Based on
CST- 13 & 14

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CONCEPT STRENGTHENING SHEET

CSS-07

BOTANY

Q.109 (CST-13) [Biological Classification: Kingdom - Monera]

1. Eubacteria is/are
   (1) Cyanobacteria (2) *Lactobacillus*
   (3) Methanogens (4) Both (1) & (2)
2. Which of the given monerans is wall-less?
   (1) *Nostoc* (2) *Mycoplasma*
   (3) *Methanobacterium* (4) Halophiles
3. Read the given statements and select the **correct** option.
   Statement A: Cyanobacteria have chlorophyll 'a' similar to green plants.
   Statement B: Cyanobacteria may be unicelled, filamentous and colonial.
   (1) Only statement A is correct
   (2) Only statement B is correct
   (3) Both statements are correct
   (4) Both statements are incorrect
4. Read the given statements and state them true (T) or false (F) and select the **correct** option.
   A) *Nostoc* is a filamentous eubacteria.
   B) Some of the cyanobacteria converts atmospheric nitrogen into ammonia.
   C) *Mycoplasma* is an unicellular free-living prokaryotes.
   (1) A - T, B - T, C - T
   (2) A – F, B – F, C - F
   (3) A – T, B – F, C - T
   (4) A – F, B – T, C - F

Q.117 (CST-13) (Plant Kingdom: Bryophytes)

1. Which among the following liverwort(s) has/have thalloid plant body which is dorsiventral and closely appressed to the substrate?
   (1) *Marchantia* (2) *Riccia*
   (3) *Porella* (4) Both (1) & (2)
2. Which among the following is **not** a moss?
   (1) *Funaria* (2) *Polytrichum*
   (3) *Porella* (4) *Sphagnum*
3. In which of the following liverworts, tiny leaf-like appendages are present in two rows on the stem like structure?
   (1) *Marchantia* (2) *Porella*
   (3) *Riccia* (4) *Funaria*

Q.123 (CST-13) (Respiration in Plants: Krebs Cycle)

1. Which of the following is **not** a reaction of Krebs Cycle?
   (1) Pyruvic acid → Acetyl CoA
   (2) Succinic acid → Fumaric acid
   (3) Oxaloacetic acid → Citric acid
   (4) Succinyl CoA → Succinic acid
2. During decarboxylation reaction in Krebs Cycle
   (1) CO_2 is evolved
   (2) Decarboxylase enzymes play the role
   (3) CO_2 is consumed and added to substrates
   (4) Both (1) & (2)
3. Read the statement and select the **correct** option.
   A – CO_2 is evolved during the conversion of α-KGA to succinyl CoA.
   B – Oxalosuccinic acid is a transient intermediate between isocitric acid and α-KGA.
   (1) Both A and B are correct
   (2) Both A and B are incorrect
   (3) Only A is correct
   (4) Only B is correct

Q.124 (CST-13) (Respiration in Plants: Aerobic Respiration, Electron Transport System(ETS) and Oxidative Phosphorylation)

1. Ubiquinone is oxidized with the transfer of electrons to
   (1) NADH dehydrogenase
   (2) $FADH_2$
   (3) Cytochrome c
   (4) Both (1) and (2)
2. Which of the following acts as a mobile carrier for transfer of electrons between complex III and IV ?
   (1) Cyt *c*
   (2) $FADH_2$
   (3) Cyt *a* and a_3
   (4) Ubiquinone
3. Complex IV in the ETS contains
   (1) NADH dehydrogenase
   (2) $FADH_2$
   (3) Cyt *c*
   (4) Cyt *a* and a_3 along with two copper centres
4. Read the following statement and select the **correct** option respectively.
   Ubiquinone located within the _____ membrane of mitochondria, receives reducing equivalents via _____.
   (1) Outer, Complex V
   (2) Inner, Cytochrome c oxidase
   (3) Inner, $FADH_2$
   (4) Outer, $FADH_2$

Q.107 (CST-14) (Cell: The Unit of Life – Eukaryotic Cells)

1. Which of the following shows flip flop movement in the plasma membrane?
   (1) Extrinsic proteins
   (2) Lipids
   (3) Carbohydrates
   (4) Transmembrane proteins
2. _____ shows lateral movement in the plasma membrane?
   (1) Cholesterol (2) Proteins
   (3) Oligosaccharides (4) Both (1) & (2)
3. Read the following statements and select the **correct** option.
   Statement A: Tails of lipids are nonpolar whereas heads are polar.
   Statement B: Polar heads are present towards- the outside as well as towards the cytoplasm.
   (1) Only statement A is correct
   (2) Only statement B is correct
   (3) Both statement A & B are correct
   (4) Both statement A & B are incorrect

Q.130 (CST-14) (Sexual reproduction in Flowering Plants: Pre-fertilization – Structures and Events)

1. The third layer of anther wall which degenerates at maturity
   (1) Has thick cuticle deposition
   (2) Is 1-3 layered thick
   (3) Has α-cellulosic fibrous bands in the cell wall
   (4) Is made up of polyploid cells
2. Endothecium of anther
   (1) Helps in its dehiscence
   (2) Is hydrophobic in nature
   (3) Provides nutrients to the developing pollen grains
   (4) Degenerates before microsporogenesis
3. All of the following are true w.r.t. innermost layer of anther wall, **except**
   (1) It surrounds the sporogenous tissue
   (2) It nourishes the microspores
   (3) It is made up of haploid cells
   (4) It has cells with dense cytoplasm
4. Epidermis of anther wall is
   (a) Single layered
   (b) Diploid
   (c) Ephemeral
   (d) Protective in function
   The **correct** one(s) is/are
   (1) (b), (c) & (d)
   (2) (a), (b) & (d)
   (3) (c) only
   (4) (b) & (c) only

Q.134 (CST-14) (Strategies foe Enhancement in food Production-Tissue culture – What does tissue culture means?)

1. The plant cells without cell wall are called
   (1) Cytoplasm (2) Protoplasm
   (3) Protoplast (4) Nucleoplasm

2. When hybrid is produced by fusion of two different protoplasts, it is known as
   (1) Explant
   (2) Somatic hybrid
   (3) Somaclone
   (4) Hybrid vigour
3. Naked protoplast represents
   (1) Cell with cell wall and plasma membrane
   (2) Cell without nucleus
   (3) Cell without glycocalyx
   (4) Plant cell without cell wall but surrounded by plasma membrane
4. The technique of maintaining and growing plant cells in artificial medium under sterile condition is called
   (1) Tissue culture
   (2) Biofortification
   (3) Heterosis
   (4) Germplasm collection
5. Pomato is developed as a new crop plant by fusion of protoplast of
   (1) Pomato and tomato
   (2) Potato and tomato
   (3) Tomato and brinjal
   (4) Potato and carrot

Q.103 (CST-14) (Biological Classification: Protista)

1. Organisms that are considered as indicators of water pollution didn't grow in polluted water bodies. The organisms are
   (1) Diatoms (2) Dinoflagellates
   (3) Slime moulds (4) Protozoans
2. Some blue green algae grow abundantly in water bodies and are known to
   (1) Cause water bloom
   (2) Cause biomagnifications
   (3) Indicate water pollution
   (4) Make water body clear
3. Methanogens
   (1) Grow in marshy areas
   (2) Are known to cause water pollution
   (3) Are filamentous fungi
   (4) Are found in water bodies

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CONCEPT STRENGTHENING SHEET
CSS-07 (Botany)
Answer Key

Q.109 (Biological Classification: Kingdom - Monera)

1. (4)
2. (2)
3. (3)
4. (1)

Q.117 (Plant Kingdom: Bryophytes)

1. (4)
2. (3)
3. (2)

Q.123 (Respiration in Plants: Krebs Cycle)

1. (1)
2. (4)
3. (1)

Q.124 (Respiration in Plants: Aerobic Respiration, Electron Transport System(ETS) and Oxidative Phosphorylation)

1. (3)
2. (1)
3. (4)
4. (3)

Q.107 (Cell: The Unit of Life – Eukaryotic Cells)

1. (2)
2. (2)
3. (3)

Q.130 (Sexual reproduction in Flowering Plants: Pre-fertilization – Structures and Events)

1. (2)
2. (1)
3. (3)
4. (2)

Q.134 (Strategies foe Enhancement in food Production-Tissue culture – What does tissue culture means?)

1. (3)
2. (2)
3. (4)
4. (1)
5. (2)

Q.103 (Biological Classification: Protista)

1. (1)
2. (1)
3. (1)

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CONCEPT STRENGTHENING SHEET
CSS-07
CHEMISTRY

Q.63 (CST-13) (Titration of Weak Acid with Strong base)

1. How much volume (in ml) of 0.2 M CH_3COOH solution should be added in 500 ml of 0.1 M NaOH solution to make a buffer of pH of 5.0? (pK_a (CH_3COOH) = 4.7)

   (1) 500 ml (2) 200 ml

   (3) 375 ml (4) 400 ml

2. pH of solution which is formed by taking equal volumes of two solution of 0.2 M CH_3COOH and 0.1 M NaOH is (pK_a (CH_3COOH) = 4.7)

   (1) 4.7 (2) 3.0

   (3) 5.0 (4) 4.4

3. pH of solution which is formed by taking equal volumes of two solution of 0.2 M CH_3COOH and 0.2 M NaOH (pK_a (CH_3COOH) = 4.7)

   (1) 4.7 (2) 5.0

   (3) 4.4 (4) 8.85

Q.77. (CST-13) (Cubic Unit Cell)

1. First nearest neighbour of Cl^- in terms of edge length 'a' for NaCl lattice is

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

   (3) 2a (4) $\frac{a}{\sqrt{2}}$

2. Second nearest neighbour of an atom which crystallizes in bcc is at (Edge length of unit cell is a)

   (1) $\sqrt{3}a$ (2) $\frac{\sqrt{3}a}{2}$

   (3) a (4) $\frac{a}{\sqrt{2}}$

3. Nearest distance between two tetrahedral voids in NaCl unit cell is (Edge length of unit cell is a)

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

   (3) $\frac{a}{2}$ (4) 2a

4. Second nearest neighbour of an atom which crystallizes in fcc is at (Edge length of unit cell is a)

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

   (3) $\frac{a}{\sqrt{2}}$ (4) $\sqrt{3}\frac{a}{2}$

Q.81. (CST-13) (Nernst Equation)

1. Cell of maximum e.m.f. among the following is (Consider all the partial pressure of $H_2(g)$ to be 1 atm)

   (1) $Pt|H_2(g)|H^+(0.1M) \,||\, H^+(1M)\,|H_2(g)|Pt$

   (2) $Pt|H_2(g)|H^+(1M) \,||\, H^+(10M)\,|H_2(g)|\,Pt$

   (3) $Pt|H_2(g)|H^+(0.1M) \,||\, H^+(10M)\,|H_2(g)|Pt$

   (4) $Pt|H_2(g)|H^+(10\,M) \,||\, H^+(0.1M)\,|H_2(g)|Pt$

2. Calculate the e.m.f. of cell,

   $Mg|Mg^{2+}(0.1M)||Cu^{2+}(1M)|Cu$

   $\left(E^\circ_{cell} = 2.7\ V\right)$

   (1) 2.7 V (2) 2.67 V

   (3) 2.73 V (4) 2.87 V

3. Select the pH at which reduction potential of hydrogen electrode is maximum?

   (1) pH = 2

   (2) pH = 4

   (3) pH = 5

   (4) pH = 6

Q.87. (CST-13) (Peroxy Linkage)

1. Number of peroxy linkage(s) in $H_2S_2O_8$ is
   (1) 1 (2) Zero
   (3) 2 (4) 3
2. Number of peroxy linkage(s) in H_2SO_5 is
   (1) 1 (2) Zero
   (3) 2 (4) 3
3. Number of peroxy linkage(s) in $H_2S_2O_7$ and $H_4P_2O_7$ respectively are
   (1) 1, Zero (2) Zero, 1
   (3) Zero, Zero (4) 2,1

Q. 76. (CST-14) Acids and Bases

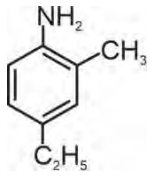
1. Conjugate acid base pair of NH_3 are
   (1) $\overset{+}{N}H_4$ and $\bar{O}H$ (2) H^+ and $\bar{O}H$
   (3) $\overset{+}{N}H_4$ and $\bar{N}H_2$ (4) H^+ and $\bar{N}H_2$
2. Which among the following is not a Lewis acid?
   (1) B_2H_6 (2) Co^{3+}
   (3) $AlCl_3$ (4) NH_3
3. Consider the following statements
   (a) HSO_4^- can act both as Bronsted acid and base
   (b) If Bronsted acid is a strong acid then its conjugate base is a weak base
   (c) I^- is a weaker base than H_2O
   The correct statements are
   (1) (a) and (b) only (2) (b) and (c) only
   (3) (a) and (c) only (4) (a), (b) and (c)

Q.68. (CST-14) Electrophiles and Nucleophiles

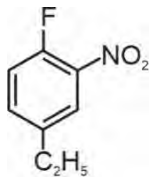
1. Which among the following is not an electrophile?
   (1) CO_2
   (2) $\overset{+}{N}O_2$
   (3) $(CH_3)_3N$
   (4) Br^+
2. The species which is not used as nucleophile is
   (1) $CH_3\bar{O}$ (2) $\bar{C}N$
   (3) BF_3 (4) H_2O
3. The strongest nucleophile in ethanol is
   (1) F^- (2) Cl^-
   (3) I^- (4) Br^-

Q.70. (CST-14) IUPAC Nomenclature

1. Correct IUPAC nomenclature of the given compound is



   (1) 2-Amino-5-ethyl-1-methylbenzene
   (2) 4-Ethyl-2-methylaniline
   (3) 4-Ethyl-6-methylaniline
   (4) 2-Amino-5-ethyltoluene
2. Correct order of priority of functional groups in IUPAC nomenclature is
   (1) $-SO_3H > -COOH > -CN > -CONH_2$
   (2) $-COOH > -SO_3H > -CONH_2 > -CN$
   (3) $-COOH > -SO_3H > -CN > -CONH_2$
   (4) $-SO_3H > -COOH > -CONH_2 > -CN$
3. Correct IUPAC nomenclature of the given compound is



   (1) 1–Ethyl–4–fluoro–3–nitrobenzene
   (2) 4–Ethyl–1–fluoro–2–nitrobenzene
   (3) 5–Ethyl–2–fluoro–1–nitrobenzene
   (4) 4–Ethyl–1–fluoro–6–nitrobenzene
4. Neopentyl group among the following is
   (1) $CH_3-\underset{CH_3}{CH}-\underset{CH_3}{CH}-$
   (2) $(CH_3)_3C-CH_2-$
   (3) $CH_3CH_2CH_2CH_2CH_2-$
   (4) $CH_3-CH_2-\underset{CH_3}{\overset{CH_3}{C}}-$

Q.83. (CST-14) Electron Gain Enthalpy and Electronegativity

1. Which of the following processes is endothermic in nature?

   (1) $H \longrightarrow H^-$

   (2) $S \longrightarrow S^-$

   (3) $Br \longrightarrow Br^-$

   (4) $He \longrightarrow He^-$

2. Correct order of negative electron gain enthalpy of the given elements is

   (1) Se > S > Br > I (2) Br > I > S > Se

   (3) I > Br > S > Se (4) S > Br > I > Se

3. Correct order of electronegativity of given species is

   (1) C > P > B > Si (2) P > C > B > Si

   (3) P > B > C > Si (4) C > B > P > Si

4. Which of the given alkali metals has same electronegativity as that of potassium?

   (1) Na (2) Rb

   (3) Cs (4) Li

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CONCEPT STRENGTHENING SHEET

CSS-07

CHEMISTRY

ANSWERS KEY

Q.63 (CST-13) Titration of Weak Acid with Strong base

1. (3)
2. (1)
3. (4)

Q77. (CST-13) Cubic Unit Cell

1. (2)
2. (3)
3. (3)
4. (1)

Q.81. (CST-13) Nernst Equation

1. (3)
2. (3)
3. (1)

Q.87. (CST-13) Peroxy linkage

1. (1)
2. (1)
3. (3)

Q. 76. (CST-14) Acids and Bases

1. (3)
2. (4)
3. (4)

Q.68. (CST-14) Electrophiles and Nucleophiles

1. (3)
2. (3)
3. (3)

Q.70. (CST-14) IUPAC Nomenclature

1. (2)
2. (2)
3. (2)
4. (2)

Q.83. (CST-14) Electron Gain Enthalpy and Electronegativity

1. (4)
2. (2)
3. (1)
4. (2)

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CONCEPT STRENGTHENING SHEET

CSS-07

PHYSICS

Q.9 (CST-13) Work-energy Theorem

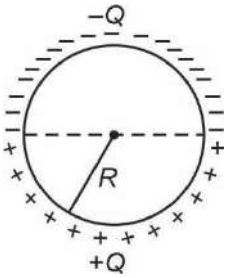
1. If W_{all} denotes work done by all forces, W_C denotes work done by conservative forces, W_{ext} denotes work done by external forces, W_{int} denotes the work done by internal forces and ΔK denotes the change in kinetic energy. Then from work-energy theorem, which among the following relation is correct?
   (1) $W_{ext} = \Delta K$ (2) $W_{all} = \Delta K$
   (3) $W_{int} = \Delta K$ (4) $W_C = \Delta K$
2. A uniform chain of length *L* and mass *M* is lying on a smooth table and one third of its length is hanging vertically down over the edge of the table. If *g* is acceleration due to gravity, then work required to pull the hanging part slowly onto the table is
   (1) *MgL* (2) *MgL*/3
   (3) *MgL*/18 (4) *MgL*/9
3. In Question (2), If table surface level is taken as reference level, then the change in potential energy of the chain is equal to
   (1) *MgL*/2 (2) *MgL*/3
   (3) *MgL*/9 (4) *MgL*/18

Q.11 (CST-13) Dynamics of Rotational Motion

1. If a body of moment of inertia *I* is having angular acceleration α about an axis, then the torque acting on the body about that axis is given as
   (1) $\tau = I\alpha$ (2) $\tau = \frac{I}{\alpha}$
   (3) $\tau = I\alpha^2$ (4) $\tau = \frac{1}{2}I\alpha^2$
2. The angular speed of a motor wheel (I = 50 kg m^2) is decreased uniformly from 1200 rpm to 600 rpm in 4 seconds. The retarding torque applied on motor wheel is
   (1) 250 N m (2) 250 π N m
   (3) 125 N m (4) 125 π N m
3. In Question (2), how many revolutions does the wheel make during this time?
   (1) 20 (2) 30
   (3) 40 (4) 60

Q.27 (CST-13) Electric Potential due to a Charged Ring

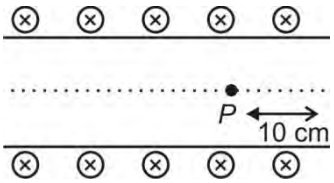
1. Electric charge *Q* is uniformly distributed on a thin ring of radius *R*. The electric potential at the centre of ring is ($K = 1/4\pi\varepsilon_0$)
   (1) *KQ*/*R* (2) *KQ*/2*R*
   (3) $\sqrt{2}KQ/R$ (4) Zero
2. In question (1), the electric potential at a point on the axis of ring, at a distance *x* from its centre, will be
   (1) $\frac{KQ}{\sqrt{x^2+R^2}}$ (2) $\frac{KQ}{x}$
   (3) $\frac{KQ}{R}$ (4) $\frac{KQ}{\sqrt{(x^2+R^2)^3}}$
3. A ring of radius *R* is charged as shown in the figure. The electric potential at the centre will be ($K = 1/4\pi\varepsilon_0$)



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

Q.5 (CST-13) Magnetic Field on Axis of Solenoid

1. A solenoid has length of 60 cm and radius of 10 cm. The solenoid carries current of 20 A and has 500 turns per meter. What is magnetic field intensity at a point 10 cm from one end of solenoid on its axis



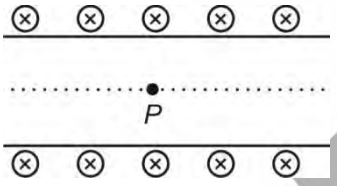
(1) $4\pi\times10^{-3}\times\left[\frac{1}{\sqrt{2}}+\frac{1}{\sqrt{26}}\right]$T

(2) $4\pi\times10^{-3}\times\left[\frac{1}{\sqrt{2}}-\frac{1}{\sqrt{26}}\right]$T

(3) $2\pi\times10^{-3}\times\left[\frac{1}{\sqrt{2}}+\frac{5}{\sqrt{26}}\right]$T

(4) $2\pi\times10^{-3}\times\left[\frac{1}{\sqrt{2}}-\frac{5}{\sqrt{26}}\right]$T

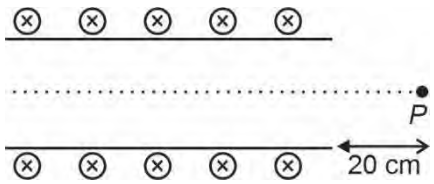
2. A solenoid has length of 80 cm and radius of 30 cm. The solenoid has 1000 turns/meter and current flowing in it is 20 A. What is magnetic field on axis of solenoid at its mid point



(1) $\frac{32\pi}{5}\times10^{-3}(T)$ (2) $\frac{6\pi\times10^{-3}}{5}(T)$

(3) $\frac{8\pi\times10^{-3}}{7}(T)$ (4) $\frac{4\pi\times10^{-3}}{5}(T)$

3. A solenoid of length 80 cm carries current of 10 A and has 1000 turns/metre length of solenoid. Calculate magnetic field induction at the point *P* outside solenoid on its axis (Radius of solenoid is 20 cm)



(1) $4\pi\times10^{-3}\left[\frac{5}{\sqrt{26}}+\frac{1}{\sqrt{2}}\right]$T

(2) $2\pi\times10^{-3}\left[\frac{5}{\sqrt{26}}-\frac{1}{\sqrt{2}}\right]$T

(3) $4\pi\times10^{-3}\left[\frac{5}{\sqrt{26}}-\frac{1}{\sqrt{2}}\right]$T

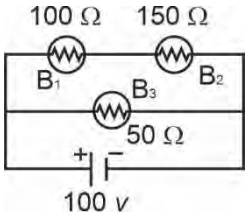
(4) $2\pi\times10^{-3}\left[\frac{5}{\sqrt{26}}\right]$T

Q.16 (CST-13) Terminal Speed

1. A steel ball of radius *r* and density ρ is gently dropped in a liquid column of density σ with coefficient of viscosity η. After falling through liquid column for sometimes it starts falling at constant speed. This constant speed attained is
   (1) Directly proportional to liquid viscosity
   (2) Directly proportional to surface area of ball
   (3) Inversely proportional to liquid density
   (4) Independent of acceleration due to gravity
2. An air bubble is released in deep lake. The bubble starts rising up and after sometimes moves up covering equal distance in equal intervals of time. During the movement of bubble it is observed that
   (1) Viscous drag acts upwards
   (2) Weight of air bubble is more than Buoyant force
   (3) It attains equilibrium and moves up at constant speed when up-thrust is balanced by `weight and viscous drag
   (4) Magnitude of constant speed achieved by it is independent of velocity
3. What will be terminal velocity of steel ball of radius 2 mm falling through glycerine cylinder? The density of glycerine is 1200 kg m^{-3} and its viscosity is 1.5 Pa.s. (Take density of steel ball as 7800 kg/m^3)
   (1) 2.7×10^{-4} m/s
   (2) 1.2×10^{-5} m/s
   (3) 3.9×10^{-2} m/s
   (4) 4.2×10^{-2} m/s

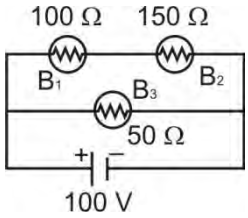
Q.25 (CST-13) Joule's Heating Effect

1. In the shown circuit, all bulbs are identical. The battery is an ideal battery. What is effect on the glow of bulb B_1 when bulb B_2 fuses?



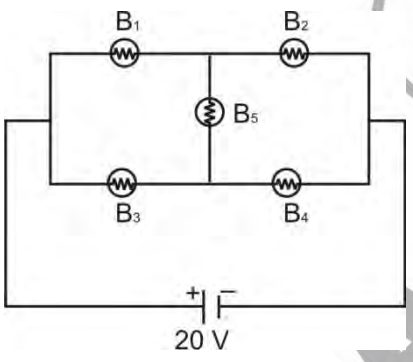
(1) Its glow remains unchanged
(2) Its glow increases
(3) Its glow decreases
(4) Its glow may increase or remains constant

2. Three bulbs with marked resistances are shown in circuit. The source voltage is 100 V d.c. Then the correct options is



(1) Bulb B_1 will have maximum glow
(2) Bulb B_1 and B_2 will have equal glow
(3) Bulb B_2 has more glow than bulb B_3
(4) Bulb B_1 has less glow than bulb B_2

3. Four bulbs B_1, B_2, B_3 and B_4 has each resistance of 100 Ω and bulb B_5 has resistance of 50 Ω. The supply voltage is 20 V. From the arrangement, it can be seen that

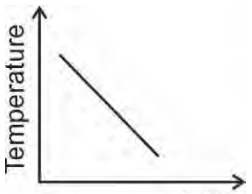


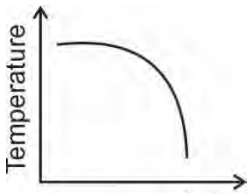
(1) Total power consumed by all bulbs is 5 W
(2) Bulb B_5 will have more glow than any other bulb
(3) Power consumed by bulb B_1 is 1 W
(4) Power consumed by B_5 bulb is 4 W

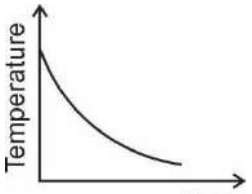
Q.15 (CST-14) Newton's Law of Cooling

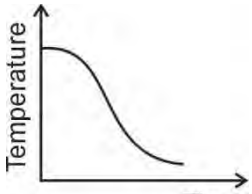
1. Newton's law of cooling is a special case of
(1) Stefan's law
(2) Kirchhoff's law
(3) Wein's law
(4) Planck's law

2. A block of metal is heated to a temperature higher than the room temperature and allowed to cool in a room. Which of the following graph correctly represents the rate of cooling?

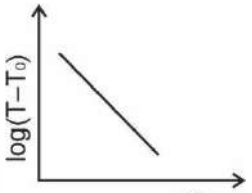
(1) 

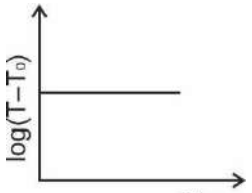
(2) 

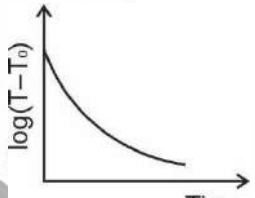
(3) 

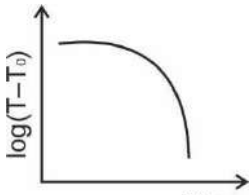
(4) 

3. Which of the following graphs proves Newton's law of cooling?

(1) 

(2) 

(3) 

(4) 

Q.25 (CST-14) Moment of Inertia

1. A solid sphere of mass density ρ and radius R is rotated about its diameter axis passing through the centre. Then the moment of inertia is related to radius of sphere as
(1) $I \propto R^2$ (2) $I \propto R^3$
(3) $I \propto R^4$ (4) $I \propto R^5$

2. Two concentric circular rings of same material and same thickness are rotated along an axis passing through centre perpendicular to plane. The radius of inner and outer rings are R and $3R$ respectively. The moment of inertia of inner ring as compared to that of outer ring is
(1) 9 times (2) 27 times
(3) $\frac{1}{27}$ times (4) $\frac{1}{9}$ times

3. A disc of uniform mass density σ and radius R is rotating about its diameter lying in the plane. The moment of inertia is related to radius of disc as
(1) $I \propto R^2$ (2) $I \propto R^3$
(3) $I \propto R^4$ (4) $I \propto R^5$

Q.34 (CST-14) Relation Between Electric Field, Magnetic Field and Speed of Light

1. An electromagnetic wave propagates in a medium of refractive index μ with velocity v. Its (c = speed of EM wave in vacuum)

(1) $v = \mu c$ (2) $c = \mu v$

(3) $v = \sqrt{\mu c}$ (4) $c = \sqrt{\mu c}$

2. An electromagnetic wave propagates in a medium, whose magnetic field vector is given as $B = 100 \times 10^{-6} \sin(10^9 t + 5x)$ T. Then refractive index of medium is

(1) $\mu = \frac{3}{2}$ (2) $\mu = \frac{4}{3}$

(3) $\mu = \frac{5}{4}$ (4) $\mu = \frac{7}{4}$

3. An electromagnetic wave propagates in vacuum with velocity c (speed of light). Its velocity in medium whose electric permittivity is ε and magnetic permeability μ is

(1) $v = \frac{c}{\sqrt{\mu\varepsilon}}$ (2) $v = \frac{1}{\sqrt{\mu\varepsilon}}$

(3) $v = (\sqrt{\mu\varepsilon})c$ (4) $v = \sqrt{\mu\varepsilon}$

Q.35 (CST-14) Power consumed by an A.C circuit

1. A dc source is supplying constant dc current I and an ac source is supplying ac current $I = I_0 \sin\omega t$ through two identical resistor. Then which of the following option is correct?

(1) $I = I_0$ (2) $I = \frac{I_0}{\sqrt{2}}$

(3) $I = \frac{I_0}{2}$ (4) $I_0 = \frac{I}{\sqrt{2}}$

2. The current flowing through an ac circuit is given as $I = (4 + 3\sin\omega t)A$. Then the RMS value of current is

(1) $\frac{5}{\sqrt{2}}$ A (2) $\sqrt{\frac{17}{2}}$ A

(3) $\sqrt{\frac{41}{2}}$ A (4) $\sqrt{41}$ A

3. In a series LCR circuit impedance is z and resistance of resistor is R. An ac source is supplying ac voltage $\varepsilon = \varepsilon_0 \sin\omega t$ to the circuit. Then the average power consumed in the resistor in time interval t is (ϕ is phase angle between circuit voltage and current)

(1) $P = \frac{\varepsilon^2}{R}$ (2) $P = \left(\frac{\varepsilon^2}{z^2}\right)R$

(3) $P = \left(\frac{\varepsilon^2}{z^2}\right)R\cos\phi$ (4) $P = \frac{\varepsilon^2}{R}\cos\phi$

Q.4 (CST-14) Expansion of Liquid

1. For liquid when heated in a vessel it is found that $\gamma_a = \frac{6}{7}\gamma_r$. The co-efficient of linear expansion of the vessel is

(1) $\frac{\gamma_r}{21}$ (2) $\frac{\gamma_r}{11}$

(3) $\frac{\gamma_r}{12}$ (4) $\frac{\gamma_r}{14}$

2. A one liter flask contains some mercury. It is found that at different temperature the volume of air inside the flask remains same. The volume of mercury taken in the flask is (co-efficient of linear expansion of glass is 9×10^{-6}/°C and co-efficient of volume expansion of Hg is 1.8×10^{-4}/°C)

(1) 150 ml (2) 750 ml

(3) 1000 ml (4) 700 ml

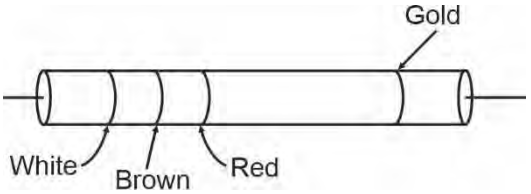
3. A body is floating in water at 4°C such that 0.98 of its total volume is immersed in water. If coefficient of real expansion of water is 3.3×10^{-4}/°C. The temperature at which the body gets immersed completely is

(1) 32.8 °C (2) 28.4 °C

(3) 65.6 °C (4) 72.4°C

Q.14 (CST-14) Colour Code of Resistor

1. In the figure, a carbon resistor has bands of different colours on its body as mentioned in the figure. The value of resistance is



(1) 2.2 kΩ ± 10% (2) 3.3 kΩ ± 10%

(3) 5.6 kΩ ± 5% (4) 9.1 kΩ ± 5%

2. Carbon resistors used in electronic circuits are marked for their value of resistance and tolerance by a colour code. A given resistor has colour scheme brown, red, green and gold. Its value in ohm is

(1) 5.2×10^6 ±10% (2) 2.4×10^5 ±5%

(3) 1.2×10^4 ±10% (4) 1.2×10^6 ±5%

3. If there is no fourth band on resistor then tolerance is

(1) 10% (2) 20%

(3) 5% (4) 3%

Q.20 (CST-14) Work Energy Theorem

1. According to work energy theorem. The net work done on the system due to all the forces acting on the system is equal to

(1) Change in potential energy of system

(2) Change in kinetic energy of system

(3) Change in mechanical energy of system

(4) Change in electrical energy of system

2. The displacement of a body of mass 2 kg as a function of time is given by $x = (5 + 2t)^2$ m. Where t is time in second. The increase in its kinetic energy after 2 seconds of its motion will be

(1) 636 J (2) 800 J

(3) 896 J (4) 400 J

3. Under the action of a force, a 2 kg body moves such that the position x as function of time is given by $x = 2t^2$, where x is in meter and t is time in seconds. The work done by the force in first 3 second will be

(1) 324 J (2) 100 J

(3) 200 J (4) 144 J

Q.38 (CST-14) Earth Satellite

1. The total energy of a satellite of mass m orbiting a planet of mass M and radius R, at an altitude of 3 R is

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

(3) $-\frac{GMm}{6R}$ (4) $-\frac{GMm}{8R}$

2. Determine the energy required to launch a satellite of mass m from the surface of a planet of mass m and radius R in a circular orbit at an altitude of 2 R will be

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

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

3. Determine the velocity of projection of a satellite of mass m from the surface of a planet of mass M and radius R in a circular orbit at an altitude of R

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

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

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CONCEPT STRENGTHENING SHEET
CSS-07
PHYSICS
Answer key

Q.9 (CST-13) Work-energy Theorem

1. (2)
2. (3)
3. (4)

Q.11 (CST-13) Dynamics of Rotational Motion

1. (1)
2. (2)
3. (4)

Q.27 (CST-13) Electric Potential Due to Charged Ring

1. (1)
2. (1)
3. (4)

Q.5 (CST-13) Magnetic Field on Axis of Solenoid

1. (3)
2. (1)
3. (2)

Q.16 (CST-13) Terminal Speed

1. (2)
2. (3)
3. (3)

Q.25 (CST-13) Joule's Heating Effect

1. (3)
2. (4)
3. (3)

Q.15 (CST-14) Newton's law of Cooling

1. (1)
2. (3)
3. (1)

Q.25 (CST-14) Moment of Inertia

1. (4)
2. (3)
3. (3)

Q.34 (CST-14) Relation between electric field, Magnetic Field and Speed of Light

1. (2)
2. (1)
3. (2)

Q.35 (CST-14) Power Consumed by A.C

1. (2)
2. (3)
3. (2)

Q.4 (CST-14) Expansion of Liquid

1. (1)
2. (1)
3. (3)

Q.14 (CST-14) Colour Code of Resistor

1. (4)
2. (4)
3. (2)

Q.20 (CST-14) Work energy Theorem

1. (2)
2. (3)
3. (1)

Q.38 (CST-14) Earth Satellite

1. (4)
2. (4)
3. (3)

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CONCEPT STRENGTHENING SHEET

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ZOOLOGY

Q.198 (CST-13) Digestive Glands

1. Which of the following is largest gland in the body of human?
   (1) Pancreas (2) Liver
   (3) Intestinal glands (4) Salivary glands
2. Choose the **correct** option to fill in the blank in the given statement.
   The duct of gall bladder commonly called ____ along with ____ forms common bile duct.
   (1) Hepatopancreatic duct and cystic duct
   (2) Cystic duct and bile duct
   (3) Bile duct and hepatopancreatic duct
   (4) Cystic duct and hepatic duct
3. Select the **correct** option to complete the analogy
   Bile juice : Liver :: Succus entericus : _____.
   (1) Pancreas (2) Intestinal glands
   (3) Salivary glands (4) Liver
4. Read the options and match the Column-A with Column-B

	Column A		Column B
a.	Liver	(i)	Succus entericus
b.	Gall bladder	(ii)	Largest gland of the body
c.	Salivary glands	(iii)	Cystic duct
d.	Intestinal glands	(iv)	Situated outside the buccal cavity

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

Q.163 (CST-13) Blood Vessels

1. The maximum volume of blood is carried by which of the given blood vessels in the human body at a given time?
   (1) Arteries (2) Veins
   (3) Arterioles (4) Venules
2. Which of the given blood vessels carry minimum volume of bloods in the human body at a given time?
   (1) Venules (2) Arteries
   (3) Veins (4) Capillaries
3. Which of the following layer(s) of wall of blood vessels is composed of squamous endothelium?
   (1) Tunica intima and tunica media
   (2) Tunica media and tunica externa
   (3) Tunica media only
   (4) Tunica intima only
4. The given options represent volume of blood existing in arteries (A), veins (V) and capillaries (C) in the human body at a given time. Choose the **correct** option.
   (1) A > V > C (2) C > A > V
   (3) V > C > A (4) V > A > C

Q.168 (CST-13) Excretory Product - Nephron

1. The osmolarity of the glomerular filtrate in PCT is approximately ____ mOsmol/L
   (1) 300 (2) 400
   (3) 800 (4) 200
2. As the glomerular filtrate moves from cortex to inner medullary interstitium the osmolarity first _____, then as it moves from inner medullary interstitium back to the cortex the osmolarity _____. Choose the option which **correctly** fill the blanks.
   (1) Decreases, increases
   (2) Increases, increases
   (3) Decreases, decreases
   (4) Increases, decreases
3. The osmolarity of 1200 mOsmol/L is found in which one of the following?
   (1) PCT (2) Loop of Henle
   (3) DCT (4) Bowman's capsule
4. Which option explains the increasing osmolarity of the filtrate as it passes through the descending limb of Henle's loop?
   (1) Descending limb of Henle's loop dilutes the filtrate
   (2) Descending limb of Henle's loop is permeable to water

(3) Descending limb of Henle's loop is impermeable to water

(4) Descending limb of Henle's loop is freely permeable to electrolytes

Q.154 (CST-13) Sub-phylum - Vertebrata/Craniata

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

Statement-A : Amphibians show external fertilization.

Statement-B : Osteichthyes usually show external fertilization.

(1) Statement A is true, B is false

(2) Statement A is false, B is true

(3) Both statements are true

(4) Both statemnets are false

2. Internal fertilization is generally seen in how many of the following group of animals?

Chondrichthyes, Osteichthyes, Amphibia, Reptilia, Aves, Mammalia

(1) One (2) Three

(3) Four (4) Six

3. Choose the correct option

a. All gnathostomes show internal fertilization

b. All gnathostomes show external fertilization

c. Some gnathostomes show internal whereas some show external fertilisation

(1) a – True, b – True, c - True

(2) a – False, b – False, c - True

(3) a – True, b – False, c - False

(4) a – False, b – True, c - False

4. Choose the **correct** option

(1) Human beings show external fertilization and are oviparous

(2) Human beings show internal fertilization and are oviparous

(3) Human beings show external fertilization and are viviparous

(4) Human beings show internal fertilization and are viviparous

Q.184 (CST-14) AIDS

1. The primary target cells for HIV are T-lymphocytes and _____. Choose the option that fills the blank **correctly**.

(1) Lymph nodes (2) Macrophages

(3) Monocytes

(4) B-lymphocytes

2. HIV gets attached to which type of receptors present on helper T-lymphocytes, to gain entry in them?

(1) CD4 (2) CD8

(3) CD16 (4) CD32

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

Statement-1 : HIV is an enveloped retrovirus, having two identical molecules of ssRNA genome.

Statement-2 : Transmission of HIV infection occurs by touch, physical contact and body fluids.

(1) Both statements 1 and 2 are correct

(2) Both statements 1 and 2 are incorrect

(3) Only statement 1 is correct

(4) Only statement 2 is correct

Q.152 (CST-14) Excretory Product and their Elimination: Role of other Organs in Excretion.

1. 'X' is the largest gland of our body and is the main site for elimination of cholesterol, bile pigments, degraded steroid hormones, some vitamins and drugs. Identify 'X'.

(1) Lungs (2) Liver

(3) Sweat gland (4) Pancreas

2. Read the given statements and choose the **incorrect** one.

(1) The primary function of sweat is to facilitate a cooling effect on the body surface

(2) Sebum provides a protective oily covering for the skin

(3) Lungs remove small amount of urea from the body

(4) Bilirubin and biliverdin are bile pigments

3. Select the **incorrect** match w.r.t. Excretory waste

(1) Lungs - CO_2 and water

(2) Liver - Degraded steroid hormones

(3) Sebaceous gland - Sterols and waxes

(4) Saliva - Bilirubin and lactic acid

Q.169 (CST-14) Biomolecule - Co-factors

1. Vitamin is an important component of the coenzyme NADP. Select the **correct** vitamin from the following options.

(1) Vitamin B_1 (2) Vitamin B_3

(3) Vitamin B_{12} (4) Vitamin C

2. Zinc is a/an _____ for the proteolytic enzyme carboxypeptidase. Choose the option that fills the blank **correctly**.

(1) Coenzyme

(2) Holoenzyme

(3) Apoenzyme

(4) Cofactor

3. Some enzymes become catalytically active when they bind to non-protein constituents called

(1) Cofactors

(2) Apoenzyme

(3) Substrates

(4) Vitamins

4. Haem is the prosthetic group in two enzymes, which are
   (1) Peroxidase and carboxypeptidase
   (2) Carboxypeptidase and catalase
   (3) Catalase and lyase
   (4) Catalase and peroxidase

Q.181 (CST-14) Digestion and Absorption-Digestive Glands

1. The mucus in the stomach is secreted by
   (1) Mucus-neck cells
   (2) Peptic cells
   (3) Oxyntic cells
   (4) Parietal cells

2. Match the column w.r.t. the cells of gastric glands

A	B
(i) Oxyntic cells	a. Pepsinogen
(ii) Chief cells	b. Mucus
(iii) Mucus-neck cells	c. Intrinsic factor

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

3. Chief cells are also called _____.
   (1) Mucus-neck cells (2) Peptic cells
   (3) Oxyntic cells (4) Parietal cells

4. HCl and intrinsic factor is secreted by
   (1) Mucus neck cells
   (2) Peptic or chief cells
   (3) Peptic or parietal cells
   (4) Parietal or oxyntic cells

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ZOOLOGY

ANSWERS

Q.198 (CST-13) Digestive Glands

1. (2)
2. (4)
3. (2)
4. (1)

Q.163 (CST-13) Plasma

1. (2)
2. (4)
3. (4)
4. (4)

Q.168 (CST-13) Excretory Product - Nephron

1. (1)
2. (4)
3. (2)
4. (2)

Q.154 (CST-13) Sub-phylum - Vertebrata/Craniata

1. (3)
2. (3)
3. (2)
4. (4)

Q.184 (CST-14) Pathogen

1. (2)
2. (1)
3. (3)

Q.152 (CST-14) Excretory Product and their elimination: Role of other Organs in Excretion.

1. (2)
2. (3)
3. (4)

Q.169 (CST-14) Biomolecule - Co-factors

1. (2)
2. (4)
3. (1)
4. (4)

Q.181 (CST-14) Digestion and Absorption-Digestive Glands

1. (1)
2. (3)
3. (2)
4. (4)

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