

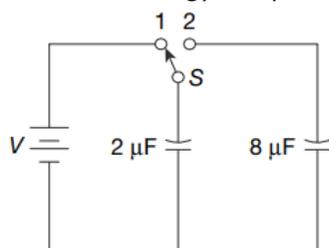
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Q1. Among the following, the correct order of acidity is:

- (a) $\text{HClO}_3 < \text{HClO}_4 < \text{HClO}_2 < \text{HClO}$
- (b) $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$
- (c) $\text{HClO}_4 < \text{HClO} < \text{HClO}_3 < \text{HClO}_2$
- (d) $\text{HClO}_4 < \text{HClO}_2 < \text{HClO} < \text{HClO}_3$

Q2. A capacitor of $2\mu\text{F}$ is charged as shown in the diagram. When the switch S is turned to position 2, the percentage of its stored energy dissipated is:



- (a) 20%
- (b) 75%
- (c) 80%
- (d) 0%

Q3. Homozygous purelines in cattle can be obtained by

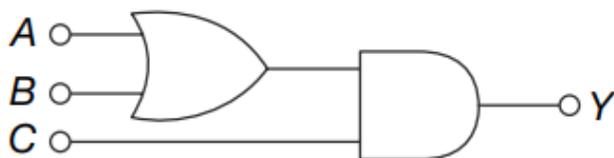
- (a) Mating of unrelated individuals of same breed
- (b) Mating of individuals of different breed
- (c) Mating of individuals of different species
- (d) Mating of related individuals of same breed

Q4. In which of the following options the order of arrangement does not agree with the variation of property indicated against it?

- (a) $\text{Al}^{3+} < \text{Mg}^{2+} < \text{Na}^+ < \text{F}^-$ (increasing ionic size)
- (b) $\text{B} < \text{C} < \text{N} < \text{O}$ (increasing first ionisation enthalpy)
- (c) $\text{I} < \text{Br} < \text{F} < \text{Cl}$ (increasing electron gain enthalpy)
- (d) $\text{Li} < \text{Na} < \text{K} < \text{Rb}$ (increasing metallic radius)

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Q5. To get output 1 for the following circuit, the correct choice for the input is:



- (a) A = 1, B = 0, C = 0
- (b) A = 1, B = 1, C = 0
- (c) A = 1, B = 0, C = 1
- (d) A = 0, B = 1, C = 0

Q6. The function of copper ions in copper releasing IUD's is

- (a) They inhibit gametogenesis
- (b) They make uterus unsuitable for implantation
- (c) They inhibit ovulation
- (d) They suppress sperm motility and fertilizing capacity of sperms

Q7. The correct statement regarding a carbonyl compound with a hydrogen atoms on its alphacarbon is:

- (a) A carbonyl compound with a hydrogen atom on its alpha-carbon never equilibrates with its corresponding enol.
- (b) A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as aldehyde-ketone equilibrium.
- (c) A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as carbonylation.
- (d) A carbonyl compound with a hydrogen atom on its alpha-carbon rapidly equilibrates with its corresponding enol and this process is known as keto-enol tautomerism.

Q8. A potentiometer wire is 100 cm long and a constant potential difference is maintained across it. Two cells are connected in series first to support one another and then in opposite direction. The balance points are obtained at 50 cm and 10 cm from the positive end of the wire in the two cases. The ratio of emf's is

- (a) 5:04
- (b) 3:04
- (c) 3:02
- (d) 5:01

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Q9. In case of poriferans, the spongocoel is lined with flagellated cells called

- (a) Oscula
- (b) Choanocytes
- (c) Mesenchymal cells
- (d) Ostia

Q10. Natural rubber has:

- (a) All cis-configuration
- (b) All trans-configuration
- (c) Alternate cis - and trans-configuration
- (d) Random cis - and trans-configuration

Q11. When a metallic surface is illuminated with radiation of wavelength λ , the stopping potential is V . If the same surface is illuminated with radiation of wavelength 2λ , the stopping potential is $V/4$. The threshold wavelength for the metallic surface is:

- (a) 5λ
- (b) $5/2 \lambda$
- (c) 3λ
- (d) 4λ

Q12. Flowers which have single ovule in the ovary and are packed into inflorescence are usually pollinated by:

- (a) Bee
- (b) Wind
- (c) Bat
- (d) Water

Q13. The electronic configuration of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No. 65) are:

- (a) $[\text{Xe}]4f^76s^2$, $[\text{Xe}]4f^86s^2$ and $[\text{Xe}]4f^85d^16s^2$
- (b) $[\text{Xe}]4f^65d^16s^2$, $[\text{Xe}]4f^75d^16s^2$ and $[\text{Xe}]4f^96s^2$
- (c) $[\text{Xe}]4f^65d^16s^2$, $[\text{Xe}]4f^75d^16s^2$ and $[\text{Xe}]4f^85d^16s^2$
- (d) $[\text{Xe}]4f^76s^2$, $[\text{Xe}]4f^75d^16s^2$ and $[\text{Xe}]4f^96s^2$

Q14. Two non-mixing liquids of densities ρ and $n\rho$ ($n > 1$) are put in a container. The height of each liquid is h . A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length pL ($p < 1$) in the denser liquid. The density d is equal to:

- (a) $\{2 + (n + 1) \rho\} \rho$
- (b) $\{2 + (n - 1) \rho\} \rho$
- (c) $\{1 + (n - 1) \rho\} \rho$
- (d) $\{1 + (n + 1) \rho\} \rho$

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Q15. Which among the following are the smallest living cells, known without a definite cell wall, pathogenic to plants as well as animals and can survive without oxygen?

- (a) Pseudomonas
- (b) Mycoplasma
- (c) Nostoc
- (d) Bacillus

Q16. Which of the following reagents would distinguish cis-cyclopenta-1, 2-diol from the trans-isomer?

- (a) Acetone
- (b) Ozone
- (c) MnO₂
- (d) Aluminium isopropoxide

Q17. Out of the following options which one can be used to produce a propagating electromagnetic wave?

- (a) A stationary charge
- (b) A charge less particle
- (c) An accelerating charge
- (d) A charge moving at constant velocity

Q18. In Bougainvillea thorns are the modification of?

- (a) Adventitious root
- (b) Stem
- (c) Leaf
- (d) Stipules

Q19. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules?

- (a) I₂ > Br₂ > Cl₂ > F₂
- (b) Cl₂ > Br₂ > F₂ > I₂
- (c) Br₂ > I₂ > F₂ > Cl₂
- (d) F₂ > Cl₂ > Br₂ > I₂

Q20. The charge flowing through a resistance R varies with time t as $Q = at - bt^2$, where a and b are positive constants. The total heat produced in R is?

- (a) $a^3R/3b$
- (b) $a^3R/2b$
- (c) a^3R/b
- (d) $a^3R/6b$

Q21. Functional megaspore in an angiosperm develops into

- (a) Endosperm
- (b) Embryo sac
- (c) Embryo
- (d) Ovule

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Q22. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_2 . If a large amount of KHSO_4 is added to the mixture, the rate of nitration will be:

- (a) Faster
- (b) Slower
- (c) Unchanged
- (d) Doubled

Q23. At what height from the surface of earth the gravitation potential and the value of g are $-5.4 \times 10^7 \text{ J kg}^{-2}$ and 6.0 ms^{-2} respectively? Take the radius of earth as 6400 km

- (a) 1600 km
- (b) 1400 km
- (c) 2000 km
- (d) 2600 km

Q24. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, then which of the following is expected to occur?

- (a) Chromosomes will be fragmented
- (b) Chromosomes will be not segregate
- (c) Recombination of chromosome arms will occur
- (d) Chromosomes will not condense

Q25. Consider the following liquid - vapour equilibrium $\text{Liquid} \rightleftharpoons \text{Vapour}$. Which of the following relations is correct?

(a) $\frac{d \ln G}{dT^2} = \frac{\Delta H_v}{RT^2}$

(b) $\frac{d \ln P}{dT} = \frac{-\Delta H_v}{RT}$

(c) $\frac{d \ln G}{dT^2} = \frac{\Delta H_v}{T^2}$

(d) $\frac{d \ln P}{dT} = \frac{\Delta H_v}{RT^2}$

Q26. Coefficient of linear expansion of brass and steel rods are α_1 and α_2 . Lengths of brass and steel rods are l_1 and l_2 respectively. If $(l_2 - l_1)$ is maintained same at all temperatures, which one of the following relations holds good?

(a) $\alpha_1 l_2^2 = \alpha_2 l_1^2$

(b) $\alpha_1^2 l_2 = \alpha_2^2 l_1$

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(c) $\alpha_1 l_1 = \alpha_2 l_2$

(d) $\alpha_1 l_2 = \alpha_2 l_1$

Q27. What is the criterion for DNA fragments movement on agarose gel during gel electrophoresis?

- (a) The smaller the fragment size, the farther it moves.
- (b) Positively charged fragments move to farther end.
- (c) Negatively charged fragments do not move.
- (d) The larger the fragment size, the farther it moves.

Q28. The pressure of H₂ required to make the potential of H₂-electrode zero in pure water at 298 K is:

- (a) 10⁻¹⁴ atm
- (b) 10⁻¹² atm
- (c) 10⁻¹⁰ atm
- (d) 10⁻⁴ atm

Q29. The maximum intensity in Young's double slit experiment is I₀. Distance between the slits is d=5λ, where λ is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance D=10d?

- (a) I₀/4
- (b) 3/4 I₀
- (c) I₀/2
- (d) I₀

Q30. Identify the wrong statement in context of heartwood?

- (a) It is highly durable.
- (b) It conducts water and minerals efficiently.
- (c) It comprises of dead elements with highly lignified walls.
- (d) Organic compounds are deposited in it.

Q31. Which is the correct statement for the given acids?

- (a) Phosphinic acid is a diprotic acid while phosphonic acid is a monoprotic acid
- (b) Phosphinic acid is a monoprotic acid while phosphonic acid is a diprotic acid
- (c) Both are triprotic acids
- (d) Both are diprotic acids

Q32. Given the value of Rydberg constant is 10⁷ m⁻¹, the wave number of the last line of the Balmer series in hydrogen spectrum will be:

- (a) 0.5 × 10⁷ m⁻¹
- (b) 0.25 × 10⁷ m⁻¹
- (c) 2.5 × 10⁷ m⁻¹
- (d) 0.025 × 10⁴ m⁻¹

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Q33. Zygotic meiosis is a characteristic of:

- (a) Fucus
- (b) Funaria
- (c) Chlamydomonas
- (d) Marchantia

Q34. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane, is:

- (a) The staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain
- (b) The eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain
- (c) The eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain
- (d) The staggered conformation of ethane is more stable than eclipsed conformation has no torsional strain

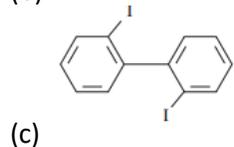
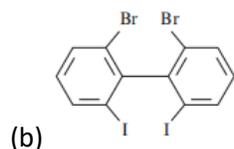
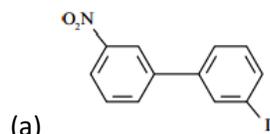
Q35. The ratio of escape velocity at earth (V_e) to the escape velocity at a planet (V_p) whose radius and mean density are twice as that of earth is

- (a) 1: $2\sqrt{2}$
- (b) 1:4
- (c) 1 : $\sqrt{2}$
- (d) 1:2

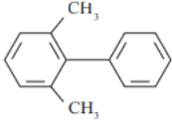
Q36. Which of the following statements is correct, with reference to enzymes?

- (a) Holoenzyme = Apoenzyme + Coenzyme
- (b) Coenzyme = Apoenzyme + Holoenzyme
- (c) Holoenzyme = Apoenzyme + Co-factor
- (d) Apoenzyme = Holoenzyme + Coenzyme

Q37. Which of the following biphenyl is optically active?



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(d)

Q38. A long solenoid has 1000 turns. When a current of 4 A flows through it, the magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self-inductance of the solenoid is

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

Q39. A gene whose expression helps to identify transformed cell is known as

- (a) Vector
- (b) Plasmid
- (c) Structural gene
- (d) Selectable marker

Q40. The correct statement regarding RNA and DNA, respectively is:

- (a) The sugar component in RNA is arabinose and the sugar component in DNA is 2'-deoxyribose
- (b) The sugar component in RNA is ribose and the sugar component in DNA is 2'-deoxyribose
- (c) The sugar component in RNA is arabinose and the sugar component in DNA is ribose
- (d) The sugar component in RNA is 2'-deoxyribose and the sugar component in DNA is arabinose

Q41. A car is negotiating a curved road of radius R. The road is banked at an angle θ . The coefficient of friction between the tyres of the car and the road is μ_s . The maximum safe velocity on this road is

(a) $\sqrt{gR \frac{\mu_s + \tan \theta}{1 - \mu_s + \tan \theta}}$

(b) $\sqrt{R \frac{g}{1 - \mu_s + \tan \theta} (\mu_s + \tan \theta)}$

(c) $\sqrt{R^2 \frac{g}{1 - \mu_s + \tan \theta} (\mu_s + \tan \theta)}$

(d) $\sqrt{gR^2 \frac{\mu_s + \tan \theta}{1 - \mu_s + \tan \theta}}$

Q42. Plants which produce characteristic pneumatophores and show vivipary belong to:

- (a) Halophytes

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- (b) Psammophytes
- (c) Hydrophytes
- (d) Mesophytes

Q43. The pair of electron in the given carbanion, $\text{CH}_3\text{C} \equiv \text{C}^-$ is present in which of the following orbitals?

- (a) 2p
- (b) sp^3
- (c) sp^2
- (d) sp

Q44. The magnetic susceptibility is negative for:

- (a) paramagnetic material only
- (b) ferromagnetic material only
- (c) paramagnetic and ferromagnetic materials
- (d) diamagnetic material only

Q45. Select the correct route for the passage of sperms in male frogs:

- (a) Testes \rightarrow Vasa efferentia \rightarrow Kidney \rightarrow Seminal Vesicle \rightarrow Urinogenital duct \rightarrow Cloaca
- (b) Testes \rightarrow Vasa efferentia \rightarrow Bidder's canal Ureter \rightarrow Cloaca
- (c) Testes \rightarrow Vasa efferentia \rightarrow Kidney \rightarrow Bidder's canal \rightarrow Urinogenital duct \rightarrow Cloaca
- (d) Testes \rightarrow Bidder's canal \rightarrow Kidney \rightarrow Vasa efferentia \rightarrow Urinogenital duct \rightarrow Cloaca

Q46. Which of the following compounds will not give Lassaigne's test for nitrogen?

- (a) NH_2NH_2
- (b) $\text{C}_6\text{H}_5\text{NHNH}_2$
- (c) $\text{PhN} = \text{NPh}$
- (d) NH_2CONH_2

Q47. A siren emitting a sound of frequency 800 Hz moves away from an observer towards a cliff at a speed of 15 ms^{-1} . Then, the frequency of sound that the observer hears in the echo reflected from the cliff is: (Take velocity of sound in air = 330 ms^{-1})

- (a) 800 Hz
- (b) 838 Hz
- (c) 885 Hz
- (d) 765 Hz

Q48. Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration because of:

- (a) Inspiratory reserve volume
- (b) Tidal volume
- (c) Expiratory reserve volume
- (d) Residual volume

Q49. By what factor does the average velocity of a gaseous molecule increase when the absolute temperature is doubled?

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- (a) 1.4
- (b) 2
- (c) 2.8
- (d) 4

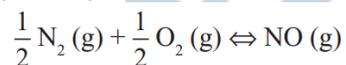
Q50. From a disc of radius R and mass M , a circular hole of diameter R , whose rim passes through the centre is cut. What is the moment of inertia of the remaining part of the disc about a perpendicular axis, passing through the centre?

- (a) $13 MR^2 / 32$
- (b) $11 MR^2 / 32$
- (c) $9 MR^2 / 32$
- (d) $15 MR^2 / 32$

Q51. Viroids differ from viruses in having:

- (a) DNA molecules without protein coat
- (b) RNA molecules with protein coat
- (c) RNA molecules without protein coat
- (d) DNA molecules with protein coat

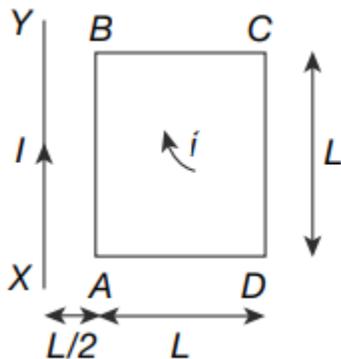
Q52. The free energy of formation of NO is 78 kJ mol^{-1} at the temperature of an automobile engine (1000 K).



What is the equilibrium constant for this reaction at 1000 K?

- (a) 8.4×10^{-5}
- (b) 7.1×10^{-9}
- (c) 4.2×10^{-10}
- (d) 1.7×10^{-19}

Q53. A square loop ABCD carrying a current i , is placed near and coplanar with a long straight conductor XY carrying a current I , the net force on the loop will be:



- (a) $\frac{\mu_0 I i}{2\pi}$

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- (b) $\frac{2\mu_o IiL}{3\pi}$
- (c) $\frac{\mu_o IiL}{2\pi}$
- (d) $\frac{2\mu_o Ii}{3\pi}$

Q54. Which ecosystem has the maximum biomass?

- (a) Grassland ecosystem
- (b) Pond ecosystem
- (c) Lake ecosystem
- (d) Forest ecosystem

Q55. Which of these changes with time for a first order reaction?

- 1. Rate of reaction
- 2. Rate constant
- 3. Half life

- (a) (1) only
- (b) (3) only
- (c) (1) & (2) only
- (d) (2) & (3) only

Q56. An air column, closed at one end and open at the other, resonates with a tuning fork when the smallest length of the column is 50 cm. The next larger length of the column resonating with the same tuning fork is:

- (a) 100 cm
- (b) 150 cm
- (c) 200 cm
- (d) 66.7 cm

Q57. Alexander Von Humboldt described for the first time:

- (a) Laws of limiting factor
- (b) Species area relationships
- (c) Population growth equation
- (d) Ecological biodiversity

Q58. Which of these species has a standard enthalpy of formation equal to zero?

- (a) $F_2(g)$
- (b) $F(g)$
- (c) $HF(aq)$
- (d) $F^-(aq)$

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Q59. Consider the junction diode as ideal. The value of current flowing through AB is:



- (a) 10^{-2} A
- (b) 10^{-1} A
- (c) 10^{-3} A
- (d) 0A

Q60. Which of the following statements is correct?

- (a) The descending limb of loop of Henle is impermeable to water.
- (b) The ascending limb of loop of Henle is permeable to water.
- (c) The descending limb of loop of Henle is permeable to electrolytes.
- (d) The ascending limb of loop of Henle is impermeable to water.

Q61. As O_2 (l) is cooled at 1 atm pressure, it freezes to form solid I at 54.5 K. At a lower temperature, solid I rearranges to solid II, which has a different crystal structure. Thermal measurements show that for the phase transition solid I to solid II, $\Delta H = -743.1 \text{ J mol}^{-1}$ and $\Delta S = -17.0 \text{ JK}^{-1} \text{ mol}^{-1}$. At what temperature are solids I and II in equilibrium?

- (a) 2.06 K
- (b) 31.6 K
- (c) 43.7 K
- (d) 53.4 K

Q62. A astronomical telescope has objective and eyepiece of focal lengths 40 cm and 4 cm respectively. To view an object 200 cm away from the objective, the lenses must be separated by a distance

- (a) 46.0 cm
- (b) 50.0 cm
- (c) 54.0 cm
- (d) 37.3 cm

Q63. Adult human RBCs are enucleate. Which of the following statement(s) is/are the most appropriate explanation for this feature?

- A. They do not reproduce
- B. They are somatic cells
- C. They do not metabolize
- D. All their internal space is available for oxygen transport

- (a) Only (a)
- (b) (a), (c) and (d)
- (c) (b) and (c)
- (d) Only (d)

Q64. Which of the following complexes has minimum magnitude of Δ_0 ?

- (a) $[\text{Cr}(\text{CN})_6]^{3-}$

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- (b) $[\text{Co}(\text{NH}_3)_6]^{3+}$
- (c) $[\text{CoCl}_6]^{3-}$
- (d) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$

Q65. A gas is compressed isothermally to half its initial volume. The same gas is compressed separately through an adiabatic process until its volume is again reduced to half. Then:

- (a) Compressing the gas through adiabatic process will require more work to be done.
- (b) Compressing the gas isothermally or adiabatically will require the same amount of work.
- (c) Which of the case (whether compression through isothermal or through adiabatic process) requires more work will depend upon the atomicity of the gas.
- (d) Compressing the gas isothermally will require more work to be done.

Q66. Which of the following in sewage treatment removes suspended solids?

- (a) Secondary treatment
- (b) Primary treatment
- (c) Sludge treatment
- (d) Tertiary treatment

Q67. On adding excess of NH_4OH to copper sulphate solution:

- (a) A deep blue solution is obtained
- (b) A blue precipitate of $\text{Cu}(\text{OH})_2$ is obtained
- (c) A black precipitate of CuO is obtained
- (d) No change takes place

Q68. Match the corresponding entries of column 1 with column 2. [Where m is the magnification produced by the mirror]

Column 1

(A) $m = -2$

(B) $m = -\frac{1}{2}$

(C) $m = +2$

(D) $m = +\frac{1}{2}$

Column 2

(p) Convex mirror

(q) Concave mirror

(r) Real image

(s) Virtual image

- (a) $A \rightarrow p, r$; $B \rightarrow p, s$; $C \rightarrow p, q$; $D \rightarrow r, s$
- (b) $A \rightarrow p, s$; $B \rightarrow q, r$; $C \rightarrow q, s$; $D \rightarrow q, r$
- (c) $A \rightarrow r, s$; $B \rightarrow q, s$; $C \rightarrow q, c$; $D \rightarrow p, s$
- (d) $A \rightarrow q, r$; $B \rightarrow q, r$; $C \rightarrow q, s$; $D \rightarrow p, s$

Q69. The final proof for DNA as the genetic material came from the experiments of:

- (a) Hershey and Chase
- (b) Avery, Macleod and McCarty
- (c) Har Gobind Khorana
- (d) Griffith

Q70. The number of unpaired electrons in tetrahedral $[\text{Ni}(\text{CO})_4]$ is:

- (a) 0

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- (b) 2
- (c) 3
- (d) 4

Q71. A disk and a sphere of same radius but different masses roll off on two inclined planes of the same altitude and length. Which one of the two objects gets to the bottom of the plane first?

- (a) Sphere
- (b) Both reach at the same time
- (c) Depends on their masses
- (d) Disk

Q72. The region of biosphere reserve which is legally protected and where no human activity is allowed is known as:

- (a) Buffer zone
- (b) Transition zone
- (c) Restoration zone
- (d) Core zone

Q73. On α -decay ${}_{92}\text{U}^{238}$ produces:

- (a) ${}_{92}\text{Np}^{238}$
- (b) ${}_{90}\text{Th}^{234}$
- (c) ${}_{91}\text{Pa}^{234}$
- (d) ${}_{92}\text{U}^{234}$

Q74. A particle moves so that its position vector is given by $\vec{r} = \cos \omega t \hat{x} + \sin \omega t \hat{y}$. Where ω is a constant. Which of the following is true?

- (a) Velocity and acceleration both are parallel to \vec{r} .
Velocity is perpendicular to \vec{r} and acceleration is directed towards the origin.
- (b) Velocity is perpendicular to \vec{r} and acceleration is directed away from the origin.
- (c) Velocity and acceleration both are perpendicular to \vec{r} .
- (d) to \vec{r} .

Q75. Myelin sheath is produced by:

- (a) Astrocytes and Schwann cells
- (b) Oligodendrocytes and osteoclasts
- (c) Osteoclasts and astrocytes
- (d) Schwann cells and oligodendrocytes

Q76. Compound A undergoes formation of cyano-hydrin which on hydrolysis gives lactic acid ($\text{CH}_3\text{CH}(\text{OH})\text{COOH}$). Therefore, compound A is:

- (a) Acetaldehyde
- (b) Acetone
- (c) Benzaldehyde
- (d) Formaldehyde

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Q77. A uniform circular disc of radius 50 cm at rest is free to turn about an axis which is perpendicular to its plane and passes through its centre. It is subjected to a torque which produces a constant angular acceleration of 2.0 rad s^{-2} . Its net acceleration in ms^{-2} at the end of 2.0 s is approximately.

- (a) 7.0
- (b) 6.0
- (c) 3.0
- (d) 8.0

Q78. Which of the following are not polymeric?

- (a) Proteins
- (b) Polysaccharides
- (c) Lipids
- (d) Nucleic acids

Q79. Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is

(Given that $1 \text{ L bar} = 100 \text{ J}$)

- (a) 25 J
- (b) 30 J
- (c) -30 J
- (d) 5 KJ

Q80. A small signal voltage $V(t) = V_0 \sin \omega t$ is applied across an ideal capacitor C:

- (a) Over a full cycle the capacitor C does not consume any energy from the voltage source.
- (b) Current $I(t)$ is in phase with voltage $V(t)$.
- (c) Current $I(t)$ is in phase with voltage V .
- (d) Current $I(t)$ lags voltage $V(t)$ by 90° .

Q81. The association of histone H1 with a nucleosome indicates:

- (a) DNA replication is occurring
- (b) The DNA is condensed into a chromatin fibre
- (c) The DNA double helix is exposed
- (d) Transcription is occurring

Q82. The anticodon transfer RNA for the messenger RNA codon G-C-A is:

- (a) G-U-T
- (b) T-G-A
- (c) C-G-U
- (d) A-G-T

Q83. An inductor 20 mH, a capacitor 50 μF and a resistor 40 Ω are connected in series across a source of emf $V = 10 \sin 340t$. The power loss in A.C. circuit is

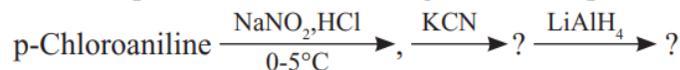
- (a) 0.67 W
- (b) 0.76 W
- (c) 0.89 W
- (d) 0.51 W

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Q84. Attractants and rewards are required for:

- (a) Entomophily
- (b) Hydrophily
- (c) Cleistogamy
- (d) Anemophily

Q85. The final product in the following reaction sequence is:



- (a) p-chlorophenol
- (b) p-chlorobenzamide
- (c) p-chlorobenzylamine
- (d) p-chlorobenzyl alcohol

Q86. When an α -particle of mass m moving with velocity v bombards on a heavy nucleus of charge Ze , its distance of closest approach from the nucleus depends on m as:

- (a) $1/vm$
- (b) $1/m^2$
- (c) m
- (d) $1/m$

Q87. Which among these is the correct combination of aquatic mammals?

- (a) Dolphins, Seals, Trygon
- (b) Whales, Dolphins, Seals
- (c) Trygon, Whales, Seals
- (d) Seals, Dolphins, Sharks

Q88. The dyes which are used in reduced state and are then oxidized in the fabric by air are called:

- (a) Dispersed dyes
- (b) Azo dyes
- (c) Vat dyes
- (d) Basic dyes

Q89. A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of this acceleration if the kinetic energy of the particle becomes equal to 8×10^{-4} J by the end of the second revolution after the beginning of the motion?

- (a) 0.15 m/s^2
- (b) 0.18 m/s^2
- (c) 0.2 m/s^2
- (d) 0.1 m/s^2

Q90. A temporary endocrine gland in the human body is:

- (a) Corpus cardiacum
- (b) Corpus luteum
- (c) Corpus allatum
- (d) Pineal gland

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Q91. The compound with molecular formula C_8H_{10} which will give only two isomers on electrophilic substitution with $Cl_2 / FeCl_3$ or with HNO_3 / H_2SO_4 is:

- (a) m-dimethylbenzene
- (b) p-dimethylbenzene
- (c) o-methylbenzene
- (d) ethylbenzene

Q92. A spring of force constant k is cut into lengths of ratio 1 : 2 : 3. They are connected in series and the new force constant is k' . Then they are connected in parallel and force constant is k'' . Then $k' : k''$ is

- (a) 1:9
- (b) 1:11
- (c) 1:14
- (d) 1:16

Q93. Coconut fruit is a:

- (a) Berry
- (b) Nut
- (c) Capsule
- (d) Drupe

Q94. A gas at 350 K and 15 bar has molar volume 20 percent smaller than that for an ideal gas under the same conditions. The correct option about the gas and its compressibility factor (Z) is :

- (a) $Z > 1$ and attractive forces are dominant
- (b) $Z > 1$ and repulsive forces are dominant
- (c) $Z < 1$ and attractive forces are dominant
- (d) $Z < 1$ and repulsive forces are dominant

Q95. The two nearest harmonics of a tube closed at one end and open at other end are 220 Hz and 260 Hz. What is the fundamental frequency of the system?

- (a) 20Hz
- (b) 30 Hz
- (c) 40 Hz
- (d) 10 Hz

Q96. Capacitation occurs in:

- (a) Epididymis
- (b) Vas deferens
- (c) Female reproductive tract
- (d) Rete testis

Q97. Which will make basic buffer?

- (a) 50 mL of 0.1 M NaOH + 25 mL of 0.1 M CH_3COOH
- (b) 100 mL of 0.1 M CH_3COOH + 100 mL of 0.1 M NaOH
- (c) 100 mL of 0.1 M HCl + 200 mL of 0.1 M NH_4OH
- (d) 100 mL of 0.1 M HCl + 100 mL of 0.1 M NaOH

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Q98. A physical quantity of the dimensions of length that can be formed out of c , G and $\frac{e^2}{4\pi\epsilon_0}$ is [c is velocity of light, G is universal constant of gravitation and e is charge]

(a) $c^2 \left[G \frac{e^2}{4\pi\epsilon_0} \right]^{1/2}$

(b) $\frac{1}{c^2} \left[\frac{e^2}{G4\pi\epsilon_0} \right]^{1/2}$

(c) $\frac{1}{c} G \frac{e^2}{4\pi\epsilon_0}$

(d) $\frac{1}{c^2} \left[G \frac{e^2}{4\pi\epsilon_0} \right]^{1/2}$

Q99. The DNA fragments separated on an agarose gel can be visualized after staining with:

- (a) Acetocarmine
- (b) Aniline blue
- (c) Ethidium bromide
- (d) Bromophenol blue

Q100. Conjugate base for Bronsted acids H_2O and HF are:

- (a) OH^- and H_2F^+ , respectively
- (b) H_3O^+ and F^- , respectively
- (c) OH^- and F^- , respectively
- (d) H_3O^+ and H_2F^+ , respectively

Q101. A capacitor is charged by a battery. The battery is removed and another identical uncharged capacitor is connected in parallel. The total electrostatic energy of resulting system:

- (a) Decreases by a factor of 2
- (b) Remains the same
- (c) Increases by a factor of 2
- (d) Increases by a factor of 4

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Q102. Match the following sexually transmitted diseases (Column-I) with their causative agent (Column-II) and select the correct option

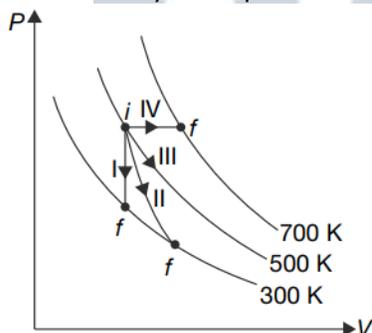
Column-I	Column-II
(a) Gonorrhoea	(i) HIV
(b) Syphilis	(ii) Neisseria
(c) Genital warts	(iii) Treponema
(d) AIDS	(iv) Human Papilloma Virus

- (a) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
 (b) (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)
 (c) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
 (d) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

Q103. pH of a saturated solution of $\text{Ca}(\text{OH})_2$ is 9. The solubility product (K_{sp}) of $\text{Ca}(\text{OH})_2$ is:

- (a) 0.5×10^{-15}
 (b) 0.25×10^{-10}
 (c) 0.125×10^{-15}
 (d) 0.5×10^{-19}

Q104. Thermodynamic processes are indicated in the following diagram:



Match the following

Column-I	Column-II
P. Process I	1. Adiabatic
Q. Process II	2. Isobaric
R. Process III	3. Isochoric
S. Process IV	4. Isotherm

- (a) $P \rightarrow 3, Q \rightarrow 1, R \rightarrow 4, S \rightarrow 2$
 (b) $P \rightarrow 3, Q \rightarrow 4, R \rightarrow 2, S \rightarrow 1$
 (c) $P \rightarrow 4, Q \rightarrow 2, R \rightarrow 1, S \rightarrow 3$
 (d) $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 4, S \rightarrow 2$

Q105. Frog's heart when taken out of the body continues to beat for some time. Select the best option from the following statement.

- a) Frog is a poikilotherm.

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- b) Frog does not have any coronary circulation.
- c) Heart is 'myogenic' in nature.
- d) Heart is autoexcitable.

- (a) Only (d)
- (b) (a) and (b)
- (c) (c) and (d)
- (d) Only (c)

Q106. Reaction between acetone and methylmagnesium chloride followed by hydrolysis will give:

- (a) Isopropyl alcohol
- (b) Sec. butyl alcohol
- (c) Tert. butyl alcohol
- (d) Isobutyl alcohol

Q107. The resistance of a wire is R ohm. If it is melted and stretched to n times its original length, its new resistance will be:

- (a) R/n
- (b) n²/R
- (c) R/n²
- (d) nR

Q108. Mycorrhizae are the example of:

- (a) Amensalism
- (b) Antibiosis
- (c) Mutualism
- (d) Fungistasis

Q109. If the rate constant for a first order reaction is k, the time (t) required for the completion of 99% of the reaction is given by:

- (a) $t = 0.693/k$
- (b) $t = 6.909/k$
- (c) $t = 4.606/k$
- (d) $t = 2.303/k$

Q110. The de-Broglie wavelength of a neutron in thermal equilibrium with heavy water at a temperature T (kelvin) and mass m, is:

- (a) $\frac{h}{\sqrt{3mkT}}$
- (b) $\frac{2h}{\sqrt{3mkT}}$

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(c) $\frac{2h}{\sqrt{mkT}}$

(d) $\frac{h}{\sqrt{mkT}}$

Q111. Which one of the following is related to ex situ conservation of threatened animals and plants?

- (a) Biodiversity hot spots
- (b) Amazon rainforest
- (c) Himalayan region
- (d) Wildlife safari parks

Q112. Which one of the followings has maximum number of atoms?

- (a) 1 g of Ag(s) [Atomic mass of Ag = 108]
- (b) 1 g of Mg(s) [Atomic mass of Mg = 24]
- (c) 1 g of O₂(g) [Atomic mass of O = 16]
- (d) 1 g of Li(s) [Atomic mass of Li = 7]

Q113. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At the centre of the solenoid, a coil of 100 turns and radius 0.01 m is placed with its axis coinciding with the solenoid axis. The current in the solenoid reduces at a constant rate to 0 A from 4 A in 0.05 s. If the resistance of the coil is $10 \pi^2 \Omega$, the total charge flowing through the coil during this time is:

- (a) $16 \mu\text{C}$
- (b) $32 \mu\text{C}$
- (c) $16 \pi \mu\text{C}$
- (d) $32 \pi \mu\text{C}$

Q114. Which cells of 'Crypts of Lieberkuhn' secrete antibacterial lysozyme?

- (a) Paneth cells
- (b) Zymogen cells
- (c) Kupffer cells
- (d) Argentaffin cells

Q115. Which is the correct thermal stability order for H₂E (E = O, S, Se, Te and Po)?

- (a) H₂S < H₂O < H₂Se < H₂Te < H₂Po
- (b) H₂O < H₂S < H₂Se < H₂Te < H₂Po
- (c) H₂Po < H₂Te < H₂Se < H₂S < H₂O
- (d) H₂Se < H₂Te < H₂Po < H₂O < H₂S

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Q116. A mixture of N_2 and Ar gases in a cylinder contains 7 g of N_2 and 8 g of Ar. If the total pressure of the mixture of the gases in the cylinder is 27 bar, the partial pressure of N_2 is: [Use atomic masses (in g mol⁻¹): N = 14, Ar = 40]

- (a) 9 bar
- (b) 12 bar
- (c) 15 bar
- (d) 18 bar

Q117. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8th bright fringe in the medium lies where 5th dark fringe lies in air. The refractive index of the medium is nearly:

- (a) 1.59
- (b) 1.69
- (c) 1.78
- (d) 1.25

Q118. Good vision depends on adequate intake of carotene rich food. Select the best option from the following statements.

- a) Vitamin A derivatives are formed from carotene.
- b) The photopigments are embedded in the membrane discs of the inner segment.
- c) Retinal is a derivative of Vitamin A.
- d) Retinal is light absorbing part of all the visual photopigments.

(a) (a), (c) and (d)

(b) (a) and (c)

(c) (b), (c) and (d)

(d) (a) and (b)

Q119. 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is:

- (a) $5f > 6p > 5p > 4d$
- (b) $6p > 5f > 5p > 4d$
- (c) $6p > 5f > 4d > 5p$
- (d) $5f > 6p > 4d > 5p$

Q120. If θ_1 and θ_2 be the apparent angles of dip observed in two vertical planes at right angles to each other, then the true angle of dip q is given by:

- (a) $\tan^2\theta = \tan^2\theta_1 + \tan^2\theta_2$
- (b) $\cot^2\theta = \cot^2\theta_1 - \cot^2\theta_2$
- (c) $\tan^2\theta = \tan^2\theta_1 - \tan^2\theta_2$
- (d) $\cot^2\theta = \cot^2\theta_1 + \cot^2\theta_2$

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Q121. A baby boy aged two years is admitted to play school and passes through a dental check-up. The dentist observed that the boy had twenty teeth. Which teeth were absent?

- (a) Canines
- (b) Pre-molars
- (c) Molars
- (d) Incisors

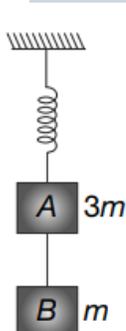
Q122. Measuring Zeta potential is useful in determining which property of colloidal solution?

- (a) Viscosity
- (b) Solubility
- (c) Stability of the colloidal particles
- (d) Size of the colloidal particles

Q123. Thalassaemia and sickle cell anaemia are caused due to a problem in globin molecule synthesis. Select the correct statement.

- (a) Both are due to a quantitative defect in globin chain synthesis.
- (b) Thalassaemia is due to less synthesis of globin molecules.
- (c) Sickle cell anaemia is due to a quantitative problem of globin molecules.
- (d) Both are due to a qualitative defect in globin chain synthesis.

Q124. Two blocks A and B of masses $3m$ and m respectively are connected by a massless and inextensible string. The whole system is suspended by a massless spring as shown in figure. The magnitudes of acceleration of A and B immediately after the string is cut, are respectively



- (a) $g/3$, g
- (b) g , g
- (c) $g/3$, $g/3$
- (d) g , $g/3$

Q125. GnRH, a hypothalamic hormone, needed in reproduction, acts on:

- (a) Anterior pituitary gland and stimulates secretion of LH and FSH.
- (b) Posterior pituitary gland and stimulates secretion of oxytocin and FSH.
- (c) Posterior pituitary gland and stimulates secretion of LH and relaxin.
- (d) Anterior pituitary gland and stimulates secretion of LH and Oxytocin.

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Q126. On electrolysis of dil. sulphuric acid using Platinum (Pt) electrode, the product obtained at anode will be:

- (a) Hydrogen gas
- (b) Oxygen gas
- (c) H₂S gas
- (d) SO₂ gas

Q127. The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then

- (a) d = 1 km
- (b) d = 3/2 km
- (c) d = 2 km
- (d) d = 1/2 km

Q128. Out of 'X' pairs of ribs in humans only 'Y' pairs are true ribs. Select the option that correctly represents values of X and Y and provides their explanation:

- (a) X = 12, Y = 5

True ribs are attached dorsally to vertebral column and sternum on the two ends.

- (b) X = 24, Y = 7

True ribs are dorsally attached to vertebral column but are free on ventral side.

- (c) X = 24, Y = 12

True ribs are dorsally attached to vertebral column but are free on ventral side.

- (d) X = 12, Y = 7

True ribs are attached dorsally to vertebral column and ventrally to the sternum.

Q129. 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is:

- (a) 6p > 5f > 4d > 5p
- (b) 5f > 6p > 4d > 5p
- (c) 6p > 5f > 5p > 4d
- (d) 5f > 6p > 5p > 4d

Q130. A spherical black body with a radius of 12 cm radiates 450 watt power at 500 K. If the radius were halved and the temperature doubled, the power radiated in watt would be:

- (a) 450
- (b) 1000
- (c) 1800
- (d) 225

Q131. If there are 999 bases in an RNA that codes for a protein with 333 amino acids and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered?

- (a) 11
- (b) 33

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- (c) 333
- (d) 1

Q132. For an ideal solution, the correct option is:

- (a) $D_{\text{mix}} H = 0$ at constant T and P
- (b) $D_{\text{mix}} G = 0$ at constant T and P
- (c) $D_{\text{mix}} S = 0$ at constant T and P
- (d) $D_{\text{mix}} V = 0$ at constant T and P

Q133. Radioactive material A has decay constant 8λ and material B has decay constant λ . Initially they have same number of nuclei. After what time, the ratio of number of nuclei of material B to that A will be?

- (a) $1/7\lambda$
- (b) $1/8\lambda$
- (c) $1/9\lambda$
- (d) $1/\lambda$

Q134. DNA fragments are:

- (a) Negatively charged
- (b) Neutral
- (c) Either positively or negatively charged depending on their size
- (d) Positively charged

Q135. In which case change in entropy is negative?

- (a) Sublimation of solid to gas
- (b) $2\text{H}(\text{g}) \rightleftharpoons \text{H}_2(\text{g})$
- (c) Evaporation of water
- (d) Expansion of a gas at constant temperature

Q136. Two astronauts are floating in gravitational free space after having lost contact with their spaceship. The two will

- (a) Move towards each other.
- (b) Move away from each other.
- (c) Will become stationary
- (d) Keep floating at the same distance between them.

Q137. The genotypes of a husband and wife are IAIB and IAi. Among the blood types of their children, how many different genotypes and phenotypes are possible?

- (a) 3 genotype; 4 phenotype
- (b) 4 genotypes; 3 phenotypes
- (c) 4 genotype; 4 phenotypes
- (d) 3 genotypes; 3 phenotypes

Q138. One end of string of length l is connected to a particle of mass m and the other end is connected to a small peg on a smooth horizontal table. If the particle moves in circle with speed v the net force on the particle (directed towards centre) will be (T represents the tension in the string):

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- (a) $T + mv^2/l$
- (b) $T - mv^2/l$
- (c) Zero
- (d) T

Q139. Double fertilization is exhibited by:

- (a) Algae
- (b) Fungi
- (c) Angiosperms
- (d) Gymnosperms

Q140. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is:

- (a) C_3A_4
- (b) C_4A_3
- (c) C_2A_3
- (d) C_3A_2

Q141. Two Polaroids P_1 and P_2 are placed with their axis perpendicular to each other. Unpolarised light I_0 is incident on P_1 . A third polaroid P_3 is kept in between P_1 and P_2 such that its axis makes an angle 45° with that of P_1 . The intensity of transmitted light through P_2 is:

- (a) $I_0/4$
- (b) $I_0/8$
- (c) $I_0/16$
- (d) $I_0/2$

Q142. The water potential of pure water is:

- (a) Less than zero
- (b) More than zero but less than one
- (c) More than one
- (d) Zero

Q143. Identify the incorrect statement related to PCl_5 from the following:

- (a) Axial P-Cl bonds are longer than equatorial P-Cl bonds
- (b) PCl_5 molecule is non-reactive
- (c) Three equatorial P-Cl bonds make an angle of 120° with each other
- (d) Two axial P-Cl bonds make an angle of 180° with each other

Q144. In an electromagnetic wave in free space the root mean square value of the electric field is $E_{rms} = 6 \text{ V/m}$. The peak value of the magnetic field is:

- (a) $2.83 \times 10^{-8} \text{ T}$
- (b) $0.70 \times 10^{-8} \text{ T}$

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- (c) $4.23 \times 10^{-8} \text{ T}$
- (d) $1.41 \times 10^{-8} \text{ T}$

Q145. Which of the following options gives the correct sequence of events during mitosis?

- (a) Condensation → Nuclear membrane disassemble → Arrangement at equator → Centromere division → Segregation → Telophase
- (b) Condensation → Crossing over → Nuclear membrane disassembly → Segregation → Telophase
- (c) Condensation → Arrangement at equator → Centromere division → Segregation → Telophase
- (d) Condensation → Nuclear membrane disassembly → Crossing over → Segregation → Telophase

Q146. Which of the following is incorrect statement?

- (a) GeX_4 (X = F, Cl, Br, I) is more stable than GeX_2
- (b) SnF_4 is ionic in nature
- (c) PbF_4 is covalent in nature
- (d) SiCl_4 is easily hydrolysed

Q147. Two discs of same moment of inertia rotating about their regular axis passing through centre and perpendicular to the plane of disc with angular velocities ω_1 and ω_2 . They are brought into contact face to face coinciding the axis of rotation. The expression for loss of energy during this process is:

(a) $\frac{1}{4} I(\omega_1 - \omega_2)^2$

(b) $I(\omega_1 - \omega_2)^2$

(c) $\frac{1}{8} (\omega_1 - \omega_2)^2$

(d) $\frac{1}{2} I(\omega_1 + \omega_2)^2$

Q148. The vascular cambium normally gives rise to:

- (a) Primary phloem
- (b) Secondary xylem
- (c) Periderm
- (d) Phelloderm

Q149. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is:

- (a) 30

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- (b) 40
- (c) 10
- (d) 20

Q150. A 250-Turn rectangular coil of length 2.1 cm and width 1.25 cm carries a current of 85 μ A and subjected to magnetic field of strength 0.85 T. Work done for rotating the coil by 180° against the torque is:

- (a) 4.55 μ J
- (b) 2.3 μ J
- (c) 1.15 μ J
- (d) 9.1 μ J

Q151. Which of the following best represents the enzyme composition of pancreatic juice?

- (a) amylase, pepsin, trypsinogen, maltase
- (b) peptidase, amylase, pepsin, rennin
- (c) lipase, amylase, trypsinogen, procarboxypeptidase
- (d) amylase, peptidase, trypsinogen, rennin

Q152. Which one is malachite from the following?

- (a) Fe_3O_4
- (b) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
- (c) CuFeS_2
- (d) $\text{Cu}(\text{OH})_2$

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Q153. A carnot engine having an efficiency of $1/10$ as heat engine, is used as a refrigerator. If the work done on the system is 10 J, the amount of energy absorbed from the reservoir at lower temperature is:

- (a) 90 J
- (b) 99 J
- (c) 100 J
- (d) 1 J

Q154. The morphological nature of the edible part of coconut is:

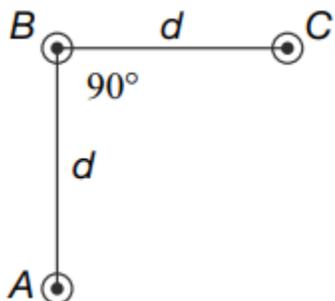
- (a) Cotyledon
- (b) Endosperm
- (c) Pericarp
- (d) Perisperm

Q155. For the second period elements the correct increasing order of first ionisation enthalpy is:

- (a) $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{N} < \text{O} < \text{F} < \text{Ne}$
- (b) $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$
- (c) $\text{Li} < \text{Be} < \text{B} < \text{C} < \text{N} < \text{O} < \text{F} < \text{Ne}$
- (d) $\text{Li} < \text{B} < \text{Be} < \text{C} < \text{O} < \text{N} < \text{F} < \text{Ne}$

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Q156. An arrangement of three parallel straight wires placed perpendicular to plane of paper carrying same current I along the same direction is shown in fig. Magnitude of force per unit length on the middle wire B is given by



(a) $\frac{2\mu_0 i^2}{\pi d}$

(b) $\frac{\sqrt{2}\mu_0 i^2}{\pi d}$

(c) $\frac{\mu_0 i^2}{\sqrt{2}\pi d}$

(d) $\frac{\mu_0 i^2}{2\pi d}$

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Q157. The hepatic portal vein drains blood to liver from:

- (a) Stomach
- (b) Kidneys
- (c) Intestine
- (d) Heart

Q158. Which mixture of the solutions will lead to the formation of negatively charged colloidal $[\text{AgI}]^-$ sol?

- (a) 50 mL of 2 M AgNO_3 + 50 mL of 1.5 M KI
- (b) 50 mL of 0.1 M AgNO_3 + 50 mL of 0.1 M KI
- (c) 50 mL of 1 M AgNO_3 + 50 mL of 1.5 M KI
- (d) 50 mL of 1 M AgNO_3 + 50 mL of 2 M KI

Q159. Which of the following statements are correct?

- (a) Centre of mass of a body always coincides with the centre of gravity of the body
- (b) Central of mass of a body is the point at which the total gravitational torque on the body is zero
- (c) A couple on a body produce both translational and rotation motion in a body
- (d) Mechanical advantage greater than one means that small effort can be used to lift a large load

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Q160. Which of the following represents the order of 'Horse'?

- (a) Perissodactyla
- (b) Caballus
- (c) Ferus
- (d) Equidae

Q161. The mixture that forms maximum boiling azeotrope is:

- (a) Acetone + Carbon disulphide
- (b) Heptane + Octane
- (c) Water + Nitric acid
- (d) Ethanol + Water

Q162. Photoelectric effect is an example of

- (a) elastic collision
- (b) inelastic collision
- (c) two dimensional collision
- (d) oblique collision

Q163. Which of the following are found in extreme saline conditions?

- (a) Eubacteria
- (b) Cyanobacteria
- (c) Mycobacteria
- (d) Archaeobacteria

Q164. Which of the following species is not stable?

- (a) $[\text{Sn}(\text{OH})_6]^{2-}$
- (b) $[\text{SiCl}_6]^{2-}$
- (c) $[\text{SiF}_6]^{2-}$
- (d) $[\text{GeCl}_6]^{2-}$

Q165. Two bodies of masses 1 kg and 3 kg have position vectors $(\hat{i} + 2\hat{j} + \hat{k})$ and $(-3\hat{i} - 2\hat{j} + \hat{k})$ respectively. The centre of mass of this system has a position vector:

- (a) $-\hat{i} + \hat{j} + \hat{k}$
- (b) $-2\hat{i} + 2\hat{k}$
- (c) $-2\hat{i} - \hat{j} + \hat{k}$
- (d) $-2\hat{i} - \hat{j} - 2\hat{k}$

Q166. Which of the following facilitates the opening of stomatal aperture?

- (a) Decrease in turgidity of guard cells.
- (b) Radial orientation of cellulose microfibrils in the cell wall of guard cells.
- (c) Longitudinal orientation of cellulose microfibrils in the cell wall of guard cells.

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(d) Contraction of outer wall of guard cells.

Q167. Which of the following is an amphoteric hydroxide?

- (a) $\text{Mg}(\text{OH})_2$
- (b) $\text{Be}(\text{OH})_2$
- (c) $\text{Sr}(\text{OH})_2$
- (d) $\text{Ca}(\text{OH})_2$

Q168. The rms speed of the molecules of a gas at 100°C is v . The temperature at which the rms speed will be $\sqrt{3}v$ is

- (a) 546°C
- (b) 646°C
- (c) 746°C
- (d) 846°C

Q169. Artificial selection to obtain cows yielding higher milk output represents

- (a) Directional as it pushes the mean of the character in one direction.
- (b) Disruptive as it splits the population into two, one yielding higher output and the other lower output.
- (c) Stabilizing followed by disruptive as it stabilizes the population to produce higher yielding cows.
- (d) Stabilizing selection as it stabilizes this character in the population.

Q170. Enzymes that utilize ATP in phosphate transfer require an alkaline earth metal (M) as the cofactor. M is :

- (a) Ca
- (b) Sr
- (c) Be
- (d) Mg

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Q171. When a battery connected across a resistor of $16\ \Omega$, the voltage across the resistor is $12\ \text{V}$. When the same battery is connected across a resistor of $10\ \Omega$, voltage across it is $11\ \text{V}$. The internal resistance of the battery is:

- (a) $10/7\ \Omega$
- (b) $20/7\ \Omega$
- (c) $25/7\ \Omega$
- (d) $30/7\ \Omega$

Q172. Receptor sites neurotransmitters are present on

- (a) Pre-synaptic membrane
- (b) Tips of axons
- (c) Post-synaptic membrane
- (d) Membranes of synaptic vesicles

Q173. The manganate and permanganate ions are tetrahedral, due to:

- (a) The π -bonding involves overlap of p-orbitals of oxygen with p-orbitals of manganese
- (b) The π -bonding involves overlap of d-orbitals of oxygen with d-orbitals of manganese
- (c) The π -bonding involves overlap of p-orbitals of oxygen with d-orbitals of manganese
- (d) There is no π -bonding

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Q174. If the length of stretched string is shortened by 40% and the tension is increased by 44%, then the ratio of the final and initial fundamental frequencies is:

- (a) 02:01
- (b) 03:02
- (c) 03:04
- (d) 01:03

Q175. Transplantation of tissues/organs fails often due to non-acceptance by the patient's body. Which type of immune is responsible for such rejections?

- (a) Cell-mediated immune response
- (b) Hormonal immune response
- (c) Physiological immune response
- (d) Autoimmune response

Q176. Which is the correct thermal stability order for H₂E (E = O, S, Se, Te and Po)?

- (a) H₂Po < H₂Te < H₂Se < H₂S < H₂O
- (b) H₂Se < H₂Te < H₂Po < H₂O < H₂S
- (c) H₂S < H₂O < H₂Se < H₂Te < H₂Po
- (d) H₂O < H₂S < H₂Se < H₂Te < H₂Po

Q177. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{L/g}$. Measured value of L is 10 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 50 s using a wrist watch of 1 s resolution. What is the accuracy in the determination of g?

- (a) 2%
- (b) 3%
- (c) 4%
- (d) 5%

Q178. Spliceosomes are not found in the cells of:

- (a) Fungi
- (b) Animals
- (c) Bacteria
- (d) Plants

Q179. Among the following, the one that is not a green house gas is

- (a) Ozone
- (b) Sulphur dioxide
- (c) Nitrous oxide
- (d) Methane

Q180. A convex lens of focal length 20 cm made of glass of refractive index 1.5 is immersed in water having refractive index 1.33. The change in the focal length of lens is:

- (a) 62.2 cm
- (b) 5.82 cm
- (c) 58.2 cm
- (d) 6.22 cm

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Answer Key

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