between the plane and block as shown in figure. The coefficient of viscosity of the thin film is



(1) $\eta = \rho\ell gt$ (2) $\eta = \frac{2}{5}\rho\ell gt$

(3) $\eta = \frac{5}{8}\rho gt$ (4) $\eta = \frac{8}{3}\frac{\rho gt}{\ell}$

47. The amount of heat required to increase the temperature of given mass of any material by 1°C is referred as

(1) Mechanical equivalent of heat

(2) Heat capacity

(3) Molar specific heat

(4) Latent heat of vaporization

48. If linear momentum of particle changes with time t as $p = (5t^2 + 6t + 1)$ kg m s^{-1}, then the force acting on the particle at $t = 1$ s will be

(1) 10 N (2) 20 N

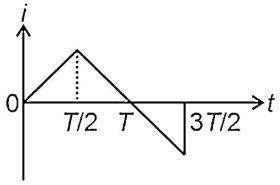
(3) 15 N (4) 16 N

49. In an ideal step up transformer having ratio of turns in primary and secondary as 1 : 5. A resistance of 100 Ω connected across the secondary winding is drawing a current of 5 A. The voltage in primary coil is

(1) 50 V (2) 100 V

(3) 250 V (4) 500 V

50. The current i in a coil varies with time as shown in the figure. The variation of induced emf (ε) with time (t) would be



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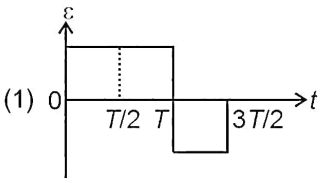

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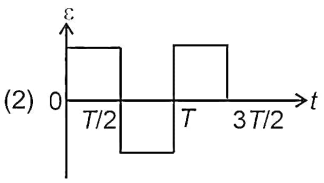

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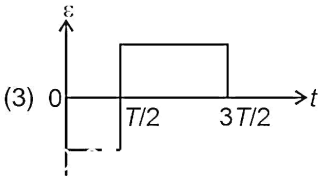

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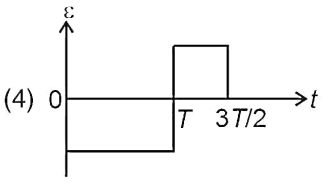


Space for Rough Work

BOTANY

SECTION-A

51. **Assertion (A):** Satellite DNA is a very useful identification tool in forensic applications.

Reason (R): DNA from every tissue from an individual shows the same degree of polymorphism.

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 but (R) is false

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

52. The product of *lac i* gene

(1) Positively regulates the structural genes of *lac* operon

(2) Is synthesised constitutively

(3) Binds to the promoter region in the absence of lactose

(4) Requires permease enzyme for its synthesis

53. DNA ligase

(1) Joins the RNA fragments during transcription

(2) Is required during the unwinding of DNA helix

(3) Joins discontinuously synthesised fragments during DNA replication

(4) Acts only on origin of replication

54. Which of the following statements is **incorrect** w.r.t. the process proposed by H. Temin and D. Baltimore?

(1) This process can be visualised in viruses

(2) This process is catalysed by reverse transcriptase in template independent manner

(3) It can only be observed in organisms having RNA as genetic material

(4) This process aided in the understanding of cancer

55. The uninterrupted continuation of Calvin cycle requires

(1) Carboxylation of 5C aldose sugar

(2) Reduction of 3PGA

(3) Regeneration of 5C ketose sugar

(4) Formation of 4C organic acid

56. PSII is not directly associated with

(1) Fixation of CO_2

(2) Splitting of water

(3) Evolution of oxygen

(4) Light absorption

57. A pleiotropic gene

(1) Controls traits only in combination with another genes

(2) Controls the expression of several traits

(3) Can only be observed in plants

(4) Has multiple alleles

58. What are the chances of pregnancy resulting in an affected child if both the parents are carriers for thalassemia?

(1) 75% (2) 0%

(3) 100% (4) 25%

59. How many phenotype(s) is/are possible in the blood type of their children, if the genotype of husband and wife are I^Ai and I^AI^B respectively?

(1) Two (2) Four

(3) Three (4) One

60. Chromosomal theory of inheritance was proposed by

(1) T.H. Morgan (2) Sutton and Boveri

(3) Gregor Mendel (4) Alfred Sturtevant

61. Select the **odd** one out w.r.t. number of carbons present in them.

(1) Oxaloacetic acid (2) Fumaric acid

(3) Succinic acid (4) α-ketoglutaric acid

Space for Rough Work

62. Identify the **correct** statement for species-area relationship.
(1) Was given by David Tilman
(2) For very large area, the value of Z lies in the range of 0.6 to 1.2
(3) Species richness is inversely proportional to explored area always
(4) Can be expressed as log C = log S + A log Z

63. Select the **odd** one out w.r.t. *ex-situ* conservation.
(1) Botanical garden (2) Zoological parks
(3) National parks (4) Wildlife safari parks

64. Consider the following statements.
a. Wheat, monocots and plants represent different taxa at different level.
b. Wheat family and mango family belong to different orders but same division.
c. Mammalia, dicotyledonae and insecta represent taxa at different levels.
d. Solanaceae and Convolvulaceae are included in the order polymoniales mainly based on the floral characters.
Select the **correct** option.
(1) Only d is correct
(2) a, b and c are correct
(3) a, b and d are correct
(4) Only b and d are correct

65. Choose the **incorrect** statement w.r.t. sac fungi
(1) Dikaryophase is a short phase of life cycle
(2) Female sex organ is called ascogonium
(3) The mycelium consists of septate hyphae
(4) Meiospores are exogenously produced.

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

	Column-I		Column-II
a.	Diatoms	(i)	Their cell wall has stiff cellulose plates on outer surface and are mostly marine
b.	Dinoflagellates	(ii)	Saprophytic protists, form plasmodium under suitable conditions
c.	Cyanobacteria	(iii)	Photosynthetic autotrophs, can fix atmospheric nitrogen in heterocysts
d.	Slime moulds	(iv)	Their walls are embedded with silica, float passively in water currents

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

67. Endosperm is fully consumed during embryo development in the seed of which plants?
(1) Gram, maize and castor
(2) *Pisum*, bean and *Triticum*
(3) *Pisum*, bean and gram
(4) Maize, lily and *Triticum*

68. Identify the **correct** features w.r.t. Poaceae.
a. Flowers are zygomorphic, bisexual and hypogynous.
b. Fruit is caryopsis
c. It is a family of monocots
d. Bicarpellary, syncarpous ovary with replum.
e. Inflorescence is racemose.
(1) a, b, c and e (2) a, d and e
(3) b and c only (4) c and e only

69. Aestivation seen in petals of *Calotropis*, chilli and *Petunia* is
(1) Imbricate (2) Twisted
(3) Valvate (4) Vexillary

Space for Rough Work

70. Organelle that contains the linear dsDNA is
(1) Ribosomes (2) Mitochondria
(3) Nucleus (4) Vacuole

71. Plasma membrane is made up of
(1) Lipid and carbohydrate only
(2) Protein, lipid and carbohydrates
(3) Protein only
(4) Protein and lipid only

72. Select the **incorrect** statement regarding cell membrane
(1) Lipids are arranged in a bilayer with polar heads towards the outerside
(2) Polar molecules move across the membrane by the process of simple diffusion
(3) Na^+ and K^+ ions move across cell membrane by an energy dependent process
(4) Cell membrane is selectively permeable to some molecules present on either side of it

73. Read the following statements and choose the **correct** option.
Statement-A: The offspring do not resemble each other, when produced by meiosis.
Statement-B: Recombination occurs during pachytene stage of prophase II
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements are correct
(4) Both statements are incorrect

74. All given statements are characteristic features of meiosis, **except**
(1) Karyokinesis and cytokinesis occurs twice
(2) Centriole and DNA duplication occurs twice
(3) Pairing occurs between homologous chromosomes
(4) The longest phase is prophase I

75. A pair of synapsed homologous chromosomes is known as
(1) Synapsis
(2) Recombination nodule
(3) Bivalent
(4) Chaismata

76. Natural system of classification was given by
(1) Bentham and Hooker
(2) Engler and Prantl
(3) Aristotle
(4) Linnaeus

77. Which of the following features is **incorrect** w.r.t. algae?
(1) They are largely aquatic
(2) Some of them also occur in association with fungi and animals
(3) They are chlorophyll containing, thalloid and autotrophic organisms
(4) They are the first embryophytes

78. Which of the following statements is **incorrect** w.r.t. Baculoviruses?
(1) They are pathogens that attack insects and other arthropods
(2) Majority of them are in the genus nucleopolyhedrovirus and used as biocontrol agents
(3) These viruses have species-specific, narrow spectrum insecticidal applications
(4) They have negative impacts on plants, mammals, birds, fish or even non-target insects

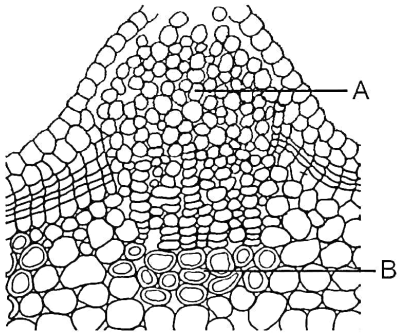
79. In the hypersaline lagoons, salt concentration (measured as salinity in parts per thousand) is
(1) <5 (2) 30-35
(3) >100 (4) 5-10

80. Mass of living matter at a trophic level in an area at any time is called
(1) Humus (2) Standing crop
(3) Standing state (4) Detritus

81. Radial vascular bundles are found in
(1) Monocot stem (2) Dicot stem
(3) Dicot root (4) Dicot leaf

Space for Rough Work

82. Examine the figure given below and select the **correct** option for label 'A' and 'B'



	A	B
(1)	Secondary cortex	Complementary cells
(2)	Epidermis	Secondary cortex
(3)	Complementary cells	Secondary cortex
(4)	Epidermis	Cork cambium

83. Which of the following plant hormones is used to prepare weed-free lawns by gardners?

(1) Zeatin (2) 2,4-D

(3) Ethylene (4) Gibberellins

84. In flowering plants, primary endosperm nucleus is

(1) Haploid (2) Triploid

(3) Polyploid (4) Diploid

85. Select the **correctly** matched pair.

(1) Coconut water – Cellular endosperm

(2) Persistent chalaza – Perisperm

(3) Double fertilization – Gymnosperms

(4) Female gametophyte – Embryo sac

SECTION-B

86. Which of the following linkage can be observed in purine nucleoside?

(1) 1′-1 glycosidic linkage

(2) Phosphoester linkage

(3) Phosphodiester linkage

(4) 1′-9 N-glycosidic linkage

87. Value of which of the following expressions is specific to species and can be used for the identification of species?

(1) $\frac{A+G}{T+C}$ (2) A = G

(3) A + G + T + C = 1 (4) $\frac{A+T}{G+C}$

88. The substrate level phosphorylation

(1) Occurs only in glycolysis

(2) Involves direct synthesis of NADH from metabolites

(3) Reaction occur only once in a TCA cycle

(4) Involves synthesis of GTP only

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

	Column-I		Column-II
a.	Female birds	(i)	Produce sperms by mitosis
b.	Male grasshopper	(ii)	Contain heteromorphic sex chromosomes
c.	Male butterflies	(iii)	They have only one X chromosome besides the autosomes
d.	Male honey bee	(iv)	Produce homomorphic sex chromosome

Select the **correct** option.

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

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

90. The organisms which show the most extensive metabolic diversity belong to the kingdom?

(1) Monera (2) Fungi

(3) Plantae (4) Animalia

91. How many of the given plants have axile placentation?

Colchicum, *Aloe*, Chilli, *Sesbania*, *Indigofera*, Lemon, Mustard, *Primrose*, *Argemone*, China rose, Tomato.

(1) Five (2) Six

(3) Four (4) Seven

Space for Rough Work

92. The endoplasmic reticulum is said to be rough because of the presence of
(1) 70 S ribosomes associated with ER
(2) 80 S ribosomes on the surface of ER
(3) Phosphate granules on the surface of ER
(4) Inclusion bodies associated with ER

93. If 48 chromosomes are present in a meiocyte in G_1 phase, then the number of chromosomes in a meiotic product will be
(1) 6 (2) 48
(3) 12 (4) 24

94. Which of the following is a green alga?
(1) *Gelidium* (2) *Porphyra*
(3) *Sargassum* (4) *Spirogyra*

95. Read the following statements and select the **correct** options.
Statement-A: Statins are produced by the yeast *Monascus purpureus*
Statement-B: Statin is used as an immunosuppressive agent in organ-transplant patients.
(1) Only statement A is correct
(2) Only statement B is correct
(3) Both statements are correct
(4) Both statements are incorrect

96. The impact of emigration on population density is
(1) Positive
(2) Negative
(3) Neutralised by mortality
(4) Neutralised by both mortality and natality

97. All of the following are gaseous cycles, **except**
(1) Sulphur cycle (2) Nitrogen cycle
(3) Carbon cycle (4) Hydrogen cycle

98. Read the following statements and select the **correct** option.
Assertion (A): Vessel cells are devoid of protoplasm.
Reason (R): Vessel members are interconnected through perforations in their common walls
(1) Both (A) and (R) are true and (R) is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

99. Select the option having **correct** set of statements w.r.t. ethylene
a. Promotes male flowers in cucumbers
b. Thinning of cotton, cherry, walnut
c. Initiates germination in peanut seeds
d. Inhibits root growth and root hair formation
(1) a, b and c only (2) b and c only
(3) a, c and d only (4) b and d only

100. In the light of given statements, choose the **correct** option.
Statement-A: Groundnut seeds have no residual endosperm as it is completely consumed during embryo development.
Statement-B: Micropyle facilitates entry of oxygen and water into the seed during germination.
(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

ZOOLOGY

SECTION-A

101. The neurotransmitters are involved in the transmission of impulses
(1) Throughout the length of an axon
(2) Throughout the length of myelinated nerve fibres
(3) At the nodes of Ranvier
(4) At the chemical synapses

Space for Rough Work

102. White muscle fibres appear white due to the presence of
(1) Low quantity of myoglobin
(2) High quantity of sarcoplasmic reticulum
(3) Low quantity of haemoglobin
(4) High quantity of mitochondria

103. Which of the following options represents the correct set of specialised connective tissue?
(1) Areolar tissue, adipose tissue, tendons
(2) Blood, cartilage, lymph
(3) Ligaments, lymph, bone
(4) Neural tissue, bone, cartilage

104. For the formation of a tripeptide, the amino acids are joined together by the 'X' bond which is formed by _____ reaction.
Select the **correct** option to fill in the blank.
(1) Dehydration
(2) Hydrolysis
(3) Dehydrogenation
(4) Reduction

105. The similarity between protein, cellulose and deoxyribonucleic acid is that they all
(1) Are natural sugars
(2) Are polymeric substances
(3) Contain C, H and N in their structures
(4) Are present in the acid-soluble pool obtained upon chemical analysis of a living tissue

106. In humans, all of the following are associated with ovaries, **except**
(1) Formation of female gametes
(2) Completion of meiosis in a secondary oocyte to form an ootid
(3) Synthesis of steroid hormones
(4) Synthesis of relaxin

107. Which among the following are not a descendant of *Psilophyton*?
(1) Ginkgos (2) Gnetales
(3) Conifers (4) *Rhynia*-type plants

108. In a healthy human, what does ERV + RV represents?
(1) Total volume of air that remains in the lungs after a normal expiration.
(2) The maximum volume of air a person can breathe in after a forced expiration.
(3) Total volume of air accommodated in the lungs at the end of a forced inspiration.
(4) Total volume of air a person can inspire after a normal expiration.

109. If we want to recover many copies of the target DNA, then it should be cloned in a vector having
(1) Large number of selectable markers
(2) Multiple cloning sites for an enzyme
(3) *ori* that supports high copy number
(4) *rop* that does not support replication of the vector

110. In human females, the paired folds of tissue under the labia majora are called
(1) Clitoris (2) Hymen
(3) Mons pubis (4) Labia minora

111. Select the **incorrect** match.
(1) Acromegaly - Severe disfigurement of face
(2) Diabetes insipidus - Loss of glucose through urine
(3) Graves' disease - Protrusion of eyeballs
(4) Addison's disease - Alters the carbohydrate metabolism

112. Consider the following features:
(a) Economically beneficial
(b) Metamerically segmented
(c) Chitinous exoskeleton
The above mentioned features are **true** for
(1) *Pila* (2) *Apis*
(3) *Locusta* (4) *Pinctada*

Space for Rough Work

113. Read the following statements w.r.t. chemical analysis of a living tissue.

Statement A: The acid-insoluble pool represents roughly the cytoplasmic composition.

Statement B: The macromolecules from cytoplasm and organelles become the acid-soluble fraction.

Select 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

114. Industrial melanism represents

a. Natural selection b. Disruptive selection

c. Directional selection d. Adaptive radiation

e. Mutation

Select the **correct** option.

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

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

115. Choose the **correct** pathway for the transport of food in the digestive system of *Rana tigrina*.

(1) Mouth → Pharynx → Oesophagus → Stomach → Intestine → Cloaca → Rectum

(2) Mouth → Oesophagus → Pharynx → Stomach → Intestine → Rectum → Cloaca

(3) Mouth → Pharynx → Oesophagus → Stomach → Intestine → Rectum → Cloaca

(4) Mouth → Oesophagus → Pharynx → Stomach → Rectum → Intestine → Cloaca

116. Complete the analogy w.r.t. blood circulation and select the **correct** option.

Ventricles of fishes : Deoxygenated blood :: Ventricles of amphibians : _____

(1) Oxygenated blood

(2) Mixed blood

(3) Deoxygenated blood

(4) Venous blood

117. Hugo deVries based on his work on _____ brought forth the idea of mutations. Choose the option that **correctly** fills the blank.

(1) *Pisum sativum*

(2) Evening primrose

(3) Tobacco plant

(4) Cotton plant

118. In all of the following, disulphide bonds are present, **except**

(1) Antibody

(2) Mature insulin

(3) Cellulose

(4) Proinsulin

119. Select the **incorrect** match w.r.t. blood components.

(1) Globulins – Insignificant role in immune response

(2) Eosinophils – Resist infections

(3) Spleen – Graveyard of RBCs

(4) Thrombocytes – Participates in blood clotting

120. Presence of which of the following substances in the urine is indicative of diabetes mellitus?

(1) Calcium oxalate, Haemoglobin

(2) Proteins, Fatty acids

(3) Insulin, Glucagon

(4) Ketone bodies, Glucose

121. Progestasert and LNG-20 exhibit additional advantages over other IUDs. Select the **correct** option w.r.t. it.

(1) They blocks estrogen receptors in the uterus.

(2) They retard the entry of sperms in the vagina.

(3) They make the uterus unsuitable for implantation and cervix hostile to the sperms.

(4) They prevent the physical meeting of sperms and ovum.

Space for Rough Work

122. **Assertion (A):** Neural signals from the pneumotaxic centre can alter the respiratory rate in humans.

Reason (R): Neural signals from this centre always increase the duration of inspiration.

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

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

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

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

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

123. The selection of recombinants due to inactivation of antibiotic resistance genes present in pBR322 is a cumbersome procedure because

(1) It requires simultaneous plating on a plate having different antibiotics

(2) It produces colour in the presence of a chromogenic substrate

(3) Antibiotics destroy the recombinants

(4) It requires simultaneous plating on two plates having different antibiotics

124. When humans are infected with HIV, the cell named 'X' continues to produce viruses and acts like a HIV factory. Choose the **correct** option which represents 'X'.

(1) B-lymphocyte (2) T-lymphocyte

(3) Macrophage (4) Natural killer cell

125. Select the **incorrect** match.

(1) Nirodh – Hormone releasing IUD

(2) Multiload 375 – Copper releasing IUD

(3) Lippes loop – Non-medicated IUD

(4) Cu7 – Copper releasing IUD

126. In a normal adult human, nearly what per cent of the blood is constituted by the formed elements?

(1) 6-8 (2) 55

(3) 45 (4) 90-92

127. If the blood sample contains a very low concentration of the disease causing pathogens, then which technique procedure can be employed for the early diagnosis of the disease?

(1) Tissue culture (2) Serum analysis

(3) Micropropagation (4) PCR

128. The most suitable vector for the transformation of dicot plant cells among the following is

(1) pBR322 (2) Retrovirus

(3) Bacteriophage (4) Modified Ti plasmid

129. Which of the following techniques involves the collection of semen from husband/healthy donor and artificial introduction of semen into the uterus of the female?

(1) IUI (2) GIFT

(3) ZIFT (4) IUT

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

	Column I	**Column II**
a.	Monoecious	(i) *Aedes*
b.	Indirect development	(ii) *Pila*
c.	Internal fertilisation	(iii) *Taenia*
		(iv) *Nereis*

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

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

131. The number of the nitrogen atoms present in the nitrogenous base that is exclusively found in RNA but is absent in DNA is

(1) Three (2) Four

(3) Five (4) Two

132. A girl noticed the appearance of dry, scaly lesions on various parts of her body. Later on, these lesions became itchy. She then consulted a doctor, who advised her to avoid heat and moisture to curb the infection.

Identify the possible disease and select its causative agent from the options given below.

(1) Retrovirus (2) *Haemophilus*

(3) *Microsporum* (4) *Entamoeba*

Space for Rough Work

133. Read the following statements:

(a) The ascending limb of Loop of Henle is impermeable to electrolytes.

(b) DCT helps to maintain sodium-potassium homeostasis.

(c) PCT is involved in the active reabsorption of sodium ions.

Choose the **correct** option w.r.t human kidneys.

(1) (a), (b) and (c) are correct

(2) Only (a) is incorrect

(3) (a) and (b) are correct

(4) (b) and (c) are incorrect

134. In humans, the midbrain is located between the forebrain and hindbrain. The forebrain and hindbrain contain centres for

(1) Cardiovascular reflexes and controlling urge for drinking respectively

(2) Thermoregulation and regulation of respiration respectively

(3) Maintaining body balance and controlling hunger respectively

(4) Normal respiratory rhythm and regulating gastric secretion respectively

135. Consider the given statements and choose the **correct** option.

Statement A: Correction of a genetic defect involves delivery of a normal gene into the individual or embryo to take over the function and compensate for the non-functional gene.

Statement B: A double stranded DNA or RNA, tagged with a radioactive molecule called probe is allowed to hybridise to its complementary DNA.

(1) Both statements A and B are incorrect

(2) Only statement A is correct

(3) Only statement B is correct

(4) Both statements A and B are correct

SECTION-B

136. Choose the option which represents layers in **correct** sequence from inside to outside present in the uterine wall of a human female.

(1) Myometrium, perimetrium, endometrium

(2) Perimetrium, myometrium, endometrium

(3) Endometrium, myometrium, perimetrium

(4) Endometrium, perimetrium, myometrium

137. Several attempts have been made to patent uses, products and processes based on the Indian traditional herbal medicines like

(1) Soyabean and Neem

(2) Neem and Turmeric

(3) Turmeric and Basmati rice

(4) Neem and Basmati rice

138. A person went to pick some flowers from the garden. Suddenly, he felt difficulty in breathing and he also began sneezing, He rushed to the hospital where the doctor told him that he is allergic to pollens. To quickly reduce the symptoms, the doctor can use all of the following drugs, **except**

(1) Steroids

(2) Anti-histamine

(3) Adrenaline

(4) Serotonin

139. Select the **correct** option w.r.t. endocrine glands and their locations in humans.

(1) Thyroid gland – On either side of the trachea

(2) Pineal gland – Basal part of the diencephalon

(3) Thymus gland – Dorsal portion of the forebrain

(4) Adrenal gland – Between lungs behind the sternum

Space for Rough Work

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

Statement A: In humans, the structure present between adjacent vertebrae possess a very hard matrix due to the presence of calcium salts in it.

Statement B: The shaft of tibia in an adult man possesses a slightly pliable matrix due to the presence of chondroitin salts in it.

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

141. In a polymerase chain reaction, primers attach themselves to the complementary region of the DNA template in the _____ step.

Select the **correct** option to fill in the blank.

(1) Extension (2) Polymerisation
(3) Denaturation (4) Annealing

142. Which of the following options is **correct**?

(1) Branchial respiration is shown by *Pleurobrachia*.
(2) Pulmonary respiration is shown by *Macaca*.
(3) Buccopharyngeal respiration is shown by *Dentalium*.
(4) Cutaneous respiration is shown by *Felis*.

143. Select the organism that belongs to the division Gnathostomata.

(1) Hagfish (2) Amphioxus
(3) Devil fish (4) Flying fish

144. In a male cockroach, the testes are present one on each lateral side in which abdominal segments?

(1) 8^{th}-9^{th} (2) 6^{th}-7^{th}
(3) 4^{th}-6^{th} (4) 2^{nd}-6^{th}

145. Which of the following statements is **incorrect** w.r.t. neural tissue?

(1) Neuroglial cells protect and support neurons.
(2) All the cells of this tissue are excitable.
(3) Arrival of the disturbance at the output zone may stimulate/inhibit adjacent neurons.
(4) Neuron is the unit of the neural system.

146. pBR322 contains restriction sites for all of the following, **except**

(1) *Bam*HI (2) *Cla*I
(3) *Pvu*II (4) *Hin*dII

147. In humans, which of the following hormones peaks twice in menstrual cycle but remains at the minimum level during the menstrual phase of the cycle?

(1) Progesterone (2) Estrogen
(3) FSH (4) LH

148. A contraceptive that blocks estrogen receptors in the uterus and thereby prevents implantation of blastocyst in the endometrium is

(1) A Cu^{+2} releasing IUD
(2) 'Once a week' pill
(3) Made of progestogen-estrogen combinations
(4) Made of thin rubber/latex

149. Consider the given features and identify the one for which these given features are true.

a. Cranial capacity more than the *Homo erectus*
b. Arose during ice age between 75,000-10,000 years ago
c. Arose in Africa and moved across continents and developed into distinct races

Select the **correct** option.

(1) Modern *Homo sapiens*
(2) *Homo habilis*
(3) Neanderthal man
(4) *Australopithecus*

150. Choose the **correct** match w.r.t. the human brain.

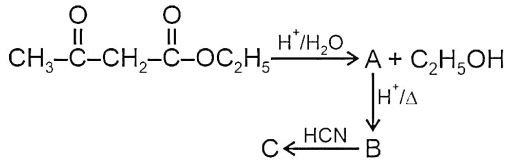
(1) Thalamus – Lies at the base of the hypothalamus
(2) Corpora quadrigemina – Round swellings in the hindbrain
(3) Cerebellum – Has very convoluted surface
(4) Corpus callosum – A tract of collagen fibres

Space for Rough Work

CHEMISTRY

SECTION-A

151. Major products B and C in the following reaction, respectively are



(1) $CH_3-\underset{\underset{OH}{|}}{CH}-CH_2COOH$, $CH_3-\underset{\underset{CN}{|}}{CH}-CH_2-COOH$

(2) $CH_3-\overset{\overset{O}{||}}{C}-CH_3$, $CH_3-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CN$

(3) $CH_3-\overset{\overset{O}{||}}{C}-CH_2COOH$, $CH_3-\underset{\underset{CN}{|}}{\overset{\overset{OH}{|}}{C}}-CH_2-COOH$

(4) $CH_3CH=CH-COOH$, $CH_3-CH_2-\underset{\underset{CN}{|}}{CH}-COOH$

152. $CH_3CN \xrightarrow{H_3O^+} A \xrightarrow[(ii)\ \Delta]{(i)\ NH_3} B \xrightarrow{Br_2/KOH} C(Major)$

Product C is

(1) CH_3CONH_2 (2) CH_3NH_2

(3) CH_3COBr (4) CH_3COCH_3

153. Given below are two statements, one is labelled as Assertion **(A)** and other is labelled as Reason **(R)**

Assertion (A): Rate constant of a reaction increases with increase in temperature.

Reason (R): In the Arrhenius equation the factor $e^{-Ea/RT}$ corresponds to the fraction of molecules that have kinetic energy lesser than Ea.

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

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

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

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

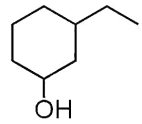
(4) Both (A) and (R) are true and (R) is the correct explanation (A)

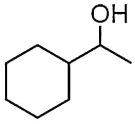
154. On addition of dilute H_2SO_4 in a salt solution, a gas is evolved which turns lime water milky. Anion present in salt may be

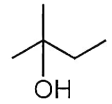
(1) NO_3^- (2) CO_3^{2-}

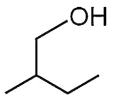
(3) Cl^- (4) Br^-

155. Which among the following alcohols gives red colouration in Victor Meyer's test?

(1) 

(2) 

(3) 

(4) 

156. Number of sp^2 hybridised carbon atoms in naphthalene is

(1) 10

(2) 12

(3) 8

(4) 6

157. Calculate the mole fraction of solute in aqueous solution which contains 10% NaOH by mass (w/w%)

(1) 0.024

(2) 0.048

(3) 0.012

(4) 0.036

Space for Rough Work

158. Given below are two statements.

Statement-I: Pressure does not have any significant effect on solubility of solids in liquids.

Statement-II: The solubility of a gas increase with increase in partial pressure of the gas present above the surface of liquid or solution.

In light of above two 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

159. Which of the following species has the same bond order as that of N_2

(1) NO (2) O_2^{2-}

(3) O_2^{2+} (4) F_2

160. Most ionic compound among the following is

(1) NaCl (2) $MgCl_2$

(3) $AlCl_3$ (4) $SiCl_4$

161. Choose the **incorrect** match.

	Species		Colour
(1)	$[Fe(SCN)]^{2+}$	–	Prussian blue
(2)	$(NH_4)_3PO_4 \cdot 12MoO_3$	–	Yellow
(3)	$Na_4[Fe(CN)_5NOS]$	–	Violet
(4)	PbS	–	Black

162. Given below are two statements: one is labelled as assertion (A) and the other is labelled as reason (R)

Assertion (A): Cycloheptatrienyl cation is an aromatic species.

Reason (R): Cycloheptatrienyl cation is cyclic, planar and follows Huckel's $(4n + 2)\pi$ electron rule

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

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

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

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

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

163. Which of the following options denotes a Purine and Pyrimidine base respectively?

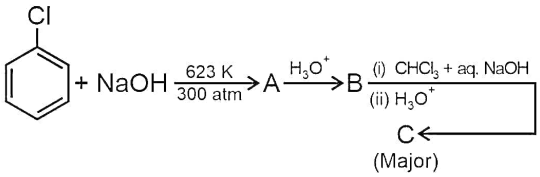
(1) Guanine and Thymine

(2) Uracil and Adenine

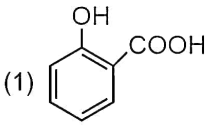
(3) Cytosine and Adenine

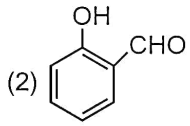
(4) Thymine and Uracil

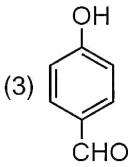
164. Consider the following reaction sequence

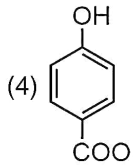


Major product C is

(1) 

(2) 

(3) 

(4) 

165. Given below are the two statements.

Statement-I: pK_a of phenol is less than pK_a of ethanol.

Statement-II: Phenol and ethanol do not react with $NaHCO_3$.

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

(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

166. Which compound on reductive ozonolysis gives methylglyoxal as one of the products?

(1)  (2) 

(3)  (4) 

167. Given below are two statements

Statement-I: The value of equilibrium constant, K_C changes with change in temperature.

Statement-II: Equilibrium constant for the reverse reaction is the inverse of the equilibrium constant for the reaction in forward direction.

In the light of above statements choose the correct option.

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

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

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

168. Given below are two statements.

One is labelled as assertion (A) and the other is labelled as reason (R).

Assertion (A): An aqueous solution of NaCl comprises of sodium ions and chloride ions, while that of acetic acid solution mainly contains unionized acetic acid molecules and only some acetate ions and hydronium ions.

Reason (R): There is almost 100% ionization in case of sodium chloride and very less ionization of acetic acid.

In the light of above statements choose 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 but (R) is false

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

169. Identify the correct order of negative electron gain enthalpy for group 17 elements

(1) F > Cl > Br > I (2) I > Br > Cl > F

(3) Br > Cl > F > I (4) Cl > F > Br > I

170. Which of the following order is incorrect against the property indicated?

(1) P < S < N (Electronegativity)

(2) Rb < Na < K < Al (Atomic radius)

(3) $Mg^{2+} < Na^{+} < O^{2-}$ (Ionic radius)

(4) He < Ar < Ne (Positive electron gain enthalpy)

171. Electrolytic cells of $AgNO_3$ and $CuSO_4$ are connected in a series. Same amount of electricity is passed through them until 10.8 g of Ag is deposited at cathode. The mass of copper deposited will be (Atomic mass of Ag = 108 u and Cu = 63.5 u)

(1) 3.175 g (2) 6.35 g

(3) 1.58 g (4) 2.12 g

172. Match column-I with column-II

	Column-I (Species)	**Column-II (Oxidation state of underlined element)**
a.	$\underline{Cl}O_3^-$	(i) +7
b.	$\underline{K}O_2$	(ii) +6
c.	$\underline{Cr}O_5$	(iii) +1
d.	$\underline{Mn}O_4^-$	(iv) +5

Choose the correct option.

(1) a(iv), b(iii), 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)

173. Mole of $KMnO_4$ required to oxidise 2 mol of Br^- in acidic medium is

(1) $\frac{1}{5}$ mol (2) $\frac{2}{5}$ mol

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

Space for Rough Work

174. Given below are two statements, one is labelled as Assertion **(A)** and other is labelled as Reason **(R)**

Assertion (A): $[BF_4^{\ominus}]$ has sp^3 hybridisation and tetrahedral geometry.

Reason (R): Due to the absence of *d*-orbitals, maximum covalency of boron is four.

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

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

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

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

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

175. Orbital angular momentum of electron present in 3*p* orbital is

(1) $\sqrt{3}\hbar$ (2) $\sqrt{2}\hbar$

(3) $\hbar$ (4) $\sqrt{6}\hbar$

176. Which of the following compounds of xenon has pyramidal structure?

(1) XeF_4 (2) $XeOF_4$

(3) XeO_3 (4) XeF_2

177. When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from

(1) Zero to –1 and zero to +5

(2) Zero to +1 and zero to –3

(3) Zero to +1 and zero to –5

(4) Zero to –1 and zero to +3

178. The geometry and magnetic behaviour of the compiex $[Ni(CN)_4]^{2-}$ respectively are

(1) Tetrahedral and diamagnetic

(2) Square planar and diamagnetic

(3) Tetrahedral and paramagnetic

(4) Square planar and paramagnetic

179. Given below are two statements. One is labelled as assertion (A) and the other is labelled as reason (R).

Assertion (A): There are three significant figures in 0.023.

Reason (R): Zeros preceding to first non-zero digit are significant

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

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

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

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

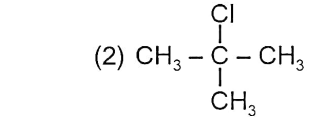
(4) Both (A) and (R) are false

180. Number of sucrose molecules present in 200 mL of 0.3 M sucrose solution is

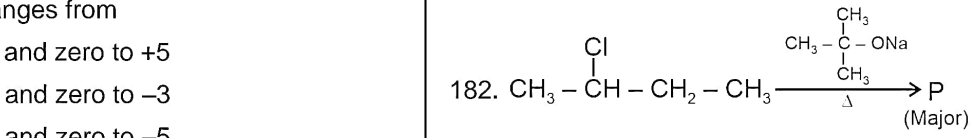
(1) 2.8×10^{20} (2) 4.2×10^{23}

(3) 4.6×10^{16} (4) 3.6×10^{22}

181. Which among the following is least reactive towards nucleophilic substitution reaction?

(1) CH_3Cl (2) 

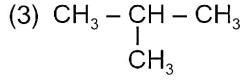
(3) C_6H_5Cl (4) $C_6H_5CH_2Cl$

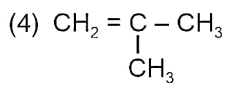
182. 

Product P will be

(1) $CH_3 - CH = CH - CH_3$

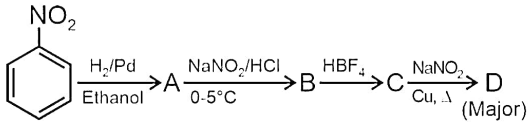
(2) $CH_2 = CH - CH_2 - CH_3$

(3) 

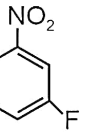
(4) 

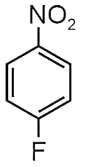
Space for Rough Work

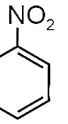
183. Consider the following reaction sequence

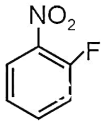


Major product D is

(1) 

(2) 

(3) 

(4) 

184. Given below are two statements.

Assertion (A): ΔH is independent of path.

Reason (R): ΔH is negative for exothermic reactions which evolve heat during the reaction.

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

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

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

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

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

185. Consider the following statements.

a. Atomic radius of samarium is greater than Erbium.

b. Lanthanoids on reaction with dilute HCl liberate H_2 gas.

c. Eu^{2+} is a strong reducing agent.

The correct statements are

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

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

SECTION-B

186. The rate constant of the reaction A $\rightarrow$ B is 2.5×10^{-3} mol L^{-1} s^{-1}. If initial concentration of A is 4 M, then concentration of B after 5 minutes will be

(1) 2.25 M (2) 0.75 M

(3) 1.45 M (4) 1.8 M

187. Reaction of acetyl chloride and diethylcadmium produces

(1) Acetone (2) Butanal

(3) Propanal (4) Butanone

188. Consider the following carbocations:

I. $O_2N-\overset{\oplus}{C}H_2$ II. $H_3C-\overset{\oplus}{C}H_2$

III. $(CH_3)_2\overset{\oplus}{C}H$ IV. $\overset{\oplus}{C}H_3$

The correct order of stability of these carbocations is

(1) III > I > II > IV (2) IV > I > II > III

(3) III > II > IV > I (4) III > II > I > IV

189. The conductivity of a saturated solution of $BaSO_4$ is 3.06×10^{-6} S cm^{-1} and its molar conductivity is 1.53 S cm^2 mol^{-1}. The K_{sp} of $BaSO_4$ will be

(1) 2×10^{-6} (2) 4×10^{-6}

(3) 4×10^{-4} (4) 2×10^{-5}

190. The rate constant for the reaction, $A_2(g) + B(s) \rightarrow A_2B(g)$ is 4.5 s^{-1} at 900 K and 9 s^{-1} at 1000 K respectively. The activation energy (E_a) of the reaction (approximately in kJ/mol) will be

(1) – 2.7 R log(3) (2) + 20.7 R log(3)

(3) + 20.7 R log(2) (4) – 20.7 R log(4)

191. Bond length of H – X is 0.94 Å and observed dipole moment of H – X is 1.8 D, then % of ionic character of H – X is

(1) 21.2% (2) 62.3%

(3) 39.9% (4) 78.4%

192. Incorrect statement among the following is

(1) In sucrose, the glycosidic linkage is between C1 of α-D-glucose and C2 of β-D-fructose

(2) Sucrose is dextrorotatory compound

(3) Maltose does not reduce Tollens' reagent

(4) In maltose, the glycosidic linkage is between C1 of one α-D-glucose and C4 of another α-D-glucose unit

Space for Rough Work

193. Consider the following statements

a. Glucose in presence of enzyme zymase is converted to ethanol and carbon dioxide.

b. Denaturation of ethanol is done by adding copper sulphate and pyridine.

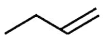
c. Ethanol on reaction with sulphuric acid at 413 K gives ethene as major product.

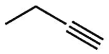
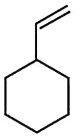
The correct statements are

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

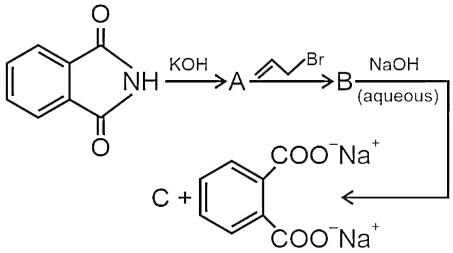
(3) a and c only (4) a, b and c

194. The compound which does not decolourise bromine water colour is

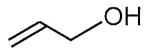
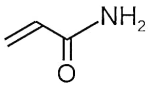
(1)  (2) 

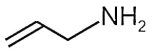
(3)  (4) 

195. Consider the following reaction sequence



Product C is

(1)  (2) 

(3)  (4) 

196. Kinetic energy of the electron in the third orbit of Li^{2+} ion will be

(1) 54.4 eV (2) 13.6 eV

(3) 3.4 eV (4) –13.6 eV

197. Partial hydrolysis of XeF_6 gives

a. XeO_2F_2

b. $XeOF_4$

c. XeO_3

Choose the correct option.

(1) a only (2) b only

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

198. Which of the following is/are optically active complex(es)?

a. $[Co(en)_3]^{3+}$

b. cis-$[CrCl_2(ox)_2]^{3-}$

c. trans-$[CrCl_2(ox)_2]^{3-}$

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

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

199. The heat of combustion of acetylene and ethylene are –300 and –340 kcal mol^{-1} respectively. ΔH for the formation of water is –70 kcal mol^{-1}. The heat of reaction for the hydrogenation of acetylene at constant volume and 298 K will be

(1) –25.6 kcal mol^{-1} (2) –29.4 kcal mol^{-1}

(3) –18.6 kcal mol^{-1} (4) –21.3 kcal mol^{-1}

200. Given below are two statements

Statement-I: Transition metal ions are more effective as catalysts because of their ability to adopt multiple oxidation states.

Statement-II: Iron(III) catalyses the reaction between iodide and persulphate ions.

In light of above statements, choose the correct answer.

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

(2) Both statement I and statement II are correct

(3) Both statement I and statement II are incorrect

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

❑ ❑ ❑

Space for Rough Work