

**PHYSICS (Q NO. 1 TO Q NO. 45)**

Q1. The power factor of a chock coil at a frequency of 50Hz is  $\sqrt{2}$ . If the frequency is doubled, then the valuation of power factor will be-

- A  $\frac{1}{5}$
- B  $\frac{1}{\sqrt{5}}$
- C  $\frac{1}{3}$
- D  $\frac{1}{\sqrt{3}}$

Q2. In Young's double slit experiment, the intensity at a point where the path difference is  $\frac{\lambda}{6}$  is  $I$ . If  $I_0$  represents the maximum intensity, then  $\frac{I}{I_0}$  is equal to

- A  $\frac{1}{\sqrt{2}}$
- B  $\frac{\sqrt{3}}{2}$
- C  $\frac{1}{2}$
- D  $\frac{3}{4}$

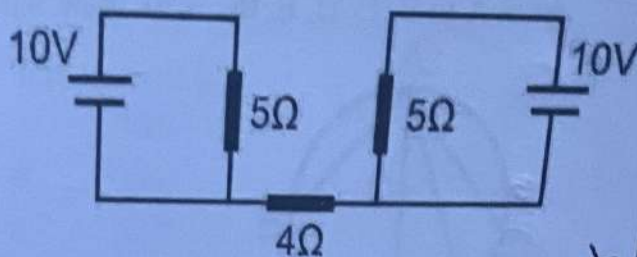
Q3. Light waves appear to travel in straight lines since -

- A They are not absorbed by the atmosphere.
- B These are reflected back by the atmosphere.
- C Their wavelength is small
- D Their velocity is very large.

Q4. A student has two wires. By connecting them individually or combinedly he can obtain resistances of 3, 4, 12 & 16  $\Omega$ . The possible resistance of the wires are -

- A 3  $\Omega$ , 4  $\Omega$
- B 4  $\Omega$ , 12  $\Omega$
- C 3  $\Omega$ , 16  $\Omega$
- D 12  $\Omega$ , 16  $\Omega$

Q5. In the given circuit, the current in the 4 $\Omega$  resistor is



- A 2A
- B Zero
- C 4A
- D 6A

Handwritten calculation:  $\frac{10}{5} + \frac{10}{5} = 2 + 2 = 4$

Q6. A charge  $q$  is uniformly spread on a thin ring of radius  $R$ . The ring rotates about its axis with a uniform frequency ' $f$ '. The magnitude of magnetic induction at the centre of ring is

- A  $\frac{\mu_0 q}{2\pi f R}$
- B  $\frac{\mu_0 q f}{2\pi R}$
- C  $\frac{\mu_0 q f}{2R}$
- D  $\frac{\mu_0 q}{2f R}$

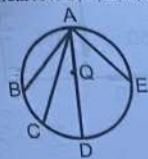
Handwritten calculation:  $B = \frac{\mu_0 q f}{2R}$

Q7. The plates of a parallel plate capacitor are charged to 100V and charging battery is removed. A 2mm thick slab is inserted between the plates. Then to maintain the same P.D., the distance between the plates is increased by 1.6 mm. The dielectric constant of the slab is

- A 5
- B 7
- C 10
- D 16

Handwritten calculation:  $\frac{100}{2} = \frac{100}{2 + 1.6} \times K$  leading to  $K = 16$

A small charge  $Q$  is placed at the centre of circle ABCDE. If a small charge  $q$  is moved from A to B, C, D, E, the work done will be



- A Least along AB
- B Greatest along AD
- C Zero along all the paths
- D Positive and equal along all paths

Q 9. A concave mirror of focal length 100 cm is used to obtain the image of a sun which subtends an angle of  $30^\circ$ , then the diameter of the image of the sun is

- A 1.74 cm
- B 0.87 cm
- C 0.435 cm
- D 100 cm

Q 10. A thin lens of focal length ' $f$ ' and aperture diameter ' $d$ ' forms an image of intensity ' $I$ '. If the central portion of the lens is blocked up to diameter  $\frac{d}{2}$  of the aperture by an opaque paper, then the intensity of the new image will be ' $I'$ ' given by

- A  $I' = \frac{1}{2} I$
- B  $I' = \frac{3}{4} I$
- C  $I' = \frac{9}{16} I$
- D  $I' = I$

Q 11. A dipole lying to parallel to a electric field requires  $W$  unit of work to turn through  $60^\circ$ . The torque required to maintain the dipole in this position is

- A  $\sqrt{3} W$
- B  $W$
- C  $\frac{\sqrt{3}}{2} W$
- D  $2W$

$$\tau = MB \sin \theta$$

$$\tau = W \times \sin 60^\circ$$

$$\tau = W \times \frac{\sqrt{3}}{2}$$

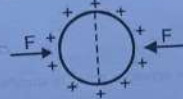
Q 12. The semiconductor used for fabrication of visible LED must at least have a energy gap of

- A 0.1 eV
- B 0.01 eV
- C 1.8 eV
- D 1.4 eV

Q 13. What is produced when an electron and a positron each of rest mass 0.51 mass units annihilate each other?

- A A gamma ray proton of energy 1.02 mass units
- B Two gamma ray photon each of energy 0.51 mass units.
- C Many gamma photons each of same energy.
- D Neutrons and antineutrons each of energy 0.51 mass units

Q 14. A uniformly charged thin spherical shell of radius  $R$  carries uniform surface charge density of  $\sigma$  per unit area. It is made up of two hemispherical shells held together by pressing them with a force  $F$  which is proportional to

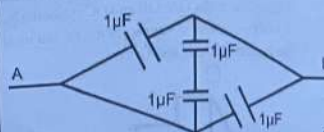


- A  $\frac{\sigma^2 R^2}{\epsilon_0}$
- B  $\frac{\sigma^2 R}{\epsilon_0}$
- C  $\frac{\sigma^2}{\epsilon_0 R}$
- D  $\frac{\sigma^2}{\epsilon_0 R^2}$

Q 15. There are two identical batteries X and Y each of emf  $E$  and internal resistance ' $r$ '. A resistance  $R_1$  is connected across the battery X and a resistance  $R_2$  is connected across the battery Y. If heat produced in  $R_1$  is equal to  $R_2$ , then the internal resistance of the battery would be given by

- A  $\sqrt{R_1 R_2}$
- B  $\sqrt{R_1^2 R_2}$
- C  $\sqrt{R_2^2 R_1}$
- D  $R_1 R_2$

Q 16. The equivalent capacitance of the capacitors shown in the figure across A and B is -



- A  $4 \mu F$
- B  $2.5 \mu F$
- C  $2 \mu F$
- D  $0.25 \mu F$

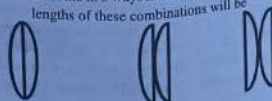
Q 17. Which of the following statement is false?

- A Kirchhoff's second law represents energy conservation
- B Wheatstone bridge is the most sensitive when all the four resistance are of the same order of magnitude.
- C In a balanced Wheatstone bridge, if the cell and galvanometer are exchanged the null point is disturbed.
- D A rheostat can be used as a potential divider.

Q 18. Two charged particles traverse identical helical paths in a completely opposite sense in a uniform magnetic field  $\vec{B} = B_0 \hat{k}$

- A They have equal  $z$ -components of momenta
- B They must have equal charges.
- C They necessarily represent a particle - antiparticle pair
- D Their charge to mass ratio satisfy  $(\frac{q}{m_1}) + (\frac{q}{m_2}) = 0$

Q 19. Two identical plano-convex lenses can be combine in 3 ways as shown. The ratio of focal lengths of these combinations will be



- A 2 : 2 : 1
- B 1 : 1 : 1
- C 1 : 2 : 2
- D 2 : 1 : 1

Q 20. A transformer is used to light a 100W, 110V lamp from a 220 V mains. If the mains current is 0.5A, the efficiency of the transformer is approximately

- A 10%
- B 30%
- C 50%
- D 90%

$$\frac{100 \times 0.25}{500}$$

$$\frac{25}{500}$$

$$\frac{1}{20}$$

$$\frac{5}{100}$$

Q 21. A particle is projected at  $60^\circ$  to the horizontal with a kinetic energy ' $K$ '. What will be the kinetic energy at the highest point?

- A Zero
- B  $\frac{K}{2}$
- C  $\frac{4K}{3}$
- D  $\frac{K}{3}$

Q 22. A spring of force constant ' $K$ ' is cut into two pieces such that one piece is double the length of the other. The longer piece will have a force constant of -

- A  $\frac{2}{3} K$
- B  $\frac{3}{2} K$
- C  $3K$
- D  $6K$

Q 23. The work done in breaking a bigger drop of radius  $R$  into ' $n$ ' droplets of equal radius ' $r$ ' is:

- A  $R n^{2/3} T$
- B  $(n^{2/3} - 1) T R^2$
- C  $4\pi R^2 T (n^{1/3} - 1)$
- D  $\pi R^2 T (n^{1/3} - 1)$

Q 24. Two cars of masses ' $m_1$ ' and ' $m_2$ ' are moving in circles of radii ' $r_1$ ' and ' $r_2$ ' respectively. Their speeds are such that each one of them completes one round at the same time ' $t$ '. The ratio of angular momentum of the first and second cars are :

- A  $m_1 : m_2$
- B  $r_1 : r_2$
- C  $m_1 r_1^2 : m_2 r_2^2$
- D  $m_1 r_1 : m_2 r_2$

$$L = m v r$$

$$L = m \frac{2\pi r}{t}$$

$$\frac{L_1}{L_2} = \frac{r_1}{r_2}$$



Q 25. The value of acceleration due to gravity on the surface of the earth is  $9.8 \text{ m/s}^2$ . It's value at a height of 3200 Km will be -

- ☒ A  $4.35 \text{ m/s}^2$   
☐ B  $9.8 \text{ m/s}^2$   
☐ C  $19.6 \text{ m/s}^2$   
☐ D  $3.75 \text{ m/s}^2$

$$g_h = g \left( \frac{R}{R+h} \right)^2$$

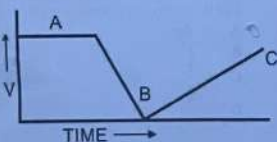
$$= 9.8 \left( \frac{6400}{6400+3200} \right)^2$$

$$= 9.8 \left( \frac{2}{3} \right)^2$$

$$= 9.8 \times \frac{4}{9}$$

$$= 4.35 \text{ m/s}^2$$

Q 26. The variation of the velocity of a body with time is shown in the graph. It explains that -

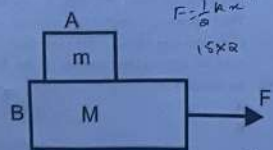


- ☐ A At B, force is zero  
☐ B At B there is force but towards motion.  
☒ C At B there is a force that opposes the motion  
☐ D Forces are equal at A, B and C.

Q 27. Finding dimensions of resistance 'R' and inductance 'L' speculate the physical quantity represented by (L/R)

- ☒ A Work  
☐ B Time  
☐ C Power  
☐ D Force

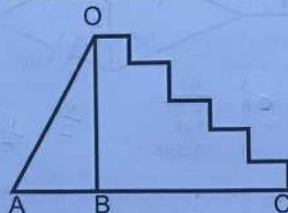
Q 28. A body A rests on B and friction exists between A and B only. The maximum value of F so that both A and B move together is



- ☐ A  $F_{\max} = \mu(M+m)g$   
☐ B  $F_{\max} = \mu mg$   
☐ C  $F_{\max} = \mu Mg$   
☐ D None of these

$F = \frac{1}{2} \mu \times 2$   
 $15 \times 2$   
 $30 = 10 \times 3$   
 $30$   
 $10$

Q 29. Three different balls of masses  $m_1, m_2$  and  $m_3$  are allowed to roll from rest on three different frictionless paths OA, OB and OC respectively. Speeds  $v_1, v_2$  and  $v_3$  of masses  $m_1, m_2$  and  $m_3$  at the bottom of A, B and C are :



- ☐ A  $\frac{v_1}{m_1} = \frac{v_2}{m_2} = \frac{v_3}{m_3}$   
☒ B  $v_1 = v_2 = v_3$   
☐ C  $v_1 < v_2 < v_3$   
☐ D  $v_1 > v_2 > v_3$

Q 30. The value of 'g' decreases by 0.1% on a mountain as compared to sea level. To record proper time by means of a simple pendulum, its length must be:

- ☒ A Increased by 0.1%  
☐ B Decreased by 0.1%  
☐ C Increased by 0.2%  
☐ D Decreased by 0.2%

Q 31. The bulk modulus of an object is B. If it is compressed with uniform pressure P, the fractional decrease in its radius is:

- ☐ A  $\frac{P}{B}$   
☒ B  $\frac{B}{3P}$   
☐ C  $\frac{3P}{B}$   
☐ D  $\frac{P}{3B}$

Q 32. A 2 kg block slides on a horizontal floor with a speed of 4m/s. It strikes an uncompressed spring and compresses it till the block is motionless. The kinetic frictional force is 15N and spring constant is 10,000N/m. The spring compresses by -

- ☐ A 2.5 cm  
☐ B 11 cm  
☐ C 8.5 cm  
☒ D 5.5 cm

Q 33. A geostationary satellite revolves around the Earth in a circular orbit of radius 36,000 km. Then a spy satellite revolving in a circular orbit at a few hundred kilometers height from the surface of the earth has a time period nearly:

- ☐ A  $\frac{1}{2} h$   
☐ B  $1h$   
☒ C  $2h$   
☐ D  $4h$

Q 34. Water rises in a vertical capillary tube up to a height of 10 cm. If the tube is inclined at  $45^\circ$ , then the length of water rising in the capillary will be:

- ☐ A 10 cm  
☐ B  $10\sqrt{2}$  cm  
☒ C  $\frac{10}{\sqrt{2}}$  cm  
☐ D 5 cm

Q 35. I started walking down a road in the morning facing the sun. After walking for some time, I turned to my left then I turned to the right once again. In which direction I was going then -

- ☒ A East  
☐ B North - West  
☐ C North - East  
☐ D South

Q 36. What is the mass of an electron moving with a velocity of 0.6 times of speed of light in terms of electronic rest mass  $m_0$  -

- ☐ A  $m_0$   
☒ B  $\frac{4}{5} m_0$   
☐ C  $\frac{5}{4} m_0$   
☐ D  $2 m_0$

Q 37. A tuning fork vibrating with a sonometer having 20 cm wire produces 5 beats per second. The beat frequency does not change if the length of the wire is changed to 21 cm. The frequency of the tuning fork must be -

- ☐ A 200 hz  
☐ B 210 hz  
☐ C 205 hz  
☒ D 215 hz

Q 38. A chain of M and length L is held vertical by fixing its upper end to a rigid support. The tension in the chain at a distance Y from the rigid support is -

- ☐ A  $Mg$   
☒ B  $\frac{Mg(L-Y)}{L}$   
☐ C  $\frac{MgL}{(L-Y)}$   
☐ D  $\frac{MgY}{L}$

Q 39. The moment of force  $\vec{F} = 4\hat{i} + 5\hat{j} - 6\hat{k}$  at (2, 0, -3) about the point (2, -2, -2) is given by

- ☐ A  $8\hat{i} - 4\hat{j} - 7\hat{k}$   
☒ B  $-7\hat{i} - 4\hat{j} - 8\hat{k}$   
☐ C  $-7\hat{i} - 8\hat{j} - 4\hat{k}$   
☐ D  $-4\hat{i} - \hat{j} - 8\hat{k}$

Q 40. Two particles of different masses initially at rest start moving towards each other under their mutual gravitational attraction. At an instant when the speeds of the particles are 'v' and '2v', the speed of centre of mass is -

- ☐ A Zero  
☐ B v  
☒ C 1.5v  
☐ D 3v

Q 41. Four charges each equal to +q are placed at the four corners of a square and a charge Q is at its centre. If the system is in equilibrium, the value of Q is -

- ☐ A  $\frac{-q}{4} (1+2\sqrt{2})$   
☒ B  $\frac{q}{4} (1+2\sqrt{2})$   
☐ C  $\frac{-q}{2} (1+2\sqrt{2})$   
☐ D  $\frac{q}{2} (1+2\sqrt{2})$

$\vec{O\hat{i}} + 2\hat{j} - 1\hat{k}$   
 $\hat{i} \hat{j} \hat{k}$   
 $4 \ 0 \ 2 \ 1$   
 $5 \ 0 \ 2 \ 1$   
 $-1 \ 1 \ 1$   
 $4 \ 5 \ 6$

$12-5 = 7$

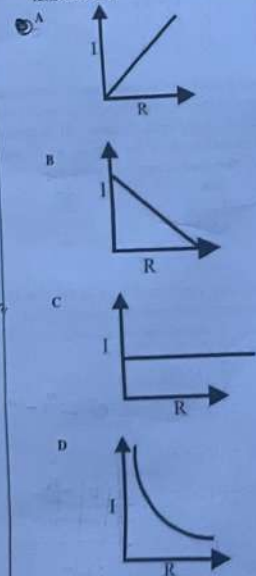
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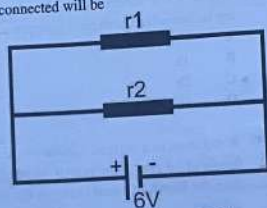
Q 42. If  $\oint \vec{E} \cdot d\vec{s} = 0$  over a surface then,

- A All the charges must necessarily be inside the surface
- B The electric field inside the surface is necessarily uniform
- ☒ C The number of flux lines entering the surface must be equal to the number of flux lines leaving the surface
- D The magnitude of electric field on the surface is constant.

Q 43. If a variable resistance is connected to a cell of constant EMF, then the graph that represents the correct relationship between current  $I$  and resistance  $R$  is -

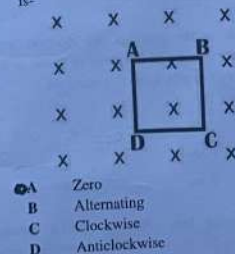


Q 44. In the circuit shown the current drawn from the cell is 1A. If  $r_1$  alone is connected then the current is  $\frac{2}{3}$  A. The current when  $r_2$  is connected will be



- A  $\frac{1}{3}$  A
- ☒ B  $\frac{2}{9}$  A
- C  $\frac{5}{3}$  A
- D  $\frac{2}{3}$  A

Q 45. A wire in the shape of a square ABCD changes its shape to become a circle. If it is placed in a magnetic field  $B$  as shown in figure and viewed from the top, the current induced is-



- ☒ A Zero
- B Alternating
- C Clockwise
- D Anticlockwise

SERIES-C

CHEMISTRY (Q NO. 46 TO Q NO. 90)

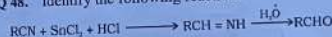
Q 46. Carboxylic acids are reduced to primary alcohols with  $\text{LiAlH}_4$ , or better with diborane in ether solution and also undergo halogenation with  $\text{Cl}_2$  and  $\text{Br}_2$  in the presence of red phosphorus. This reaction is called as

- A Aldol condensation
- B Hell-Volhard Zelinsky reaction.
- ☒ C Wolff-Kishner reduction reaction
- D Clemmensen reduction

Q 47. Carboxylate ion is \_\_\_\_\_ stabilised than phenoxide ion, so carboxylic acids are \_\_\_\_\_ acidic than phenols.

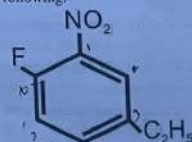
- A Less, Less respectively
- B More, Less respectively
- C More, more respectively
- ☒ D Less, More respectively

Q 48. Identify the following reaction:



- A Stephen Reaction
- B Rosenmund Reduction
- ☒ C Etard Reaction
- D Gatterman Koch reaction

Q 49. Select the correct IUPAC name of the following:



- A 3-Ethyl-5-fluoro-1-nitrobenzene
- B 4-Ethyl-2-nitro-1-fluorobenzene.
- C 4-Ethyl-1-fluoro-2-nitrobenzene
- ☒ D 3-Ethyl-6-fluoro-1-nitrobenzene.

Q 50. Analgesic reduces the \_\_\_\_\_ while antipyretic reduces the \_\_\_\_\_.

- A Fever, pain (respectively)
- ☒ B Pain and fever (respectively)
- C Both reduces pain only
- D Both reduces fever only.

Q 51. Conversion of a substance from the solid to the gaseous state without its becoming liquid. This process is called as \_\_\_\_\_.

- A Fusion
- B Sublimation
- C Melting
- ☒ D Vaporization

Q 52. In the Arrhenius equation ( $k = Ae^{-E_a/RT}$ ),  $E_a$  and  $A$  corresponds to :

- A  $E_a$  - Activated Complex and  $A$  - Activation factor
- B  $E_a$  - Arrhenius factor and  $A$  - Activation energy
- C  $E_a$  - Arrhenius energy and  $A$  - Activation energy
- ☒ D  $E_a$  - Activation energy and  $A$  - Arrhenius factor

Q 53. Which transition element shows maximum no. of oxidation states?

- ☒ A Fe
- B Mn
- C Cr
- D Cu

Q 54. Unit for calculating Magnetic moment is \_\_\_\_\_.

- ☒ A BM
- B MB
- C AB
- D MM

Q 55. The geometry for the complex  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is

- A Tetrahedral
- ☒ B Square pyramidal
- C Trigonal bipyramidal
- D Octahedral

Q 56. IUPAC name of  $[\text{CoCl}_2(\text{en})_2]\text{Cl}$  is:

- A Dichloridobis(ethane-1,2-diamine) cobalt(III) chloride
- ☒ B Dichloridodi(ethane-1,2-diamine) cobalt(IV) chloride
- C Bischloridobis(ethane-1,2-diamine) cobalt(II) chloride
- D Dichloridobis(ethane-1,2-diamine) cobalt(II) chloride



- Q 57. The rhodium complex  $[(Ph_3P)_3RhCl]$  is also called as \_\_\_\_\_ catalyst.
- A Werner  
B Coordination  
C Wilkinson  
D Wurtz
- Q 58. Correctly match following complexes with their Magnetic behaviour:
- | Complex             | Magnetic behaviour |
|---------------------|--------------------|
| $[Cr(NH_3)_6]^{3+}$ | Paramagnetic       |
| $[Ni(CN)_4]^{2-}$   | Diamagnetic        |
- A  $[Cr(NH_3)_6]^{3+}$  is Paramagnetic while  $[Ni(CN)_4]^{2-}$  is Diamagnetic.  
B  $[Cr(NH_3)_6]^{3+}$  is Diamagnetic while  $[Ni(CN)_4]^{2-}$  is Paramagnetic.  
C Both the complexes are Diamagnetic.  
D Both the complexes are Paramagnetic.
- Q 59. The acid strength of alcohols decreases in the following order:
- A  $H_2O < \text{Primary} < \text{secondary} < \text{tertiary}$   
B  $H_2O < \text{secondary} < \text{tertiary} < \text{Primary}$   
C  $H_2O > \text{Primary} > \text{Secondary} > \text{Tertiary}$   
D  $\text{Primary} > \text{Secondary} > \text{Tertiary} > H_2O$
- Q 60. What is the unit for Mole fraction?
- A No units  
B g/L  
C Mole/L  
D G
- Q 61. As the temperature decreases the solubility of the gas in liquids in the solution
- A Decreases  
B Increases  
C No change  
D Gas does not dissolve in liquids.
- Q 62. \_\_\_\_\_ Reagent shows positive results for aldehyde detection and chemically it is an alkaline solution of ammoniacal Silver nitrate solution.
- A Fehling Solution A  
B Fehling Solution B  
C Tollen's  
D Grignard
- Q 63. *p*-nitrophenol is less volatile than *o*-nitrophenol due to
- A Intermolecular hydrogen bonding  
B Vander waals forces  
C Intramolecular hydrogen bonding  
D *p*-nitrophenol is more volatile than *o*-nitrophenol.
- Q 64.  $Cr^{2+}$  is stronger \_\_\_\_\_ agent than  $Fe^{2+}$ .
- A Oxidising  
B Reducing  
C Redox  
D Cleaning
- Q 65. Buna-N is a copolymer of 1,3-butadiene and \_\_\_\_\_ and Buna-S is a copolymer of 1,3-butadiene and \_\_\_\_\_.
- A Vinyl Chloride and styrene respectively.  
B Chloroprene and Acrylonitrile respectively.  
C Styrene and Acrylonitrile respectively.  
D Acrylonitrile and styrene respectively.
- Q 66. Read the following statements:  
I. In Schottky defect the unoccupied lattice points are called as holes or vacancies.  
II. In Frenkel defect the density of crystal alters.  
III. Density of the crystal decreases in Frenkel defects.  
IV. Both Schottky and Frenkel defect are Non-Stoichiometric defects.  
Which of the following statements are TRUE:
- A I, II, III, IV  
B II, IV  
C I, III, IV  
D I, II, III
- Q 67. Relative lowering of vapour pressure is given by \_\_\_\_\_
- A Raoult  
B Van't Hoff  
C Newton  
D Ostwald

- Q 68. For preparing 0.05M  $H_2SO_4$  in 1 L, we require \_\_\_\_\_ mL  $H_2SO_4$  (Given Density of 98%  $H_2SO_4$  is 1.84g/mL)
- A 9.8079  
B 4.5028  
C 6.7790  
D 2.67

- Q 69. Lyophobic sols are easily coagulated by addition of
- A Acids  
B Electrolytes  
C Water  
D Gold

- Q 70. According to the third law of thermodynamics, At absolute zero, the entropy of a pure crystal is \_\_\_\_\_
- A Positive  
B Negative  
C Zero  
D Remains unchanged

- Q 71. In second order reactions, Units for  $k$  is
- A  $mol^{-1} L^{-1} s^{-1}$   
B  $mol^{-1} L s^{-1}$   
C  $mol^{-1} L^{-1} s$   
D  $mol L^{-1} s^{-1}$

- Q 72. The degree of hydrolysis always \_\_\_\_\_ with increase in temperature because at elevated temperature increase in  $K_w$  is \_\_\_\_\_ as compare to  $K_a$  and  $K_b$ .
- A Increases, Lower  
B Decreases, Greater  
C Decrease, Lower  
D Increases, Greater

- Q 73. Oxalic acid is an
- A Diprotic acid  
B Monoprotic acid  
C Amphoteric substance  
D Strong base

- Q 74. Match the Following:

DISCOVERY

- Proton
  - Electron
  - Neutron
  - Dual Nature of Light
- A 1-D, 2-C, 3-B, 4-A  
B 1-C, 2-D, 3-A, 4-B  
C 1-A, 2-B, 3-C, 4-D  
D 1-C, 2-D, 3-B, 4-A

SCIENTIST

- A. Einstein  
B. J. Chadwick  
C. E. Rutherford  
D. J.J. Thomson

- Q 75. If a gas is allowed to expand at constant temperature then:

- A The kinetic energy of the gas molecules remains the same but the pressure decreases.  
B The kinetic energy of the gas molecules increases and pressure decreases.  
C The kinetic energy of the gas molecules decreases  
D The gas will behave as ideal gas.

- Q 76. "No two electrons in the same atom can have identical values for all four of their quantum numbers." This is a statement of

- A Rutherford Law  
B Aufbau Principle  
C Pauli's Exclusion Principle  
D Hund's Rule

- Q 77.  $KMnO_4$  and  $K_2Cr_2O_7$  both are oxidizing agent, and the highest oxidation is of the element

- A Chromium  
B Manganese  
C Oxygen  
D Potassium

- Q 78. In a Daniel cell current flows from \_\_\_\_\_ to \_\_\_\_\_ outside the cell

- A Cathode to anode  
B Standard Potential to working Potential  
C Anode to cathode  
D Zero Flow of current

Q 79. The decreasing order of reducing property for the following metals is:

- A  $Mg > Na > Fe > Zn > Ag$
- ☒ B  $Mg > Zn > Ag > Cu > Na$
- C  $Mg > Zn > Fe > Cu > Ag$
- D  $Mg > Cu > Fe > Zn > Na$

Q 80. Which of the following statement is INCORRECT?

- A The magnitude of effective nuclear charge increases in a period when we move from left to right.
- B Electron affinity increases as the atomic radii decreases.
- C The magnitude of screening constant in case of S and P block elements increases in a period as well as in a group as the atomic number increases.
- ☒ D As we move from left to right across a period there is a regular Increases in atomic radii of the representative elements.

Q 81.  $BeCl_2$ ,  $CH_4$  and  $PCl_5$  have the following hybridization (respectively):

- A  $sp^2, sp^3, sp^3d^2$
- ☒ B  $sp, sp^3, sp^3d$
- C  $sp, sp^2, dsp^3$
- D  $sp^2, sp^3, sp^3d$

Q 82. Which of the following has zero dipole moment?

- ☒ A  $CH_4$
- B  $MnO_2$
- C  $CO_2$
- D  $H_2O$

Q 83. In the Lassaigne's test for nitrogen in an organic compound, the Prussian blue colour is obtained due to the formation of:

- A  $Fe_4[Fe(CN)_6]_3$
- ☒ B  $Na_3[Fe(CN)_6]_2$
- C  $Fe_3[Fe(CN)_6]_4$
- D  $Na_3[Fe(CN)_6]_4$

Q 84. Nitrogen is estimated by \_\_\_\_\_ method and halogens by \_\_\_\_\_ method.

- ☒ A Kjeldahl's and Carius respectively
- B Lassaigne's and Carius respectively
- C Lassaigne's and Dumas respectively
- D Newton's and Dumas respectively

Q 85. What will be the molecular weight of the substance, when 0.369 gram of organic substance was dissolved in 25 gram of water and its freezing point was lowered by  $0.17^\circ C$  (Molecular depression constant for water is  $18.5^\circ C$ )

- A 199.91
- ☒ B 160.62
- C 180.82
- D 186.62

Q 86. Which of the following is paired correctly?

- A  $CH_3Cl : sp^2$
- B  $CH_3NH_2 : sp^3$
- C  $HCHO : sp^3$
- ☒ D  $CH_2=CH_2 : sp^3d$

Q 87. Which is correct order of stability for carbonium?

- A  $CH_3CH_2CH_2\dot{C}H_2 > (CH_3)_3\dot{C} > CH_3CH_2\dot{C}HCH_3$
- B  $CH_3CH_2CH_2\dot{C}H_2 > CH_3CH_2\dot{C}HCH_3 > (CH_3)_3\dot{C}$
- C  $(CH_3)_3\dot{C} > CH_3CH_2\dot{C}HCH_3 > CH_3CH_2CH_2\dot{C}H_2$
- ☒ D All the equally stable.

Q 88. Analyze the following statements:

- I. The products obtained from Homolytic fission are free radicals.
  - II. The products obtained from Heterolytic fission are carbanions and carbocations.
  - III. Carbenes are highly reactive and acts as strong electrophiles.
  - IV. Homolytic fission is mostly initiated by heat, light or organic peroxides.
- Which of the following statement/s is/are TRUE?

- A I and II only
- ☒ B I, II and III
- C II, III and IV
- D All of the above

Q 89. Alitame has \_\_\_\_\_ times sweetness value than Cane sugar.

- A 200
- ☒ B 2000
- C 500
- D 1000

Q 90. Benadryl, a well-known antihistaminic drug also contains \_\_\_\_\_ group and Quaternary ammonium salts are used as \_\_\_\_\_.

- A Tertiary amino group and antiseptic (respectively)
- B Secondary amine group and analgesic respectively
- C Secondary amine group and antiseptic respectively
- ☒ D Tertiary amino group and surfactants respectively



SERIES-C

## BIOLOGY (Q NO. 91 TO Q NO. 135)

Q 91. The ratio of phenotypes in  $F_2$  generation of a dihybrid cross is

- A 3:1  
 B 1:2:1  
 C 9:3:3:1  
 D 2:1

Q 92. Match the columns and find out the correct combination-

Column I	Column II
a. <i>Methanobacterium</i>	1. Biofertilizer
b. <i>Rhizobium</i>	2. Biocontrol agent
c. <i>Trichoderma</i>	3. Antibiotic
d. <i>Streptomyces</i>	4. Biogas

- A a-3, b-2, c-1, d-4  
 B a-1, b-3, c-4, d-2  
 C a-2, b-4, c-3, d-1  
 D a-4, b-1, c-2, d-3

Q 93. Choose the correct option about a Test Cross

- A When  $F_1$  progeny is crossed with recessive parent, it is a test cross  
 B It is used to assess the number of alleles of a gene  
 C Both A and B statements are true  
 D Both A and B statements are false

Q 94. Splicing of DNA removes X leaving only the protein-coding regions, Y.

- A X-Introns; Y-Exons  
 B X-Exons; Y-Introns  
 C X-Recons; Y-Mutons  
 D X-Mutons; Y-Introns

Q 95. During synthesis of a polypeptide chain, the order and sequence of amino acids is determined by the sequence of codons in the

- A cRNA  
 B mRNA  
 C rRNA  
 D tRNA

Q 96. Golden rice is a genetically modified crop developed with

- A High drought tolerance  
 B More pest resistance  
 C Enhanced  $\beta$ -carotene  
 D Increased carbohydrate content

Q 97. In micro-propagation,

- A Plants are propagated *in vitro*  
 B Microbes are propagated *in vitro*  
 C Plants are produced at a small scale  
 D None of the above

Q 98. Pyramid of energy in an ecosystem

- A is always inverted  
 B is always upright  
 C either upright or inverted  
 D neither upright nor inverted

Q 99. Mycorrhizae and lichens represent examples of

- A Amensalism  
 B Parasitism  
 C Mutualism  
 D Commensalism

Q 100. Hotspots are characterized by

- A High density of biodiversity but low degree of endemism  
 B High degree of endemism but low level of species richness  
 C High density of biodiversity and high degree of endemism  
 D None of the above

Q 101. The germinal epithelium lining of the seminiferous tubules of the human testis consists of

- A Sertoli cells  
 B Spermatozoa  
 C Spermatids  
 D Vas deferens

SERIES-C

Q 102. Choose the incorrect statement about menstrual cycle

- A It is the cyclic changes in the reproductive tract of primate females  
 B It is the periodic shedding of the endometrium of the uterus with bleeding  
 C It occurs during implantation of the fertilized ovum and other events of pregnancy  
 D It is an indicator of normal reproductive phase and extends between menarche and menopause

Q 103. Which of the following is a method of birth control?

- A IVF  
 B IUDs  
 C GIFT  
 D ZIFT

Q 104. The milk produced during the initial few days of lactation is called

- A Prolactin  
 B Lactin  
 C Oxytocin  
 D Colostrum

Q 105. Match the columns and find out the correct combination-

Column I	Column II
a) Klinefelter's syndrome	(i) $2n+1$
b) Turner's syndrome	(ii) $44+XXY$
c) Down's syndrome	(iii) $44+XO$

- A a-ii; b-i; c-iii  
 B a-i; b-iii; c-ii  
 C a-ii; b-iii; c-i  
 D a-i; b-ii; c-iii

Q 106. The Darwin's finches of Galapagos islands represent

- A Species creation  
 B Sympatric speciation  
 C Evolution due to mutation  
 D Adaptive radiation

Q 107. If in a population in Hardy-Weinberg equilibrium, the frequency of recessive allele is 0.50, then the frequency of the individuals heterozygous for the gene will be

- A 0.25  
 B 0.50  
 C 0.625  
 D 0.75

Q 108. DNA fingerprinting is based on the principle of

- A Single nucleotide polymorphism  
 B Polymorphism in DNA sequence  
 C Polymorphism in RNA sequence  
 D None of the above

Q 109. In AIDS, the HIV attacks X where it replicates and produce progeny viruses making the person immuno-deficient. X is

- A B-Lymphocytes  
 B Helper T-Lymphocytes  
 C Leucocytes  
 D Thrombocytes

Q 110. Match the columns and select the correct combination

Column I	Column II
a. Cocaine	1. <i>Nicotiana tabacum</i>
b. Morphine	2. <i>Cannabis sativa</i>
c. Nicotine	3. <i>Papaver somniferum</i>
d. Hashish	4. <i>Erythroxylum coca</i>

- A a-4, b-3, c-1, d-2  
 B a-1, b-2, c-4, d-3  
 C a-3, b-1, c-2, d-4  
 D a-2, b-4, c-3, d-1

Q 111. Lichens are a group of organisms that represent symbiotic association of

- A A phycobiont and a mycobiont  
 B A phycobiont and a bacteriophage  
 C A bacteria and a bacteriophage  
 D A mycobiont and a bacteria

Q 112. Members of which kingdom(s) are characterized by absence of a nuclear membrane?

- A Monera  
 B Protista  
 C Fungi  
 D Monera and Fungi

- Q 113. The correct ascending order of categories in a taxonomic hierarchy is
- Species → Family → Genus → Order
  - Genus → Species → Order → Family
  - Species → Genus → Family → Order
  - Genus → Species → Family → Order

- Q 114. Intercalary meristem is responsible for
- Apical growth
  - Primary growth
  - Secondary growth
  - Both primary and secondary growth

- Q 115. Flower of Solanaceae is
- Actinomorphic, unisexual, hypogynous
  - Actinomorphic, bisexual, hypogynous
  - Zygomorphic, unisexual, epigynous
  - Zygomorphic, bisexual, epigynous

- Q 116. Match the columns and find out the correct combination

Column I	Column II
a. Dicot stem	1. Vascular bundles radial, exarch, polyarch
b. Monocot stem	2. Vascular bundles radial, exarch, diarch to hexarch
c. Dicot root	3. Vascular bundles conjoint, collateral, open, endarch
d. Monocot root	4. Vascular bundles conjoint, collateral, closed, endarch

- a-2, b-1, c-3, d-4
- a-1, b-2, c-4, d-3
- a-3, b-4, c-2, d-1
- a-4, b-3, c-1, d-2

- Q 117. Select the incorrect statement

- Algae are thalloid where plant body is not differentiated into root, stem and leaf.
- Gametophytes are independent and free-living in mosses and liverworts.
- The main plant body is a sporophyte in Pteridophytes.
- Gymnosperms have a free-living female gametophytic plant.

- Q 118. An inflorescence with old flowers at the lower side and young flowers at the upper side is

- Cymose
- Racemose
- Helicoid
- Scorpioid

- Q 119. In Glycolysis, the conversion of glucose to glucose-6-phosphate is catalysed by

- Glucose synthetase
- Isomerase
- Phosphorylase
- Hexokinase

- Q 120. The three C-atoms of the first stable compound formed in the Calvin cycle comes from

- PEP
- RuBP + PEP
- RuBP + CO<sub>2</sub>
- CO<sub>2</sub> + PEP

- Q 121. A body cavity where mesoderm is present as scattered pouches in between the ectoderm and endoderm is called

- Acoelom
- Coelom
- Eucoelom
- Pseudocoelom

- Q 122. The legally conserved areas for the protection and maintenance of biodiversity are

- Biosphere reserves
  - National parks
  - Botanical gardens
  - Wildlife sanctuaries
  - Gene banks
- 1., 3., 4. and 5
  - 1., 2. and 4
  - 1., 2. 3. and 4
  - 1., 2., 3., 4. and 5

- Q 123. Frogs under water respire through

- Skin and lungs
- Skin and buccal cavity
- Skin, lungs and buccal cavity
- Skin only

- Q 124. Which of the following statements are correct for the secondary metabolites

- These are organic compounds produced by many lifeforms
  - They often mediate some ecological interactions
  - They play a role in growth, development and reproduction of the organism
  - Most of them are useful for human welfare
- 1., 2. and 3.
  - 1., 2. and 4.
  - 1., 3. and 4.
  - 1., 2., 3., and 4.

- Q 125. Meiosis ensures the production of P Q in sexually reproducing organisms whereas fertilization restores the R condition through formation of S. Identify P, Q, R and S.

- P-haploid, Q-zygote, R-diploid, S-gamete
- P-diploid, Q-zygote, R-haploid, S-gamete
- P-haploid, Q-gamete, R-diploid, S-zygote
- P-diploid, Q-gamete, R-haploid, S-zygote

- Q 126. The curve given below shows activity of an enzyme with relation to a factor that is represented on the X-axis. It can be



- Either substrate concentration or temperature
- Either temperature or pH
- Either pH or substrate concentration
- Substrate concentration

- Q 127. Which of the following are membrane-bound organelles?

- Chloroplasts and centrioles
  - Nucleus and nucleolus
  - Lysosomes and peroxisomes
  - Glyoxysomes and dictyosomes
1. and 2.
  2. and 3
  3. and 4
  - Only 3

- Q 128. Which of the following proteins present in blood plasma is primarily responsible for coagulation of blood?

- Serum
- Fibrinogen
- Globulin
- Albumin

- Q 129. Which of the following blood groups will be having antigen B on RBC surface?

- B only
- B and AB
- B and O
- B, AB and O

- Q 130. Ureotelic mode of discharge of nitrogenous waste is characteristic to

- Aquatic amphibians and insects
- Terrestrial amphibians and mammals
- Birds and insects
- Reptiles and birds

- Q 131. Which of the following statements is not correct?

- Double fertilization is occurrence of syngamy and triple fusion simultaneously
- Syngamy is fusion of one male gamete with the egg nucleus
- Triple fusion is the process of fusion of a male nucleus with the two antipodal cells
- Syngamy leads to formation of a zygote and triple fusion leads to formation of an endosperm



Q 132. A mature pollen grain contains

- ☒ A A vegetative cell and a single male gamete
- B A vegetative cell and two male gametes
- C Two vegetative cells and a single male gamete
- D Two vegetative cells and two male gametes

Q 133. Filiform apparatus helps to guide the pollen tubes towards the egg. These are present in

- A Suspensor
- B Antipodals
- C Central cell
- ☒ D Synergids

Q 134. In most of the Angiosperms,

- A Egg apparatus is present at the chalazal end
- ☒ B Embryo sac is 7-celled, 8-nucleate
- C Endosperm is diploid
- D Seeds are produced by apomixis

Q 135. Haemophilia is

- A An autosomal dominant trait
- B An autosomal recessive trait
- ☒ C An X-linked trait
- D A Y-linked trait