



SATISH SCIENCE ACADEMY  
DHANORI PUNE - 411015

Mhtcet pcb 4  
ENTRANCE EXAM - MHT - CET

Time Allowed: 3 hours

Maximum Marks : 200

General Instructions:

- All questions are compulsory.
- There are two sections.
- Section A has 100 questions from Physics and Chemistry.
- Section B has 100 questions from Biology.

Section - A (Physics)

- 1) A particle is projected obliquely into air with velocity of 20 m/s at an angle of elevation of  $45^\circ$ . Neglecting air resistance the equation of motion is [1]

a)  $y = x \left[ \frac{1}{2} - \frac{gx}{400} \right]$   
 b)  $Y = x - \frac{gx^2}{200}$   
 c)  $y = x \left[ 1 - \frac{gx}{400} \right]$   
 d)  $y = \frac{x}{\sqrt{2}} - \frac{gx}{200}$

- 2) A bullet hits and gets embedded in solid block resting on a frictionless surface. In this process which one of the following is correct? [1]

- a) Only kinetic energy is conserved.  
 b) Both momentum and kinetic energy is conserved.  
 c) Only momentum is conserved  
 d) Neither momentum nor kinetic energy is conserved.

- 3) A planet of mass  $m$  moves around the Sun along an elliptical path with a period of revolution  $T$ . During the motion, the planet's maximum and minimum distance from Sun is  $R$  and  $\frac{R}{3}$  respectively. If  $T^2 = \alpha R^3$ , then the magnitude of constant  $\alpha$  will be [1]

a)  $\frac{20\pi^2}{27Gm}$   
 b)  $\frac{\pi^2}{18Gm}$   
 c)  $\frac{32\pi^2}{27Gm}$   
 d)  $\frac{10\pi}{9Gm}$

- 4) A barometer tube of length 90 cm contains some air above mercury. The reading of the mercury level is 74.8 cm when true atmospheric pressure is 76 cm and temperature is  $30^\circ\text{C}$ . If the reading is observed to be 75.4 cm on some another day when temperature is  $10^\circ\text{C}$ , then what will be true pressure? [1]

- a) 75.65 cm                      b) 74.25 cm  
 c) 76.57 cm                      d) 77.26 cm

- 5) An earthquake generates both transverse (S) and longitudinal (P) sound waves in the earth. The speed of S waves is about 4.5 km/s and that of P waves is about 8.0 km/s. A seismograph records P and S waves from an earthquake. The first P wave arrives 4.0 min before the first S wave. The epicenter of the earthquake is located at distance about [1]

- a) 5000 km                      b) 25 km  
 c) 250 km                        d) 2500 km

- 6) The angle of minimum deviation of a prism of refractive index  $\sqrt{3}$  is equal to its refracting angle. Then the refracting angle of that prism is [1]

- a)  $90^\circ$                             b)  $30^\circ$   
 c)  $60^\circ$                             d)  $45^\circ$

- 7) The correct expression for refraction at single convex spherical surface separating two media of refractive indices  $n_1$  and  $n_2$  ( $n_2 > n_1$ ) and radius of curvature  $R$  is ( $u$  and  $v$  are object, image distance respectively) [1]

a)  $\frac{n_2}{u} - \frac{n_1}{v} = \frac{(n_2 - n_1)}{R}$   
 b)  $\frac{n_2}{v} - \frac{n_1}{u} = \frac{(n_2 - n_1)}{R}$   
 c)  $\frac{n_1}{v} - \frac{n_2}{u} = \frac{(n_1 - n_2)}{R}$   
 d)  $\frac{n_1}{u} - \frac{n_2}{v} = \frac{(n_1 - n_2)}{R}$

- 8) A convex lens of glass ( $\mu_g = 1.45$ ) has focal length  $f_g$  in air. The lens is immersed in a liquid of refractive index ( $\mu_l$ ) 1.3. The ratio of the  $\frac{f_{liquid}}{f_g}$  is [1]

- a) 0.23                            b) 0.43  
 c) 0.39                            d) 3.9

- 9) What is the magnitude of a point charge due to which the electric field 30 cm away has the magnitude 2 newton/coulomb?

$\left[ \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ N m}^2/\text{C}^2 \right]$ [1]

- a)  $9 \times 10^{-11} \text{ C}$                       b)  $2 \times 10^{-11} \text{ C}$   
 c)  $3 \times 10^{-11} \text{ C}$                       d)  $5 \times 10^{-11} \text{ C}$

- 10) The safety speed of a vehicle on a curve horizontal road is [1]

a)  $\mu rg$   
 b)  $\sqrt{\mu rg}$   
 c)  $\frac{\mu}{(rg)^2}$   
 d)  $\mu r^2 g$

- 11) Which of the following is a necessary and sufficient condition for S.H.M.?

- i. Constant period  
 ii. Constant acceleration  
 iii. Proportionality between acceleration and displacement from equilibrium position  
 iv. Proportionality between restoring force and displacement from equilibrium position

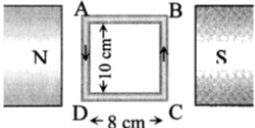
[1]

- a) Option (a)                      b) Option (b)  
 c) Option (c)                      d) Option (d)

- 12) The kinetic energy of a particle executing S.H.M. is 16 J when it is at its mean position. If the mass of the particle is 0.32 kg, then what is the maximum velocity of the particle? [1]

- a) 5 m/s                            b) 15 m/s  
 c) 20 m/s                            d) 10 m/s

- 13) For a particle performing U.C.M., the projection of its motion along the diameter is [1]

- a) U.C.M.                                      b) Periodic oscillation  
c) S.H.M.                                        d) Non - harmonic motion
- 14) Instrument which measures alternating current is based on [1]  
a) Joule's effect.  
b) Focault's effect.  
c) Current proportional to voltage across the resistance.  
d) Current directly proportional to deflection.
- 15) The force of attraction between molecules of different substances is [1]  
a) Gravitational force.                      b) Cohesive force.  
c) Nuclear force.                              d) Adhesive force.
- 16) A string is stretched between fixed points separated by 75.0 cm. It is observed to have resonant frequencies of 420 Hz and 315 Hz. There are no other resonant frequencies between these two. Then, the lowest resonant frequency for this string is [1]  
a) 1050 Hz                                      b) 1.05 Hz  
c) 10.5 Hz                                        d) 105 Hz
- 17) A string of 7 m length has a mass of 0.035 kg. If tension in the string is 60.5 N, then speed of a wave on the string is [1]  
a) 102 m/s                                        b) 165 m/s  
c) 110 m/s                                        d) 77 m/s
- 18) A string of length 2 m is fixed at both ends. If this string vibrates in its fourth normal mode with a frequency of 500 Hz, then the waves would travel on it with a velocity of [1]  
a) 500 m/s                                        b) 125 m/s  
c) 1000 m/s                                      d) 250 m/s
- 19) Half part of an ice block is covered with black cloth and rest half is covered with white cloth and then it is kept in sunlight. After some time, clothes are removed to see the melted ice. Which of the following statements is correct? [1]  
a) It will depend on the temperature of surroundings of ice  
b) Ice covered with black cloth will melt more  
c) Ice covered with white cloth will melt more  
d) Equal ice will melt under both clothes
- 20) In a double slit experiment, the slits are separated by a distance  $d$  and the screen is at a distance  $D$  from the slits. If a maximum is formed just opposite to each slit, then what is the order of the fringe so formed? [1]  
a)  $\frac{d^2}{2\lambda D}$   
b)  $\frac{d^2}{\lambda D}$   
c)  $\frac{2 \cdot d^2}{\lambda D}$   
d)  $\frac{d^2}{4\lambda D}$
- 21) A potentiometer wire of length 100 cm has a resistance of  $10\Omega$ . It is connected in series with a resistance and an accumulator of e.m.f. 2 V and negligible internal resistance. A source of e.m.f. 10 mV is balanced against a 40 cm length of the potentiometer wire. The value of the external resistance is [1]  
a)  $405\Omega$                                         b)  $395\Omega$   
c)  $790\Omega$                                         d)  $810\Omega$
- 22) In a Wheatstone's metrebridge, the null point is obtained at the middle point of the wire. If in one gap the resistance is  $10\Omega$ , then the value of resistance in the other gap is [1]
- a)  $\frac{1}{5}\Omega$     b)  $10\Omega$   
c)  $5\Omega$     d)  $500\Omega$
- 23) A potentiometer wire has length 4 m and resistance  $8\Omega$ . The resistance that must be connected in series with the wire and an accumulator of e.m.f. 2 V, so as to get a potential gradient 1 mV per cm on the wire is [1]  
a)  $44\Omega$     b)  $48\Omega$   
c)  $32\Omega$     d)  $40\Omega$
- 24) The deflection in galvanometer falls to  $(\frac{1}{4})^{\text{th}}$  when it is shunted by  $3\Omega$ . If additional shunt of  $2\Omega$  is connected to earlier shunt, the deflection in galvanometer falls to [1]  
a)  $(\frac{1}{8.5})^{\text{th}}$     b)  $(\frac{1}{3})^{\text{rd}}$   
c)  $\frac{1}{2}$     d)  $(\frac{1}{4})^{\text{th}}$
- 25) The magnetic field due to a current carrying circular loop of radius 3 cm at a point on the axis at a distance of 4 cm from the centre is  $54\mu\text{ T}$ . What will be its value at the centre of the loop? [1]  
a)  $250\mu\text{ T}$     b)  $75\mu\text{ T}$   
c)  $125\mu\text{ T}$     d)  $150\mu\text{ T}$
- 26) An electron having a charge 'e' moves with a velocity 'v' in the X - direction. A magnetic field acts on it in the Y - direction. The force on the electron acts in [1]  
a) Negative Z - direction.  
b) X - direction.  
c) Z - direction.  
d) Y - direction.
- 27) A 100 turns coil shown in figure carries a current of 2 ampere in a magnetic field  $B = 0.2\text{ Wb / m}^2$ . The torque acting on the coil is  
  
[1]  
a) 0.0032 Nm tending to rotate the side AD into the page.  
b) 0.0032 Nm tending to rotate the side AD out of the page.  
c) 0.32 Nm tending to rotate the side AD into the page.  
d) 0.32 Nm tending to rotate the side AD out of the page.
- 28) Two long and straight conductors, placed parallel to each other are separated by 10 cm, carrying current of 2 A and 4 A respectively in opposite direction. The force per unit length exerted by each conductor on the other [1]  
a)  $1.6 \times 10^{-5}\text{ N/m}$                                       b)  $32 \times 10^{-5}\text{ N/m}$   
c)  $16 \times 10^{-5}\text{ N/m}$                                       d)  $3.2 \times 10^{-5}\text{ N/m}$
- 29) An iron rod of cross sectional area 4 sq.cm is placed with its length parallel to a magnetic field of intensity 1200 A/m. The flux through the rod is  $40 \times 10^{-4}\text{ Wb}$ . The permeability of the rod is [1]  
a)  $8.3 \times 10^{-4}\text{ Wb/Am}$   
b)  $8.3 \times 10^{-6}\text{ Wb/Am}$   
c)  $8.3 \times 10^{-5}\text{ Wb/Am}$   
d)  $8.3 \times 10^{-3}\text{ Wb/Am}$
- 30) What is the magnetization of a bar magnet having length 6 cm and area of cross section  $5\text{ cm}^2$ ? ( $M = 1\text{ Am}^2$ ) [1]

- a)  $1.25 \times 10^{-4}$  A/m      b)  $3.3 \times 10^{-4}$  A/m  
c)  $1.2 \times 10^{-4}$  A/m      d)  $3.3 \times 10^4$  A/m

31) A toroid has 1500 turns and the inner and outer radii of its core 6 cm and 8 cm respectively. The magnetic field in the core for a current of 0.5 A is 2 T. The relative permeability of core is [1]

- a) 931.5                      b) 156.3  
c) 662.2                      d) 1863

32) The S.I. unit of gyromagnetic ratio is [1]

- a) Cm                          b) C kg  
c) C kg<sup>-1</sup>                      d) Kg C<sup>-1</sup>

33) An ideal transformer converts 220 V a.c. to 3.3 kV a.c. to transmit a power of 4.4 kW. If primary coil has 600 turns, then alternating current in secondary coil is [1]

- a)  $\frac{7}{3}$  A                          b)  $\frac{5}{3}$  A  
c)  $\frac{1}{3}$  A                          d)  $\frac{4}{3}$  A

34) A current  $I = I_0 e^{-\lambda t}$  is flowing in a circuit consisting of a parallel combination of resistance R and capacitance C. The total charge over the entire pulse period is [1]

- a)  $\frac{I_0}{\lambda}$   
b)  $I_0 \lambda$   
c)  $\frac{2I_0}{\lambda}$   
d)  $e^{I_0 \lambda}$

35) The primary winding of a transformer has 100 turns and its secondary winding has 200 turns. The primary is connected to an A.C supply of 120 V and the current flowing in it is 10 A. The voltage and the current in the secondary are [1]

- a) 120 V, 20 A                      b) 60 V, 20 A  
c) 240 V, 5 A                        d) 240 V, 10 A

36) Protons and  $\alpha$  particles have the same de - Broglie wavelength. What is same for both of them? [1]

- a) Linear momentum              b) Frequency  
c) Mass                                d) Energy

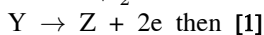
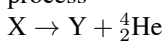
37) If the kinetic energy of the particle is increased to 16 times its previous value, the percentage change in the de - Broglie wavelength of the particle is [1]

- a) 75                                  b) 50  
c) 60                                  d) 25

38) An electron and a proton are accelerated through the same potential difference. The ratio of their de - Broglie wavelengths will be [1]

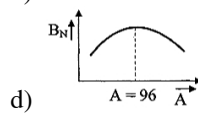
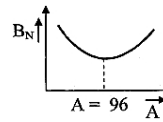
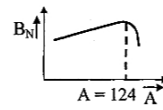
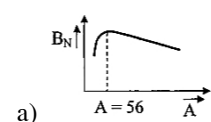
- a)  $\left(\frac{m_p}{m_e}\right)^{\frac{1}{2}}$   
b)  $M_p / m_e$   
c) 1  
d)  $M_e / m_p$

39) An element X decays into element Z by two - steps process



- a) X and Y are isotopes              b) X and Z are isobars  
c) X and Z are isotones            d) X and Z are isotopes

40) The dependence of binding energy per nucleon ( $B_N$ ) on the mass number A is represented by [1]



41) If the aluminium nucleus  ${}_{13}\text{Al}^{27}$  has nuclear radius of about 3.6 Fermi, then the tellurium nucleus  ${}_{52}\text{Te}^{125}$  will have nuclear radius nearly as [1]

- a) 16.7 Fermi                      b) 6.0 Fermi  
c) 3.6 Fermi                        d) 8.9 Fermi

42) The ratio of the velocity of the electron in the first orbit to that in the second orbit is [1]

- a) 2 : 1                                b) 4 : 1  
c) 1 : 4                                d) 8 : 1

43) Atomic mass number of an element thorium is 232 and its atomic number is 90. The end product of this radioactive element is an isotope of lead (atomic mass 208 and atomic number 82). The number of alpha and beta particles emitted is [1]

- a)  $\alpha = 6, \beta = 4$   
b)  $\alpha = 6, \beta = 0$   
c)  $\alpha = 4, \beta = 6$   
d)  $\alpha = 3, \beta = 3$

44) Rutherford's  $\alpha$  - particle experiment showed that the atoms have [1]

- a) Electrons                          b) Nucleus  
c) Neutron                          d) Proton

45) The mass number of a nucleus is

- i. Always greater than its atomic number.  
ii. Equal to its atomic number.  
iii. Sometimes higher than the atomic number and sometimes equal.  
iv. Always less than the atomic number.

[1]

- a) Option (d)                          b) Option (a)  
c) Option (b)                          d) Option (c)

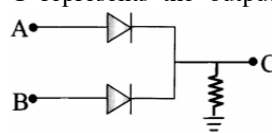
46) The Rutherford  $\alpha$  - particle experiment shows that most of the  $\alpha$  - particles pass through almost unscattered while some are scattered through large angles. What information does it give about the structure of the atom?

- i. Atom is hollow.  
ii. The whole mass of the atom is concentrated in a small centre called nucleus.  
iii. Nucleus is positively charged.  
iv. All the these.

[1]

- a) Option (d)                          b) Option (a)  
c) Option (b)                          d) Option (c)

47) In the circuit below, A and B represent two inputs and C represents the output. The circuit represents



[1]

- a) AND gate                          b) NAND gate  
c) OR gate                            d) NOR gate

- 48) In half wave rectifier, the diode
- Allows current from both positive and negative half cycles from the input.
  - Blocks the current from all the positive half cycles.
  - Blocks the current from all the negative half cycles.
  - Allows current from alternate positive and negative half cycles.

[1]

- a) Option (b)                      b) Option (c)  
c) Option (d)                      d) Option (a)

- 49) In a CE amplifier, the input ac signal to be amplified is applied across [1]

- Forward biased emitter - base junction
- Reverse biased emitter - base junction
- Forward biased collector - base junction
- Reverse biased collector - base junction

- 50) The transformer is used in rectifier circuit, [1]

- To isolate the rectifier circuit.
- All of these
- To step up or step down the AC input as per requirement.
- To protect the diode.

### Section - A (Chemistry)

- 51) The arbitrarily decided and universally accepted standards are called \_\_\_\_\_. [1]

- Measures
- Symbols
- Units
- Fundamentals

- 52) The value  $l = 1$  represents \_\_\_\_\_ subshell. [1]

- D
- P
- F
- S

- 53) Hydrogen can have \_\_\_\_\_ oxidation number(s). [1]

- Only 0
- Only +1
- 1, 0, +1
- Only - 1

- 54) Electronic configuration of potassium with respect to the nearest noble gas is \_\_\_\_\_. [1]

- $[\text{Ne}]3s^1$
- $[\text{He}]2s^1$
- $[\text{Ar}]4s^1$
- $[\text{Kr}]5s^1$

- 55) Which of the following exhibits the weakest intermolecular forces? [1]

- $\text{NH}_3$
- $\text{H}_2\text{O}$
- He
- HF

- 56) \_\_\_\_\_ and \_\_\_\_\_ are positively charged sols. [1]

- Blood and  $\text{TiO}_2$  sol
- Methylene blue sol, congo red sol
- Clay sol and gum sol
- Eosin sol, congo red sol

- 57) When propyne is treated with aqueous  $\text{H}_2\text{SO}_4$  in presence of  $\text{HgSO}_4$ , the major product is \_\_\_\_\_. [1]

- Propan - 2 - ol
- Ethanal
- Ethyne
- Propanone

- 58) Toluene reacts with halogen in presence of iron (III) chloride giving ortho and para - halo compounds. The reaction is \_\_\_\_\_. [1]

- Free radical addition reaction
- Nucleophilic substitution reaction
- Electrophilic substitution reaction
- Electrophilic elimination reaction

- 59) The least stable free radical among the following is \_\_\_\_\_. [1]

- $\dot{\text{C}}\text{H}_2\text{CH}_3$
- $\dot{\text{C}}(\text{CH}_3)_3$
- $\dot{\text{C}}\text{H}_3$
- $\dot{\text{C}}\text{H}(\text{CH}_3)_2$

- 60) Identify the INCORRECT statement.

- The larger the coordination number, the closer are the spheres to each other.
- The coordination number of any sphere in the hcp structure is 12.
- Crystal defects can be minimized by carrying out crystallization at a slower rate.
- Paramagnetic substances can be permanently magnetised.

[1]

- Option (a)
- Option (b)
- Option (d)
- Option (c)

- 61) The number of tetrahedral sites per sphere in a fcc structure is \_\_\_\_\_. [1]

- 8
- 4
- 2
- 1

- 62) Unit of boiling point elevation constant ( $K_b$ ) is \_\_\_\_\_. [1]

- $\text{G mol}^{-1}$
- $\text{Kg mol}^{-1}$
- $\text{K kg mol}^{-1}$
- $\text{K mol}^{-1}$

- 63) Which of the following is INCORRECT?

- Ideal solutions obey Raoult's law.
- No heat is evolved or absorbed when two components forming an ideal solution are mixed.
- The vapour pressure of ideal solution always lies between vapour pressures of pure components.
- Solution of phenol + aniline behaves nearly as ideal.

[1]

- Option (A)
- Option (D)
- Option (B)
- Option (C)

- 64) For which among the following reactions, change in entropy is less than zero? [1]

- Thermal decomposition of calcium carbonate
- Dissociation of hydrogen
- Formation of water
- Sublimation of iodine

- 65) In an isochoric process, the increase in internal energy is \_\_\_\_\_. [1]

- Equal to the sum of the heat absorbed and work done
- Equal to zero
- Equal to the heat absorbed
- Equal to the work done

- 66) In a galvanic cell, \_\_\_\_\_ energy is converted into \_\_\_\_\_ energy. [1]

- Chemical; mechanical
- Electrical; chemical
- Electrical; mechanical
- Chemical; electrical

- 67) Conductivity of KCl solution is  $0.002765\Omega^{-1} \text{m}^{-1}$  at  $25^\circ\text{C}$ . The resistance of the solution is  $400\Omega$ . The cell constant is \_\_\_\_\_  $\text{m}^{-1}$ . [1]

- 1.016
- 1.106
- 0.815
- 2.016

- 68) Unit of rate constant for first order reaction is \_\_\_\_\_. [1]  
 a)  $\text{Mol dm}^{-3} \text{ time}^{-1}$     b)  $\text{Time}^{-1}$   
 c)  $\text{Dm}^{-3} \text{ mol}^{-1} \text{ time}^{-1}$     d)  $\text{Mol dm}^3 \text{ time}^{-1}$
- 69) What is the overall order of a reaction which has a rate expression;  $\text{rate} = k[\text{A}]^{\frac{3}{2}} [\text{B}]^{-1}$ ? [1]  
 a)  $\frac{1}{2}$     b)  $\frac{3}{2}$   
 c) - 1    d) 0
- 70) Which among the following is INCORRECT?  
 i.  $K_{sp}$  expression contains only equilibrium concentrations of the ions. Critical Thinking  
 ii.  $K_{sp}$  changes with concentrations of the ions.  
 iii.  $K_{sp}$  is applicable for a saturated solution of the sparingly soluble salt.  
 iv.  $K_{sp}$  is temperature dependent.  
 [1]  
 a) Option (c)    b) Option (a)  
 c) Option (d)    d) Option (b)
- 71) MY and  $\text{NY}_3$ , two nearly insoluble salts, have the same  $K_{sp}$  values of  $6.2 \times 10^{-13}$  at room temperature. Which statement would be TRUE in regard to MY and  $\text{NY}_3$ ?  
 i. The salts MY and  $\text{NY}_3$  are more soluble in 0.5 M KY than in pure water.  
 ii. The addition of the salt of KY to solution of MY and  $\text{NY}_3$  will have no effect on their solubilities.  
 iii. The molar solubilities of MY and  $\text{NY}_3$  in water are identical.  
 iv. The molar solubility of MY in water is less than that of  $\text{NY}_3$ .  
 [1]  
 a) Option (c)    b) Option (d)  
 c) Option (b)    d) Option (a)
- 72) PH of a solution is given as \_\_\_\_\_. [1]  
 a)  $\text{PH} = \log_{10} [\text{OH}^-]$     b)  $\text{PH} = \log_{10} [\text{H}^+]$   
 c)  $\text{PH} = -\log_{10} [\text{H}^+]$     d)  $\text{PH} = -\log_{10} [\text{OH}^-]$
- 73) Oxidation number of sulfur is +6 in \_\_\_\_\_. [1]  
 a) Both  $\text{H}_2\text{SO}_4$  and  $\text{H}_2\text{S}_2\text{O}_8$   
 b)  $\text{H}_2\text{SO}_3$   
 c)  $\text{H}_2\text{S}_2\text{O}_8$   
 d)  $\text{H}_2\text{SO}_4$
- 74) Ozone is present as a chief constituent in which region of the atmosphere? [1]  
 a) Thermosphere    b) Troposphere  
 c) Stratosphere    d) Mesosphere
- 75) In the reaction of gold with aqua regia, the oxidation state of nitrogen changes from \_\_\_\_\_. [1]  
 a) +4 to +2    b) +3 to +1  
 c) +6 to +4    d) +5 to +2
- 76) The electronic configuration of  $\text{Gd}^{2+}$  is \_\_\_\_\_.  
 (At. No. of Gd is 64) [1]  
 a)  $[\text{Xe}]4f^8$     b)  $[\text{Xe}]4f^7 5d^1$   
 c)  $[\text{Xe}]4f^7 5d^1 6s^2$     d)  $[\text{Xe}]4f^7$
- 77) Which among the following elements is radioactive? [1]  
 a) Pm    b) Yb  
 c) Dy    d) Lu
- 78) Two complexes  $\text{PtCl}_4 \cdot 2\text{NH}_3$  and  $\text{PtCl}_4 \cdot 2\text{KCl}$  do not give a precipitate of AgCl with  $\text{AgNO}_3$  solution. The structures of these complexes are \_\_\_\_\_. [1]  
 a)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_4]$ ,  $\text{K}_2[\text{PtCl}_5]\text{Cl}$   
 b)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_4]$ ,  $\text{K}_2[\text{PtCl}_6]$   
 c)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]\text{Cl}_2$ ,  $\text{K}_2[\text{PtCl}_6]$   
 d)  $[\text{Pt}(\text{NH}_3)_2]\text{Cl}_4$ ,  $\text{K}_2[\text{PtCl}_6]$
- 79) Which of the following is not an ionic complex? [1]  
 a)  $\text{K}_2[\text{Fe}(\text{CN})_6]$     b)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$   
 c)  $\text{LiAlH}_4$     d)  $[\text{Mn}(\text{CO})_5]$
- 80) The CORRECT charge on and coordination number of 'Fe' in  $\text{K}_3[\text{Fe}(\text{CN})_6]$  are \_\_\_\_ respectively. [1]  
 a) +3, 6    b) +3, 3  
 c) +2, 6    d) +2, 4
- 81) Alkanes CANNOT be directly iodinated because \_\_\_\_\_. [1]  
 a) The reaction is too slow  
 b) Alkanes do not react with  $\text{I}_2$   
 c)  $\text{I}_2$  is a weak reagent  
 d) The reaction is reversible
- 82) The product (X) formed in the following reaction is \_\_\_\_\_.  
 $\text{Ph} - \text{CH} = \text{CH}_2 + \text{HBr} \xrightarrow{\text{H}_2\text{O}_2} (\text{X})$  [1]  
|  
*Major*  
 a)  $\text{Ph}(\text{CH}_2)_2 - \text{Br}$ :  
 Anti - Markovnikov's product  
 b)  $\text{Ph} - \text{CH}(\text{Br})\text{CH}_3$ :  
 Anti - Markovnikov's product  
 c)  $\text{Ph}(\text{CH}_2)_2 - \text{Br}$ : Markovnikov's product  
 d)  $\text{Ph} - \text{CH}(\text{Br})\text{CH}_3$ :  
 Markovnikov's product
- 83) IUPAC name of  
 $\text{C}_2\text{H}_5 - \overset{\text{C}_2\text{H}_5}{\underset{|}{\text{CH}}} - \overset{\text{Cl}}{\underset{|}{\text{CH}}} - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$   
 is \_\_\_\_\_. [1]  
 a) 4 - chloro - 3 - ethyl - 5 - methyl octane  
 b) 4 - chloro - 3 - ethyl - 2 - methyl heptane  
 c) 4 - chloro - 5 - methyl - 3 ethyl octane  
 d) 5 - chloro - 6 - ethyl - 4 - methyl octane
- 84) Conversion of benzene diazonium salt to phenol involves \_\_\_\_\_. [1]  
 a) Hydration    b) Hydrolysis  
 c) Decomposition    d) Decarboxylation
- 85)  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_2\text{CH}_3$  in the IUPAC system is known as \_\_\_\_\_. [1]  
 a) 3 - propoxyethane    b) 1 - propoxyethane  
 c) 1 - ethoxypropane    d) 3 - ethoxypropane
- 86) In alcohols, the functional group attached to a saturated carbon atom is \_\_\_\_\_. [1]  
 a) - OH    b) - X  
 c) - O -    d) - CHO
- 87) Consider the acidity of the carboxylic acids  
 i.  $\text{PhCOOH}$   
 ii.  $\text{O} - \text{NO}_2\text{C}_6\text{H}_4\text{COOH}$   
 iii.  $\text{P} - \text{NO}_2\text{C}_6\text{H}_4\text{COOH}$   
 iv.  $\text{M} - \text{NO}_2\text{C}_6\text{H}_4\text{COOH}$   
 Which of the following order is CORRECT? [1]  
 a)  $\text{ii} > \text{iv} > \text{iii} > \text{i}$     b)  $\text{ii} > \text{iii} > \text{iv} > \text{i}$   
 c)  $\text{ii} > \text{iv} > \text{i} > \text{iii}$     d)  $\text{i} > \text{ii} > \text{iii} > \text{iv}$
- 88) The distinguishing test between methanoic acid and ethanoic acid is \_\_\_\_\_. [1]  
 a) Litmus test  
 b) Sodium bicarbonate test  
 c) Tollens' test  
 d) Esterification test



- 105) Which one of the following symptoms is not due to manganese toxicity in plants? [1]
- The appearance of black spot surrounded by chlorotic veins.
  - Calcium translocation in shoot apex is inhibited.
  - Deficiency in both Iron and Nitrogen is induced.
  - The appearance of brown spot surrounded by chlorotic veins.
- 106) Absorption of water by the solid particles of an absorbent causing it to enormously increase in volume without forming a solution is called: [1]
- Absorption
  - Solubility
  - Imbibition
  - Adsorption
- 107) Bacteria responsible for chronic gastritis is: [1]
- Salmonella enterica
  - Helicobacter pylori
  - Haemophilus ducreyi
  - Lactobacillus casei
- 108) Which of the following is not a part of the human alimentary canal? [1]
- Ilium
  - Colon
  - Jejunum
  - Duodenum
- 109) How many types of gamete will be produced by an individual having genotype of AaBbcc? [1]
- Two
  - One
  - Four
  - Three
- 110) ABO blood grouping is controlled by gene I which has three alleles and show co - dominance. There are six genotypes. How many phenotypes in all are possible? [1]
- Three
  - Six
  - Four
  - Five
- 111) Occasionally, a single gene may express more than one effect. The phenomenon is called: [1]
- Polygeny
  - Pleiotropy
  - Multiple allelism
  - Mosaicism
- 112) Formation of mRNA from DNA is called [1]
- Duplication
  - Translation
  - Replication
  - Transcription
- 113) In bacteria, the formation of peptide bond during translation is affected by: [1]
- Lysozyme
  - Ribozyme
  - Nucleosome
  - Microsome
- 114) Which of the following are the functions of RNA? [1]
- All of these
  - It carries amino acids to ribosomes.
  - It is a constituent component of ribosomes.
  - It is a carrier of genetic information from DNA to ribosomes synthesising polypeptides.
- 115) To which of the following factors, RNA polymerase binds transiently to initiate transcription? [1]
- Beta
  - Sigma
  - Gamma
  - Rho
- 116) Which one of the following pairs of nitrogenous bases of nucleic acids is wrongly matched with category mentioned against it? [1]
- Guanine, adenine - purines
  - Thymine, uracil - pyrimidines
  - Adenine, thymine - purines
  - Uracil, cytosine - pyrimidines
- 117) Plasmids are suitable vectors for gene cloning because: [1]
- They are small circular DNA molecules which can integrate with the host chromosomal DNA.
  - They can shuttle between prokaryotic and eukaryotic cells.
  - They carry antibiotic resistance genes.
  - They are small circular DNA molecules with their own origin of replication site.
- 118) Nematode specific genes were introduced into the tobacco host plant using a vector: [1]
- Agrobacterium
  - Plasmid
  - PBR 322
  - Bacteriophage
- 119) The extraction of DNA from the agarose gel is called as: [1]
- Isolation
  - Elution
  - Transformation
  - Ligation
- 120) The separation and purification of recombinant protein product is called as: [1]
- Tissue culture
  - Extraction
  - Downstream processing
  - Hybridisation
- 121) An American company got patent rights through the US Patent and Trademark Office by claiming a new variety of Basmati by: [1]
- Cross breeding Indian basmati with semi - dwarf varieties.
  - Genetically modifying American basmati variety.
  - Cross breeding Indian and American basmati varieties.
  - Genetically modifying Indian basmati variety.
- 122) The dividing and undifferentiated cells are known as: [1]
- Callus
  - Embryo
  - Primordium
  - Pro - embryo
- 123) Which one is not an aim of plant breeding: [1]
- Late maturing varieties
  - Disease - free varieties
  - Early maturing varieties
  - High - yielding varieties
- 124) Which of the following algae can be used as a single - cell protein? [1]
- Spirulina
  - Chara
  - Anabaena
  - Nostoc
- 125) Breeding crops with higher levels of vitamins and minerals or higher protein and healthier fats is called: [1]
- Tissue culture
  - Biofortification
  - Single - cell protein
  - Gametogenesis
- 126) An explant is: [1]
- Part of the plant used in tissue culture.
  - Part of the plant.
  - Part of the plant that expresses a specific gene.
  - A dead plant.
- 127) The bioactive molecule used as an immunosuppressive agent during organ transplant is: [1]
- Tetracyclin
  - Streptomycin
  - Statin
  - Cyclosporin - A
- 128) Methanogens do not produce: [1]
- Methane
  - Hydrogen sulfide
  - Oxygen
  - Carbon dioxide

- 129) In which of the following microbes are not used extensively?
- Converting milk into curd.
  - Making cheese of different flavors and tastes.
  - Production of viral drugs.
  - Production of antibiotics.
  - As bio - fertilizers.
  - Production of inorganic fertilizers.
- [1]
- Only C and F
  - Only B and C
  - Only C and D
  - Only A and B
- 130) Biogas is mainly formed of: [1]
- CH<sub>4</sub>
  - CO<sub>2</sub>
  - N<sub>2</sub>
  - O<sub>2</sub>
- 131) A free living aerobic and non - photosynthetic nitrogen fixing bacterium is: [1]
- Clostridium
  - Azotobacter
  - Anabaena
  - Rhizobium
- 132) One of the useful activities of several bacteria is: [1]
- Biogeochemical cycles
  - Nitrification
  - Nitrogen fixation
  - Sulphurification
- 133) Usnic acid is an antibiotic obtained from: [1]
- Lichens
  - Fungi
  - Bacteria
  - Algae
- 134) Which of the following occurs in dark reaction of photosynthesis? [1]
- Formation of ATP
  - Synthesis of PGAL
  - Release of H<sub>2</sub>
  - Release of O<sub>2</sub>
- 135) Dark reaction in photosynthesis is called so because: [1]
- It does not depend on light energy
  - It cannot occur during day light
  - It occurs more rapidly at night
  - It can occur in dark also
- 136) What are the end products of glycolysis? [1]
- Pyruvate, NADH, and ATP
  - Pyruvic Acid
  - NADPH
  - Phosphoglyceraldehyde or PGAL
- 137) The respiratory quotient depends upon: [1]
- NADH
  - Respiratory substrates
  - Respiratory products
  - ATP
- 138) Actinomorphic flowers have:
- Radial symmetry
  - Often irregular
  - Two equal halves are produced only by one vertical division.
- [1]
- All of these
  - Only b and c are correct
  - Both a and b are correct
  - Only (a) is correct.
- 139) An angiosperm embryo sac is located within the: [1]
- Placenta
  - Nucellus
  - Megasporangium
  - Ovary
- 140) Which one of the following part of the plant when put into the soil is likely to produce new offspring? [1]
- A flower
  - Part of a primary root
  - A stem cutting with a node
  - Part of an internode
- 141) Maize is: [1]
- Cleistogamous
  - Anemophilus
  - Hygrophilous
  - Entomophilous
- 142) Double fertilization involves [1]
- Fertilization of two eggs in the same embryo sac by two sperms brought by one pollen tube.
  - Fertilization of the egg by two male gametes.
  - Fertilization of the egg and the central cell by two sperms brought by different pollen tubes.
  - Fertilization of the egg and the central cell by two sperms brought by the same pollen tube.
- 143) The egg apparatus of angiosperm comprises: [1]
- An egg cell and two antipodals.
  - An egg cell and two synergids.
  - An egg cell and two polar nuclei.
  - An egg cell and the central cell.
- 144) Self - pollination is the transfer of pollen from the anther to the stigma of: [1]
- Different flower of same plant
  - Same flower
  - Same or genetically similar flower of same or another plant
  - Same or different flower of the same plant
- 145) The Gynoecium of flower having two or more carpel fuse together are called \_\_\_\_\_. [1]
- Megacarpous
  - Syncarpous
  - Apocarpous
  - Microcarpous
- 146) In angiosperms during development of embryo, the suspensor cells develop from: [1]
- Endosperm
  - Oospore
  - Integument
  - Cotyledon
- 147) Which of the following mostly pollinate brightly coloured flowers having fragrance and nectar? [1]
- Water
  - Gecko lizard
  - Insects
  - Wind
- 148) Some of the nutrient cycles are labelled as below Sulphur cycle (A), Phosphorus cycle (B), Carbon cycle (C) and Nitrogen cycle (D) of these, the sedimentary cycle is represented by: [1]
- C - only
  - B - only
  - A and B only
  - A - only
- 149) Pyramid of biomass in a pond ecosystem is: [1]
- Always upright
  - Upright and sometimes inverted
  - Inverted
  - Sometimes upright
- 150) Deserts, grasslands, forests and tundra are the examples of: [1]
- Biogeographical realms
  - Biospheres
  - Ecosystems
  - Biomes



- 151) Secondary producers are [1]  
 a) Herbivores                      b) Producers  
 c) None of these                  d) Carnivores
- 152) An ecosystem, which can be easily damaged but can recover after some time if damaging effect stops, will be having: [1]  
 a) Low stability and high resilience  
 b) Low stability and low resilience  
 c) High stability and high resilience  
 d) High stability and low resilience
- 153) In the process of plant ecological succession, the final stage is: [1]  
 a) Climax community              b) Ecesis  
 c) Competition                      d) Seral stage
- 154) The missing link between reptiles and birds was: [1]  
 a) Dimetrodon                      b) Archaeopteryx  
 c) Sphenodon                        d) Dodo
- 155) Dinosaurs became extinct in: [1]  
 a) Triassic                            b) Permian  
 c) Jurassic                            d) Cretaceous
- 156) Human being belongs to the species of: [1]  
 a) Hominidae                        b) Homo habilis  
 c) Homo sapiens                      d) Homo erectus
- 157) Animal population within which interbreeding occurs is called: [1]  
 a) Genus                              b) Species  
 c) Family                              d) Class
- 158) The first human - like hominid was called: [1]  
 a) Homo erectus                      b) Ramapithecus  
 c) Homo sapiens                      d) Homo habilis
- 159) Evolution of life shows that life forms had a trend of moving from: [1]  
 a) Dryland to wet land  
 b) Land to water  
 c) Fresh water to sea water  
 d) Water to land
- 160) Find the odd one out, with respect to X - linkage: [1]  
 a) Haemophilia                      b) Myopia  
 c) Night blindness                  d) Nephritis
- 161) Occurrence of cell containing multiples of  $2n$  genomes in diploid organisms is known as: [1]  
 a) Amphiploidy                      b) Endopolyploidy  
 c) Aneuploidy                        d) Alloploidy
- 162) A disease caused by an autosomal primary non - disjunction is [1]  
 a) Down's syndrome  
 b) Klinefelter's syndrome  
 c) Turner's syndrome  
 d) Sickle cell anaemia
- 163) Double lines in a pedigree analysis show: [1]  
 a) Normal mating  
 b) Sex unspecified  
 c) Consanguineous marriage  
 d) Unaffected offspring
- 164) Barr body of a mammal represents: [1]  
 a) One of the two X - chromosomes in somatic cells of female  
 b) The Y chromosome in the somatic cells of male  
 c) All heterochromatin in female cells  
 d) All heterochromatin in male and female cells
- 165) What is commonly called mobile genetic elements? [1]  
 a) Plasmids                            b) Transposes  
 c) RNA                                 d) VNTRs
- 166) The first transgenic cow is: [1]  
 a) Rosie                                b) Rama  
 c) Anandi                              d) Nandi
- 167) The methods involved in HGP have two major approaches, one approach focused on identifying all the genes that expressed as RNA called as Expressed sequence tags the other one is \_\_\_\_\_. [1]  
 a) DNA automation  
 b) Expressed sequence study  
 c) Sequence annotation  
 d) DNA profiling
- 168) Cancer cells are damaged by radiations while others are not because cancer cells are: [1]  
 a) Hydrolysis  
 b) Undergoing rapid divisions  
 c) Different in nature  
 d) Starved
- 169) Excretory pore of *Ascaris* is present: [1]  
 a) Behind the mouth  
 b) In the middle of the body  
 c) On the dorsal side  
 d) On the posterior end
- 170) Colostrum is rich in: [1]  
 a) IgA                                  b) IgZ  
 c) IgF                                  d) IgD
- 171) Which one of the following is the vector of chikungunya disease? [1]  
 a) House fly                            b) Anopheles mosquito  
 c) Culex mosquito                      d) Aedes mosquito
- 172) G - 6 - P dehydrogenase deficiency is associated with haemolysis of: [1]  
 a) Platelets                            b) RBCs  
 c) Leucocytes                         d) Lymphocyte
- 173) Marijuana, hashish, charas, and ganja are known for their effects on: [1]  
 a) The digestive system of the body  
 b) The cardiovascular system of the body  
 c) Reproductive system of the body  
 d) Respiratory system of the body
- 174) The human immunodeficiency virus (HIV) causes AIDS by: [1]  
 a) Depleting  $CD_4^+$  - T helper erythrocytes.  
 b) Depleting  $CD_4^-$  - T - helper lymphocytes.  
 c) Depleting  $CD_4^+$  - T - helper lymphocytes.  
 d) Increasing  $CD_4^+$  - T - helper lymphocytes.
- 175) HIV usually infects: [1]  
 a) Cytotoxic - T cells  
 b) Helper - T cells  
 c) B - lymphocytes  
 d) Cells of nervous system
- 176) Which one of the following options gives the correct matching of a disease with its causative organism and mode of infection? [1]



