SECTION - A

1. The temperature of an ideal gas is increased for 100k to 400k. If at 100k the root mean square velocity of the gas molecules is v, at 400k it becomes
(a) 4v (b) 2Vb (c) v/2 (d) v/4

2. A piece of glass is heated to a high temperature and then allowed to cool. If it cracks, a probable reason for this is
(a) low thermal conductivity of glass (b) high thermal conductivity of glass
(c) high specific heat of glass (d) high melting point of glass

3. The field of view is maximum for
(a) plane mirror (b) concave mirror (c) convex mirror (d) cylindrical mirror

4. The age of universe is believed to be
(a) 1 billion years (b) 10 billion years
(c) 10-20 billion years (d) 1000 billion years

5. If the earth stops rotating, the value of "g" at the equator will
(a) increase (b) remain same (c) decrease (d) none of the above

6. If temperature of an object is 140^0F, then its temperature in centigrade is
(a) 105 ^{0}C (b) 32 ^{0}C (c) 140 ^{0}C (a) 60 ^{0}C

7. If one sphere collides head on with another sphere of the same mass at rest inelastically. The ratio of their speeds $\left(\frac{v_2}{v_1}\right)$ after collision shall be
(a) $\frac{1-e}{1+e}$ (b) $\frac{2e}{1+e}$ (c) $\frac{1+e}{1-e}$ (d) e

8. If 150 J of heat is added to a system and the work done by the system is 110 J, then change in internal energy will be
(a) 260J (b) 150J (c) 110 J (d) 40J

9. A T.V tower has a height 100m. How much population is covered by TV broadcast, if the average population density around the tower is $1000km^{-2}$
(a) 2×10^6 (b) 4×10^6 (c) 3×10^8 (d) 9×10^4

10. A particle A suffers an oblique elastic collision with a particle B which is initially at rest. If their masses are same, then after the collision
(a) they will move in opposite directions
(b) A continues to move in the original direction while B remains at rest
(c) they will move in mutually perpendicular directions
(d) A comes to rest and B starts moving in the direction of the original motion of A

11. One likes to sit under sunshine in winter season, because
(a) we get heat from the sun by conduction (b) we get heat from the sun by convection
(c) we get heat from the sun by radiation (d) none of the above

12. On account of the earth rotating about its axis
(a) the linear velocity of objects at equator is greater than at other places
(b) the angular velocity of objects at equator is more than that of objects at poles
(c) the linear velocity of objects at all places at the earth is equal, but angular velocity is different
(d) at all places the angular velocity and linear velocity are uniform

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13. The apparent coefficient of expansion of a liquid when heated in a copper vessel is C and when heated in a silver is S. If A is the linear coefficient of expansion of copper, then the linear coefficient of expansion of silver is

(a) $\frac{C+S-3A}{3}$ (b) $\frac{C+3A-S}{3}$ (c) $\frac{S+3A-C}{3}$ (d) $\frac{C+S+3A}{3}$

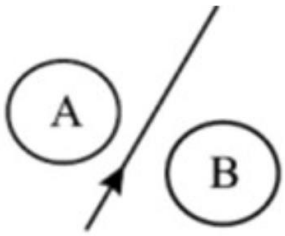
14. The ratio of the resistance of a conductor at a temperature of 15^0C to its resistance at a temperature of 37.5^0C is 4: 5. The temperature coefficient of resistance of the conductor is

(a) $\frac{1}{25}\,{}^0C^{-1}$ (b) $\frac{1}{50}\,{}^0C^{-1}$ (c) $\frac{1}{80}\,{}^0C^{-1}$ (d) $\frac{1}{75}\,{}^0C^{-1}$

15. A proton and an electron are released from an infinite distance apart and they get attracted towards each other. Which of the following statement about their kinetic energy is true?

(a) Kinetic energy of electron is more than that proton
(b) Kinetic energy of electron is less than that of proton
(c) Kinetic energy of electron=Kinetic energy of proton
(d) None of the above is true as it depends on the distance between the particles.

16. Consider the situation show in the figure. If the current I in the long straight wire as shown in the figure is increased at a steady rate then the induced EMFs in loops A and BV will be



(a) Clockwise in A, anticlockwise in B
(b) Anticlockwise in A, clockwise in B
(c) Clockwise in both A and B
(d) anticlockwise in both A and B

17. Which of the following has maximum specific heat?

(a) water (b) Alcohol (c) Glycerine (d) Oil

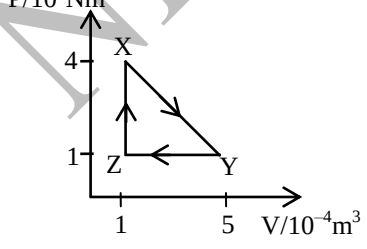
18. Choose the WRONG statement

(a) The nuclear force becomes weak if the nucleus contains too many protons compared to the number of neutrons
(b) The nuclear force becomes weak if the nucleus contains too many neutrons compared to the number of protons
(c) Nuclei with atomic number greater than 82show a tendency to disintegrate
(d) The nuclear force becomes very strong if the nucleus contains a large number of nucleons

19. A beam of metal supported at the two ends is loaded at the centre. The depression at the centre is proportional to

(a) Y^2 (b) Y (c) $\frac{1}{Y}$ (d) $\frac{1}{Y^2}$

20. A mass of an ideal gas of volume V at pressure P undergoes the cycle of changes shown in the graph –
At which point is the gas coolest and hottest?



	Coolest	hottest
(a)	X	Y
(b)	Y	X
(c)	Y	Z
(d)	Z	Y

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21. Horizontal wind is blowing with a velocity v towards north-east. A man starts running towards north with acceleration a. The time after which man will feel the wind blowing towards east is

(a) $\frac{v}{a}$ (b) $\frac{\sqrt{2}\,v}{a}$ (c) $\frac{v}{\sqrt{2}\,a}$ (d) $\frac{2\,v}{a}$

22. If the phase difference between two waves of the same frequency is 2π during superposition, then the resultant amplitude is

(a) maximum (b) minimum (c) maximum or minimum (d) none of the above

23. An electron dipole of length 2cm is placed with its axis making an angle of 30^0 to a uniform electric field 10^5 NC^{-1}. If it experiences a torque of $10\sqrt{3}N$, then potential energy of dipole is

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

24. De Broglie wavelength of 0.05eV thermal neutron is

(a) 1.3 A^0 (b) 2 A^0 (c) 5.4 A^0 (d) 8 A^0

25. An unknown tuning fork when sounded together with a tuning fork of frequency 256Hz emits two beats. On loading the tuning fork of frequency 256 Hz, the number of beats heard is 1 per second. The frequency (in Hz) of the unknown tuning fork is

(a)257 (b) 258 (c) 256 (d)254

26. The volume of a gas at 20^0C is 200 ml. If the temperature is reduced to -20^0C at constant pressure, its volume will be

(a) 172.6ml (b) 17.26 ml (c) 192.7 ml (d) 19.27 ml

27. Number of nuclei of a radioactive substance at time t=0 are 1000 and 900 at time t=2s. Then number of nuclei at time t=4s will be

(a) 800 (b) 810 (c) 790 (d)700

28. When a sound wave of frequency 300 Hz passes through a medium the maximum displacement of a particle of the medium is 0.1cm. The maximum velocity of the particle is equal to

(a) $60\pi\ cms^{-1}$ (b) $30\pi\ cms^{-1}$ (c)$30\ cms^{-1}$ (d) $60\ cms^{-1}$

29. A circular disc A of radius r is made from a iron plate of thickness t and another circular disc B of radius 4r is made from an iron plate of thickness t/4. The relation between the moments of inertia I_A and I_B is

(a) $I_A > I_B$ (b) $I_A = I_B$ (c) $I_A < I_B$ (d) depends on the actual values of t and r

30. A particle executing SHM of amplitude 4cm and T=4s. The time taken by it to move from positive extreme position to half of the amplitude is

(a) 1 s (b) 1/3 s (c) 2/3 s (d) $\sqrt{\frac{3}{2}}\,s$

31. A force of 100 dyne acts on a mass of 5g for 10s. The velocity produced is

(a) 2 cm s^{-1} (b) 20 cm s^{-1} (c) 200 cm s^{-1} (d) 2000 cm s^{-1}

32. 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, the work required to pull the hanging part on to the table is

(a) MgL (b) $\frac{MgL}{3}$ (c) $\frac{MgL}{9}$ (d) $\frac{MgL}{18}$

33. The velocity of kerosene oil in a horizontal pipe is 5ms^{-1}. If g=10ms^{-2}, then the velocity head of oil will be

(a) 1.25m (b) 12.5m (c) 0.125m (d) 125m

34. When p calories of heat is given to a body, it absorbs q calories. Then the absorption power of body will be

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(a) $\frac{p}{q}$ (b) $\frac{q}{p}$ (c) $\frac{q^2}{p^2}$ (d) $\frac{p^2}{q^2}$

35. At time t s, a particle of mass 3 kg has position vector $\vec{r} = \left(3t\hat{i} - 4\cos t\ j\right)$ m. The impulse of the force during the time interval $0 \le t \le \frac{\pi}{2}$ is

(a) $12\hat{j}$ *Ns* (b) $9\hat{j}$ *Ns* (c) $4\hat{j}$ *Ns* (d) $14\hat{j}$ *Ns*

Section -B

36. Two spheres of the same radius are made from the same material. One is hollow and the other is solid, if they are heated together from 20^0C to 100^0C

(a)both will expand equally
(b) hollow sphere will expand more
(c) solid sphere will expand more
(d) the relative expansion of solid and hollow sphere depends on the material of sphere

37. If specific heat of a substance is infinite, it means

(a) heat is given out
(b) heat is taken in
(c) no change in temperature takes place whether heat is taken in or given out
(d) all of the above

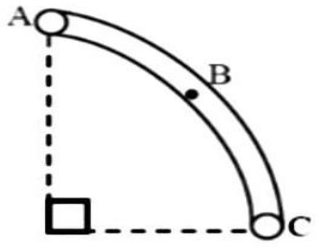
38. If an electron enters into a space between the plates of a parallel plate capacitor at an angle α with the plates and leaves at an angle β to the plates. The ratio of its kinetic energy while entering the capacitor to the while leaving will be

(a) $\left(\frac{\sin\beta}{\sin\alpha}\right)^2$ (b) $\left(\frac{\cos\beta}{\cos\alpha}\right)^2$ (c) $\left(\frac{\cos\alpha}{\cos\beta}\right)^2$ (d) $\left(\frac{\sin\alpha}{\sin\beta}\right)^2$

39. A force F=$\left(5\hat{i}+3\hat{j}\right)$ N is applied over a particle which displaces it from its origin to the point r = $\left(2\hat{i} - 1\hat{j}\right)$ m. The work done on the particle is

(a) -7J (b) +13J (c) +7J (d) +11J

40. The tube AC forms a quarter circle in a vertical plane. The ball B has an area of cross-section slightly smaller than that of the tube and can move without friction



(a) Always be in contact with the inner wall of the tube
(b) always be in contact with the outer wall of the tube
(c) initially be in contact with the inner wall and later with the outer wall
(d) initially be in contact with the outer wall and later with the inner wall.

41. Four rods each of length 1 have been hinged to form a rhombus. Vertex A is fixed to rigid support, vertex C is being moved along the x-axis with constant velocity v as shown in the figure. The rate at which vertex B is approaching the x-axis at the moment the rhombus is in the form of a square is

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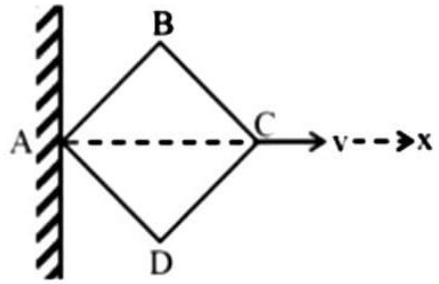


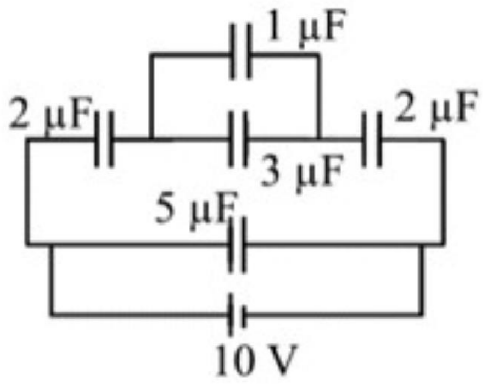
(a) $\frac{v}{4}$

(b) $\frac{v}{3}$

(c) $\frac{v}{2}$

(d) $\frac{v}{\sqrt{2}}$

42. The ratio of potential differences between $1\mu F$ and $5\mu F$ capacitors is



(a) 1 : 2

(b) 3 : 1

(c) 1 : 5

(d) 10 : 1

43. The thermal conductivity of a material in the CGS system is 0.4. In steady-state, the rate of flow of heat 10 cal $s^{-1}cm^{-2}$, then the thermal gradient will be

(a) $10^0C\ cm^{-1}$ (b) $12^0C\ cm^{-1}$ (c) $25^0C\ cm^{-1}$ (d) $20^0C\ cm^{-1}$

44. In the glass capillary tube , the shape of the surface of the liquid depends upon

(a) Only on the cohesive force of liquid molecules
(b) only on the adhesive force between the molecules of glass and liquid
(c) Only on relative cohesive and adhesive force between the atoms
(d) neither on cohesive nor on adhesive force

45. Magnetic susceptibility of a diamagnetic substance

(a) decreases with temperature (b) is not affected by temperature
(c) increases with temperature (d) first increases then decreases with temperature

46. The maximum velocity of electrons emitted from a metal surface is v when the frequency of light failing on it is f. The maximum velocity when the frequency becomes 4f is

(a) 2v (b)>2v (c) <2v (d) between 2v and 4v

47. A flux of 1mWb passes through a strip having an area $A=0.02m^2$. The plane of the strip is at an angle of 60^0 to the field

(a) 0.01T (b) 0.058 T (c) 4.0mT (d) none of the above

48. A big ball of mass M, moving with velocity u strikes a small ball of mass m, which is at rest. Finally small ball attains velocity u and big ball v. Then what is the value of v

(a) $\frac{M-m}{M+m}u$ (b) $\frac{m}{M+m}u$ (c) $\frac{2m}{M+m}u$ (d) $\frac{M}{M+m}u$

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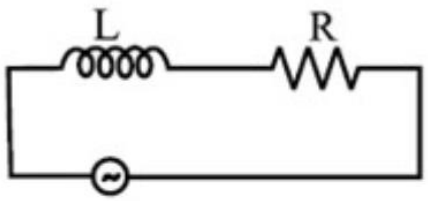
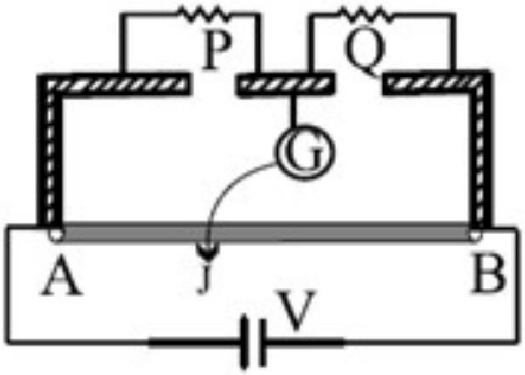
49. When a material is inserted inside the inductor the current in the circuit increases, then the nature of the material is



(a) ferromagnetic (b) paramagnetic (c) diamagnetic (d) all of the above

50. In a meter bridge circuit as shown in the figure, The bridge is balanced when Aj=20cm. On interchanging P and Q the balance length shifts by



(a) zero (b) 80cm (c) 40 cm (d) 60cm

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1. Which of the following represents a biliquidpropellant?
(a) Liquid N_2O_4 + unsymmetrical dimethylhydrazine (UDMH)
(b) Liquid N_2O_4 + acryclic rubber
(c) Nitroglycerine + nitrocellulose
(d) Polybutadiene + ammonium perchlorate

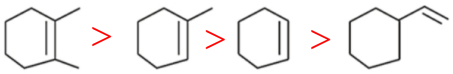
2. Dehydration of cyclopentyl carbinol with conc. H_2SO_4 forms

(a) Cyclopentene (b) Cyclohexene (c) Cyclohexane (d) none of these

3. Which of the following is incorrect order?

1) $CH_3^- > CH_3O^- > HO^- > H_2O$
(Nucleophilicity in protic solvent)

2) $Cl^- > CH_3COO^- > CH_3O^- > NH_2^-$
(Leaving group ability)

3) 
Stability of alkane

4) $CH_3 - CH_2 - F > CH_3 - CH_2 - Cl > CH_3 - CH_2 - Br > CH_3 - CH_2 - I$
(Boiling point)

4. Out of the following reactions

I. $NH_4NO_3 \xrightarrow{\Delta} N_2O + 2H_2O$ II. $NH_4NO_2 \xrightarrow{\Delta} N_2 + 2H_2O$

III. $PCl_5 \xrightarrow{\Delta} PCl_3 + Cl_2$

Disproportionation is not shown in
(a) I and II (b) II and III (c) I and III (d) I, II and III

5. The reaction, $2RCHO \xrightarrow{Al-ethoxide} RCOOCH_2R$ is called

(a) Tishchenko reaction (b) Knoevangel reaction
(c) Cannizzarrro reaction (d) HVZ reaction

6. The compound $(SiH_3)_3N$ is expected to be

(a) pyramidal and more basic than $(CH_3)_3N$ (b) planar and less basic than $(CH_3)_3N$
(c) pyramidal and less basic than $(CH_3)_3N$ (d) planar and more basic than $(CH_3)_3N$

7. When 3 mole of *A* and 1 mole of *B* are mixed in 1 *litre* vessel the following reaction takes place $A_{(g)} + B_{(g)} \rightleftharpoons 2C_{(g)}$. 1.5 moles of *C* are formed. The equilibrium constant for the reaction is
(a) 0.12 (b) 0.25 (c) 0.50 (d) 4.0

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8. In any chemical reaction, equilibrium is supposed to be establish when
(a) Mutual opposite reactions undergo
(b) Concentration of reactants and resulting products are equal
(c) Velocity of mutual reactions become equal
(d) The temperature of mutual opposite reactions become equal

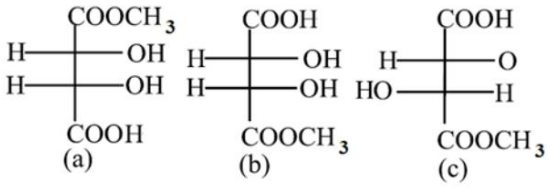
9. Which of the following will not form when $NaHCO_3$ solution is added to aqueous $FeCl_3$ solution?
(a) CO_2 (b) $Fe(OH)_3$ (c) $Fe(HCO_3)_3$ (d) $NaCl$

10. Among the complex ions given below which is/are outer – orbital's complex
I) $[Co(CN)_6]^{4-}$ II) $[Fe(H_2O)_6]^{+2}$ III) $[FeF_6]^{3-}$ IV) $[CoF_6]^{3-}$
(a) II, III, IV (b) II, III only (c) I, IV only (d) II only

11. In the reversible reaction $A + B \rightleftharpoons C + D$, the concentration of each C and D at equilibrium was 0.8 mole/litre, then the equilibrium constant K_c will be
(a) 6.4 (b) 0.64 (c) 1.6 (d) 16.0

12. Finkelstein reaction
(a) $2CH_3CH_2Cl + Ag_2O(dry) \rightarrow CH_3CH_2OCH_2CH_3 + 2AgCl$
(b) $CH_3CH_2Br + NaI \xrightarrow{Acetone} CH_3CH_2I + NaBr$
(c) $CH_3CH_2Br + Ag_2O(\text{moist}) \rightarrow CH_3CH_2OH \rightarrow AgBr$
(d) $CH_3CH_2Cl + NaOCH_3 \rightarrow CH_3CH_2OCH_3 + NaCl$

13. The correct statements about the compounds a,b and c is/are –



(a) a and b are identical (b) a and b are diastereomers
(c) a and c are enantiomers (d) a and b are enantiomers

14. A certain weak acid has a dissociation constant 1.0×10^{-4}. The equilibrium constant for its reaction with a strong base is :
(a) 1.0×10^{-4} (b) 1.0×10^{-10} (c) 1.0×10^{-14} (d) 1×10^{10}

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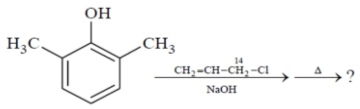
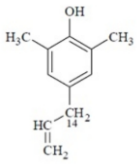
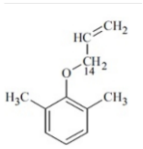
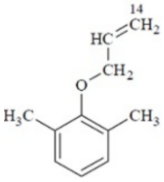
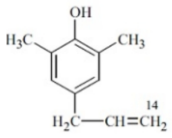
15.



What is the missing product?

(a)  (b)  (c)  (d) 

16. E^0 of $Fe^{2+}/Fe = -0.44V, E^0$ of $Cu^{+2}/Cu = 0.34\,V$. Then in the cell

(a) Cu^{2+} Oxidizes Fe (b) Fe^{2+} Oxidizes Cu (c) Cu Reduces Fe^{2+} (d) Fe Reduces Cu^{2+}

17. For tetrahedral co – ordination the radius ratio $\left(r^+/r^-\right)$ should be –

(a) 0.414 – 0.732 (b) > 0.732 (c) 0.156 – 0.225 (d) 0.225 – 0.414

18. Sodium extract of an organic substance gives a blood red color with $FeCl_3$. It contains the elements

(a) N (b) S (c) N & S both (d) N or S

19. If $\Delta_0 < P$, the correct electronic configuration for d^4 system will be

(a) $t_{2g}^4 e_g^0$ (b) $t_{2g}^3 e_g^1$ (c) $t_{2g}^0 e_g^4$ (d) $t_{2g}^2 e_g^2$

20. Boron has an exceptionally high melting point in the group 13th elements, because

(a) boron has the smallest size in the group (b) boron atoms are joined by Vander Waals force
(c) boron is covalent solid (d) boron has higher ionization energy

21. The stability of lyophilic colloid is due to which of the following

(a) charge on their particles (b) large size of their particles
(c) small size of their particles (d) salvation by dispersion medium

22. Hydrogen is

(a) electropositive (b) electronegative
(c) both electropositive as well as electronegative
(d) neither electropositive nor electronegative

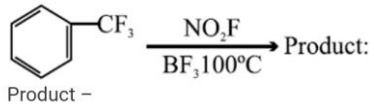
23. In the Cannizzaro reaction given below - $2Ph-CHO \rightarrow Ph-CH_2OH + PhCOO^-$ in the presence of OH^- the slowest step is –

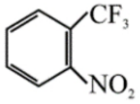
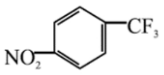
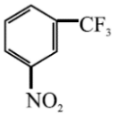
(a) The attack of OH^- at the carbonyl group (b) The transfer of hydride to the carbonyl group

Space for rough worlk

(c) The abstraction of proton form the carboxylic group (d) the deprotonation of $pH-CH_2OH$

24.



(a)  (b)  (c)  (d) Both 'A' and 'B'

25. A compound (C_5H_8) reacts with ammonical $AgNO_3$ to give a white precipitate and reacts with excess of $KMnO_4$ (hot alkaline) solution to give $(CH_3)_2CH-COOH$. The compound is

(a) $CH_2=CH-CH=CH-CH_3$ (b) $(CH_3)_2CHC\equiv CH$

(c) $CH_3(CH_2)_2C\equiv CH$ (d) $(CH_3)_2C=C-CH_2$

26. Two solutions of a substance (non – electrolyte) are mixed in the following manner. 480 ml of 1.5 M(first solution)+520 mL of 1.2 M (second solution). What is the molarity of the final mixture?

(a) 1.50 M (b) 1.20 M (c) 2.70 M (d) 1.344 M

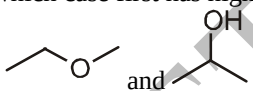
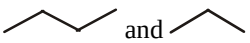
27. The rate of esterification of acetic acid with methyl alcohol (I), ethyl alcohol (II), isopropyl alcohol (III) and tertiary butyl alcohol (IV) follows in the order

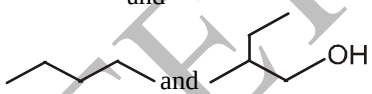
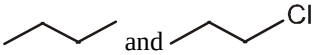
(a) I>II>III>IV (b) IV>III>II>I (c) II>I>IV>III (d) III>IV>I>III

28. XeF_6 on complete hydrolysis gives

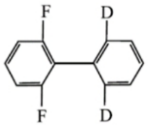
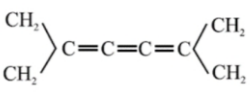
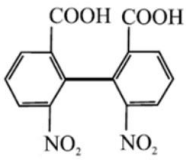
(a) $XeOF_2$ (b) XeO_2 (c) XeO_3 (d) None of these

29. In which case first has higher melting point than second?

(a)  (b) 

(c)  (d) 

30. Which of the following is optically active substance?

(a)  (b)  (c)  (d) Both (A) and (B)

31. Benzyl alcohol and sodium benzoate is obtained by the action of sodium hydroxide on benzaldehyde. This reaction is known as

(a) Perkin's reaction (b) Cannizzaro's reaction

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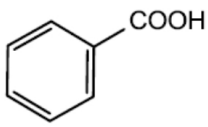
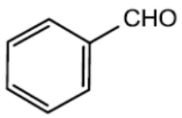
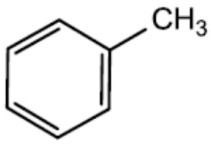
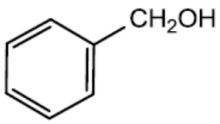
(c) Sandmeyer's reaction (d) Claisen condensation

32. The reactant (X) in the reaction, $(X) \xrightarrow[(CH_3CO)_2O]{CH_3COONa}$ Cinnamic acid is

(a) 

(b) 

(c) 

(d) 

33. Which one is incorrect statement?

(a) He is used in gas cooled nuclear reactors

(b) He is used as a cryogenic agent for carrying out experiments at low temperature

(c) He is used to produce and sustain powerful super conducting magnets

(d) He is used to fill gas balloons instead of H_2 because it is lighter than H_2 and non – inflammable

34. The total volume of dry gaseous products at STP, when 3 moles of electrons are transferred from anode to cathode in the electrolysis of water is : (volume of gas a STP = 22.4 L)

(a) 67.2 L (b) 50.4 L (c) 44.8 L (d) 56.0 L

35. Match List I with List II

	List – I		**List – II**
A)	Cyanide process	1	Ultrapure Ge
B)	Froth Floatation process	2	Pine oil
C)	Electrolytic reduction	3	Extraction of Al
D)	Zone refining	4	Extraction of Au

(a)(A) – ((C); (B) – ((A); (C) – ((D); (D) – ((B) (b)(A) – ((D); (B) – ((B); (C) – ((C); (D) – ((A)

(c)(A) – ((C); (B) – ((B); (C) – ((D); (D) – ((A) (d)(A) – ((D); (B) – ((A); (C) – ((C); (D) – ((B)

SECTION B

36. Arrange the following in order of decreasing number of unpaired electrons :

I: $\left[Fe(H_2O_6)\right]^{2+}$ II: $\left[Fe(CN)_6\right]^{3-}$ III: $\left[Fe(CN)_6\right]^{4-}$ IV: $\left[Fe(H_2O)_6\right]^{3+}$

(a) IV, I, II, III (b) I, II, III, IV (c) III, II, I, IV (d) II, III, I, IV

37. A co – ordination complex of cobalt has molecular formula containing five ammonia molecules, one nitro group and two chlorine atoms for one cobalt atom. One mole of this compound produces three mole ions in an aqueous solution. In reacting this solution with excess of silver nitrate solution, two moles of $AgCl$ get precipitated. The ionic formula of this complex would be –

(a) $\left[Co(NH_3)_4.NO_2Cl\right].\left[(NH_3)Cl\right]$ (b) $\left[Co(NH_3)_5.Cl\right].\left[Cl(NO_2)\right]$

(c) $\left[Co(NH_3)_5(NO_2)\right]Cl_2$ (d) $\left[Co(NH_3)_5\right]\left[(NO_2)_2Cl_2\right]$

38. The structural formula of isopropyl carbinol is

(a) $(CH_3)_2CHOH$ (b) $CH_3-CHOH-CH_2-CH_3$

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(c) $(CH_3)_2 CH.CH_2OH$ (d) $(CH_3)_2 COH$

39. Minamata disease is due to pollution of

(a) organic waste into drinking water (b) oil spill in water

(c) industrial waste mercury into fishing water (d) Arsenic into the atmosphere

40. A greenish yellow gas reacts with an alkali metal hydroxide to form a halite which can be used in fireworks and safety matches. The gas and halides respectively are

(a) $Br_2, KBrO_3$ (b) $Cl_2, KClO_3$ (c) $I_2, NaIO_3$ (d) $Cl_2, NaClO_3$

41. Which one of the following statements is false?

(a) Raoult's law states that the vapour pressure of a component over a solution is proportional to its mole fraction in solution.

(b) The osmotic pressure (π) of a solution is given by the equation $\pi = iCS\,T$ where M is the molarity of the solution.

(c) The correct order of osmotic pressure for 0.01 M aqueous solution of each compound is $BaCl_2 > KCl > CH_3COOH >$ sucrose

(d) none of these

42. The furnace which gives the highest temperature is

(a) Blast furnace (b) reverberatory furnace (c) electrical funace (d) muffle furnace

43. 2, 2 – dichloro propane on hydrolysis yields

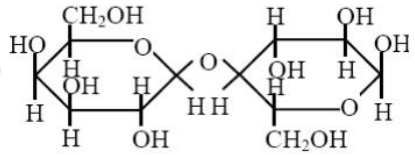
(a) Acetone (b) 2, 2 –Propane diol (c) Isopropyl alcohol (d) Acetaldehyde

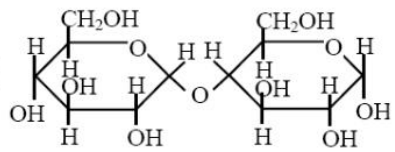
44. The IUPAC name $C_6H_5 - \underset{\displaystyle C_6H_5}{\underset{|}{CH}} - CH_2 - CCl_3$ is

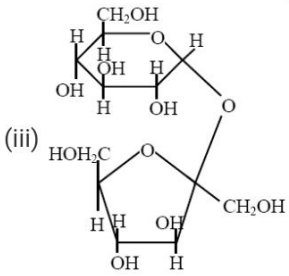
(a) 1,1,1 – trichloro – 3,3 – diphenyl propane (b) 1,1 – diphenyl – 3,3,3 – trichloro propane

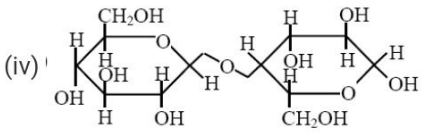
(c) Both 1 and 2 (d) None of these

45. Which of the following are non – reducing sugars

(i) 

(ii) 

(iii) 

(iv) 

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

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46. Fixed volume of 0.1 M benzoic acid solution is added into 0.2 M sodium benzoate solution and formed a 300 ml, resultant acidic buffer solution. If pH of this buffer solution is 4.5 then find added volume of benzoic acid – (Given : pK_a benzoic acid = 4.(b)

(a) 100 ml (b) 150 ml (c) 200 ml (d) None of these

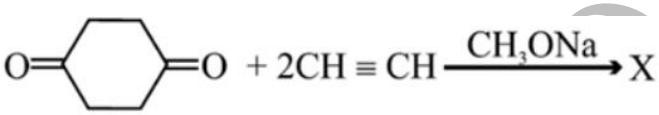
47. An unknown compound A dissociates at 500^0C to give products as follows - $A(g) \rightleftharpoons B(g)+C(g)+D(g)$ Vapour density of the equilibrium mixture is 50 when it dissociates to the extent to 10%. What will be the molecular weight of compound A –

(a) 120 (b) 130 (c) 134 (d) 140

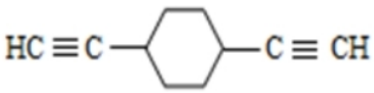
48. Three lines are drawn from a single corner of an FCC unit cell to meet the other corner such that they are found to pass through exactly – 1 – Octahedral void only, no voids Octahedral void only. Identify the line in the same order

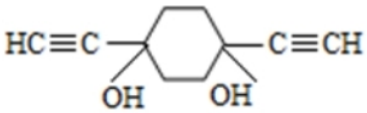
(a) Edge, Face diagonal, Body diagonal
(b) Face diagonal, Edge Body diagonal
(c) Body diagonal, Face diagonal Edge
(d) Edge, Body diagonal, Face diagonal

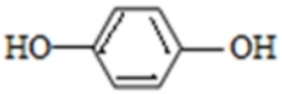
49. Identify the product in the following reactions :



(a) 

(b) 

(c) 

(d) 

50. Dissociation of phosphorus pentachloride is favoured by

(a) High temperature and high pressure
(b) High temperature and low pressure
(c) Low temperature and low pressure
(d) Low temperature and high pressure

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1. DNA probes are used in human for
   (a) Disease diagnosis (b) Disease control (c) Disease resistance (d) Disease tolerance

2. One of the following is not a threat to life
   (a) Biopollutants (b) Ionosphere (c) Nuclear blast (d) Deforestation

3. Wheat & henbane are : -
   (a) SDP (b) DNP (c) LNP (d) LDP

4. Seed dormancy is regulated by -
   (a) C_2H_4 (b) ABA (c) IAA (d) GA_3

5. *Ti*–plasmids are present in
   (a) *Agrobacterium* (b) *Cymbidium* (c) *Dendrobium* (d) *Syzygium*

6. Cytokinins help to produce all except-
   (a) New leaves (b) Chloroplast in leaves
   (c) Lateral shoot growth and adventitious shoot formation (d) Rooting on stem cut

7. The pre-requisite for any substance to imbibe any liquid is
   (a) affinity between absorbant and liquid (b) affinity between adsorbant and liquid
   (c) affinity between absorbant and seed (d) affinity between adsorbant and seed

8. To obtain virus - free healthy plants from a diseased one by tissue culture technique, which part/parts of the diseased plant will be taken ?

   (a) Apical meristem only (b) Palisade parenchyma
   (c) Both apical and axillary meristems (d) Epidermis only

9. When the evolution of CO2 is more than the intake of O2 , the respired substrate should be
   (a) Fatty acid (b) organic acid (c) Glucose (d) Polysaccharides

10. Prickles of Rose are
    (a) Modified leaves (b) Modified stipules (c) Exogenous in origin (d) Endogenous in origin.

11. In Ruscus, the modification is :-
    (a) Phyllode (b) Cladode (c) Offset (d) Sucker

12. According to EuroV norms level of 'S' in Diesel and Petrol should be : -
    (a) Below 50 ppm (b) Below 150 ppm (c) Below 350 ppm (d) Below 35 and 50 respectively

13. In the environment, ozone is known for its
    (a) Harmful effects (b) Useful effects (c) Both (a) and (b) (d) Inert nature

14. World summit on sustainable Development (2002) was held in: -
    (a) Argentina (b) South Africa (c) Brazil (d) Sweden

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15. Respiration in plants
(a) Occurs only during day (b) Results in the formation of vitamins
(c) Occurs both during day and night (d) Often requires CO2

16. Among bryophytes, which plant contains simplest and most primitive sporogonium
(a) *Riccia* (b) *Marchantia* (c) *Pellia* (d) *Funaria*

17. Which hormone promotes female flowers in cucumber –
(a) ABA (b) C_2H_4 (c) GA_4 (d) GA3

18. Which is called as living fossil
(a) *Ginkgo* (b) *Cycas* (c) *Metasequoia* (d) All the above

19. Which of the following is wrongly matched in the given table?

	Microbe	Product	Application
(a)	*Trichoderma polysporum*	Cyclosporin A	immunosup - pressive drug
(b)	*Monascus purpureus*	Statins	lowering of blood cholesterol
(c)	*Streptococcus*	Streptokinase	removal of dot from bloodvessel
(d)	*Clostridium butylicum*	Lipase	removal of oil stains

20. What is the sudden growth in very reduced stem in biennials called
(a) Bolting (b) Cell elongation (c) Internode elongation (d) None of the above

21. If a cross is made between two individuals each having genotype Bb, two offsprings are obtained. Out of these first has dominant trait. What is the probability that the second offspring will exhibit recessive trait
(a) 1/4 (b) 100 (c) Zero (d) 3/4

22. Identify *A*, *B*, *C* and *D* in the given figure and choose the correct option accordingly.

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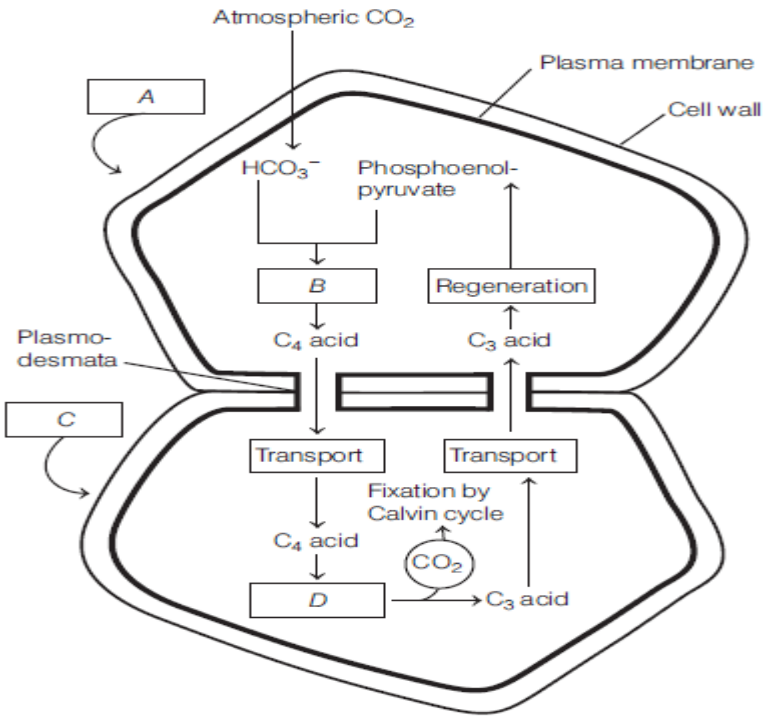

(a) A–Mesophyll cell, B–Fixation, C–Bundle sheath cell, D–Decarboxylation
(b) A–Mesophyll cell, B–Decarboxylation, C–Bundle sheath cell, D–Fixation
(c) A–Chloroplast, B–Decarboxylation, C–Bundle sheath cell, D–Fixation
(d) A–Chloroplast, B–Fixation, C–Bundle sheath cell, D–Fixation

23. According to Campbell, Pteridphytes evolved from
(a) Bryophytes (b) Algae (c) Gymnosperms (d) Independently

24. The branched sclereids present in hydrophytes are
(a) osteosclereids (b) trichosclereids (c) macrosclereids (d) astrosclereids.

25. Rachel Carson's famous book "Silent Spring" is related to : -
(a) Noise pollution (b) Population explosion (c) Ecosystem management (d) Pesticide pollution

26. Water from the soil enters in to the root hairs on account of :-
(a) Turgor pressure (b) Suction pressure or DPD (c) Atmospheric pressure (d) Osmotic pressure

27. What is true about phytochrome
(a) P_r absorbs red light and becomes P_{fr} (b) P_r absorbs yellow light and becomes P_{fr}
(c) P_{fr} absorbs yellow light and becomes P_r (d) P_{fr} absorbs red light and becomes P_r

28. The process which brings about entry of water into seed coat when seeds are placed in water for germination is
(a) Diffusion (b) Osmosis (c) DPD (d) Imbibition

29. Choose the correct sequence of microbes involved in biogas production –
(a) Fragmentative microbes, decomposers methanogens
(b) Decomposers, methanogens, putrefying microbes
(c) Putrefying microbes, methanogens, saprophytic microbes
(d) Decomposers fermentative microbes, methanogens

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30. Natural cell division inducing factor occurs in
(a) Coconut milk (b) Immature maize seeds (c) Both (a) and (b) (d) Heated t - RNA

31. Bordered pits are elongated transversely and arranged in vertical series. The pattern is known
(a) Scalariform pitting (b) Intervascular pitting (c) Reticulate thickening (d) Oblique pitting

32. Which of following plant cells are without vacuoles without nuclei and are dead -
(a) Cambium cells (b) Xylem vessels (c) Root hairs (d) Companion cells

33. The gas responsible for puffing-up appearance of dough comes from –
(a) Aerobic respiration (b) Fermentation (c) Photosynthesis (d) Photorespiration

34. Crop cultivation was first started in
(a) Nile river valley (b) Chinese river valley (c) Northern plains of India (d) All of the above

35. When a plant cell is placed in a hypotonic solution, which of the following will not apply ?
(a) Wall pressure is decreased (b) The cell become turgid
(c) Suction pressure of the cell sap will decrease (d) Water potential of the cell sap will increase

Section B

36. Mutations are caused due to
(a) Radioactive mutagens (b) Chemical mutagens (c) Radiation mutagens (d) Change in base sequence

37. Which is incorrect – (i) ABO blood groups are controlled by the gene I (ii) Gene I has four alleles (iii) IA and IB produce same type of sugar (iv) i or I° produce different type of sugar (v) IA and IB are incomplete dominant
(a) i, ii (b) v, ii (c) ii, iii, iv (d) ii, iii, iv, v

38. When secondary growth in thickness is initiated in a dicot root, which of the following happens first
(a) Portion of conjunctive parenchyma present below the phloem bundle forms cells of vascular cambium
(b) Portion of pericycle above the protoxylem becomes meristematic and forms vascular cambial cells
(c) Both
(d) Cambial initials between the xylem and phloem divide

39. Photosynthesis is
(a) Oxidative, exergonic, catabolic (b) Redox-reaction, endergonic, anabolic
(c) Reductive, exergonic, anabolic (d) Reductive, endergonic, catabolic

40. Flower is complete when it has
(a) Calyx, corolla, androecium and gynoecium (b) Calyx and corolla
(c) Androecium and gynoecium (d) Corolla, androecium and gynoecium

41. A man and woman are both affected by vitamin D resistance rickets, which is a dominant sex-linked allele. All of the female offsprings of this couple are affected with rickets but some of the male offsprings are not. What are the genotypes of the parents?
(a) Both are homozygous for the trait.
(b) The woman has two dominant alleles and man has one dominant allele.
(c) Both parents have only recessive alleles.

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(d) Each parent has only one dominant allele.

42. Glycolysis is present in :-
(a) Plants and animal only. (b) Plants, animals and fungi only.
(c) Animals only. (d) All living organisms.

43. Choose the correct option for uptake of mineral ions.
(a) Unlike water, all minerals cannot be passively absorbed by roots
(b) Most of the minerals enter the root by active transport
(c) Ions are absorbed from soil by both passive and active transport
(d) All of the above

44. Which of the following is the phosphorylating unit
(a) Oxysome (b) Mesosome (c) Peroxisome (d) Mitochondria

45. The process of conversion of $NH_4 \rightarrow NO_2 \rightarrow NO_3$ is called –
(a) Ammonification (b) Nitrification (c) N_2 fixation (d) Denitrification

46. Two main components that determine water potential are
(a) pressure gradient minus water potential (b) solute potential and pressure potential
(c) evaporation of water from stem and leaves (d) the overall movement of solutes

47. The cambium which produces cork is known as
(a) Phelloderm (b) Phellogen (c) Periblem (d) Periderm

48. Major pollutant present in the jet plane emission is
(a) CCl_4 (b) SO_2 (c) SO_3 (d) fluorocarbon

49. Match the column

Column I	**Column II**
(A) Pusa komal	(i) White rust
(B) Himgiri	(ii) Bacterial blight
(C) Brassica	(iii) Yellow mosaic virus
(D) Parbhani kranti	(iv) Leaf and stripe rust

(a) A – II, B – IV, C – I, D – III (b) A – I, B – II, C – III, D – IV
(c) A – IV, B – I, C – III, D – II (d) A – IV, B – III, C – II, D – I

50. Go through the following facts –
I. The pressure that is produced by swelling of wood had been used by prehistoric man to split rocks and boulders
II. The seedling is able to come out of soil due to development of a pressure. This pressure is –
(a) O.P. (b) T.P. (c) I.P. (d) Ψ_5

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Section-A

01. First step in digestion of fat is -
(a) Emulsification (b) Enzyme action
(c) Absorption by lacteals (d) Storage in adipose tissue

02. A living organism can be exceptionally differentiated from a nonliving thing on the basis of its ability for –
(a) Reproduction (b) Growth and movement
(c) Responsiveness to touch (d) Interaction with environment and progressive evolution

03. How many types of gametes will be produced by individuals of AABbcc genotype?
(a) Two (b) Four (c) Six (d) Nine

04. Prostate glands in earthworm are present in segments
(a) 16 to 25 (b) 17 t0 20 (c) 20 - 25 (d) 25 – 30

05. Which one is correct summary equation of nitrogen fixation?
(a) $N_2 + 8e^- + 8H^+ + 8ATP \rightarrow NH_3 + H_2 + 16ADP + 16P_1$ (b) $2NH_3 + 40_2 \rightarrow 2H^+ + 2H_2O + 2NO_3^-$
(c) $N_2 + 8e^- + 8H^+ + 16ATP \rightarrow 2NH_3 + H_2 + 16ADP + 16P_1$ (d) $2NH_3 + 3O_2 \rightarrow 2NO_2^- + 2H^+ + 2N_2O$

06. The fixation of nitrogen in the root nodules is an example of –
(a) Associative symbiosis (b) Obligatory symbiosis
(c) Non-symbiotic N_2-fixation (d) Phyllosphere association

07. A person suffering from diabetes insipidus will pass what amount of urine per day
(a) 1 litre (b) $\frac{1}{2}$ litre (c) 3 litres (d) 1.5 litres

08. Most of the mineral nutrients required by plants are absorbed by the root cells by the process –
(a) Phagocytosis (b) Passive transport (c) Active transport (d) Osmosis

09. Identify the true statements from below -
I. Father of taxonomy is John Ray II. Homo sapiens is the scientific name of man
III. A taxon is a group of related plants or animals. IV. Basic unit or lowest taxonomic category is species.
V. The first step in taxonomy is naming. VI. Modern classification is based on phylogeny
VII. First time binomial nomenclature was written in latin
VIII. The number of species that are known and described, range between 1.7 – 1.8 million
(a) I, II, III and IV (b) II, IV, VI, VII and VIII
(c) I, III, V and VI (d) II, III, V and VI

10. All eukaryotic unicellular organisms belong to
(a) Monera (b) Fungi (c) Protista (d) Bacteria

11. 'Modern synthetic theory of evolution' is the result of -
(a) A union of ideas from several biological specialties (b) Darwin (c) Mendel d) Stebbins

12. Which of the following statements is false?
I. Outer cortex and inner medulla are the two zones in kidney II. Medulla is divided into about renal pyramids
III. Pyramid projects into calyx IV. Inwards extension of cortex between the pyramids is called renal column of Bertini.
(a) I and IV (b) II and IV (c) IV (d) None

13. Diseases are broadly grouped into infectious and non – infectious diseases. In the list given below, identify the infectious diseases.
(i) Cancer (ii) Influenza (iii) Allergy (iv) Small pox
(a) ii and iv (b) i and ii (c) ii and iii (d) iii and iv

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14. Both male and female frogs have
(a) Long hindlimbs with five webbed fingers (b) Short forelimbs with four unwebbed fingers
(c) Both a and b (d) External ears

15. Find out the organism with highest life span -
(a) Tortoise (b) Horse (c) Dog (d) Fruit fly

16. Rate of hormone synthesis and secretion depends upon
(a) Functional efficiency of the feedback system (b) Amount of excitation in target tissue
(c) Degree of inhibition caused (d) Functional state of the tissue/organ

17. Diversity in the types of beaks of finches adapted to different feeding habits on the Galapagos islands, as observed by Darwin provides evidence for:
(a) Intraspecific variations (b) Interspecific competition
(c) Intraspecific competition (d) Origin of species by natural selection

18. Which of the following vertebral in adult human are fused ones?
(a) Thoracic and lumber (b) Thoracic and cervical
(c) Sacral and coccygeal (d) Cervical and coccygeal

19. Ploidy of ovary, anther, egg, pollen, male gamete and zygote are respectively -
(a) 2n, 2n, n, 2n, n, 2n (b) 2n, 2n, n, n, n, 2n
(c) 2n, n, n, n, n, n (d) 2n, 2n, n, 2n, 2n, 2n

20. If Loop of Henle were absent from mammalian nephrons, which of the following is to be expected?
(a) The urine will be more dilute (b) There will be no urine formation
(c) The urine will have more concentrated (d) There will be hardly any change in quality and quantity of urine formed

21. Plants acquire minerals from the soil by:
(a) Recyclin (b) Growing (c) Rain water (d) Soil microbes

22. Chromosomes decondense into diffuse chromatin -
(a) At the end of telophase (b) At the beginning of prophase
(c) At the end of interphase (d) At the end of metaphase

23. Tactile receptors in mammals are maximum on
(a) Body (b) Limbs (c) Face (d) Head

24. Amphibians e.g. frogs respire-
(a) Through moist skin (b) Lungs (c) Both (d) Trachea

25. Mental, foot and restricted coelom in pericardium, gonads and kidneys are the characters of
(a) Arthropoda (b) Annelida (c) Mollusca (d) Echinodermata

26. A person suffers punctures in his chest cavity in an accident without any damage to the lungs, its effect could be
(a) Reduced breathing rate (b) Rapid increase in breathing rate
(c) No change in respiration (d) Cessation of breathing.

27. The substance produced by a cell in viral infection that can protect other cells from further infection is.
(a) Serotonin (b) Interferon
(c) Colostrum (d) Histamine

28. The first experiment on hydrophonics was performed by
(a) Sachs (b) Knop (c) Hoagland (d) Arnon

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29. Amphibian heart is
(a) 2-chambered (b) 3-chambered (c) 4-chambered (d) 5-chambered

30. The medullary gradient is mainly caused by -
(a) Urea & K^+ (b) H^+ and K^+ (c) NaCl and Urea (d) Urea and H^+

31. Acrosome facilitates the sperm to
(a) Find an ovum (b) Swim (c) Acquire higher activity (d)Penetrate membrane of an ovum

32. Members of Hemichordata are
(a) Burrowing animals (b) Exclusively marine (c) Fresh water worms (d) Terrestrial

33. At menopause, there is rise in urinary excretion of
(a)FSH (b) STH (c) LTH (d) MSH

34. Diapause is shown by
(a) Zooplanktons (b) Frog (c) Birds (d) Snakes

35. Which of the following is cultivated through vegetative propagation -
(a) Potato and Sugarcane (b) Banana and Ginger (c) Dahlia and Rose (d) All

SECTION B

36. The nucleus of a sperm is located in its
(a) Acrosome (b) Head (c) Middle piece (d) Tail

37. In Pheretima, the glands that help in binding the worms during copulation are
(a) Prostate gland (b) Albumin glands (c) Accessory glands (d) Mucous glands

38. Which of the following match is correct ?
(a) Renin – Protein (b) Trypsin – Starch
(c) Amylase – Lactose (d) Invertase – Sucrose

39. Which of the following is first transgenic cow?
(a) Andi (b) Rosie (c) Polly (d) Lucy

40. The theory of natural selection of Darwin:
(a) Does not explain fossils (b) Is completely changed
(c) Has the first theory of organic evolution (d) Has been failed in explaining origin of variations

41. Which of the following product is formed by the action of fungi?
(a) Curd (b) Roquefort cheese
(c) Butyric acid (d) Swiss cheese

42. Fungi are classified on the basis of -
(a) Morphology of mycelium (b) Mode of spore formation
(c) Development of fruiting bodies (d) All

43. Carbohydrases are missing from
(a) Intestinal juice (b) Pancreatic juice (c) Gastric juice (d) Saliva

44. The efferent process of neuron is known as

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(a) Axon (b) Dendrites (c) Cyton (d) Neurofibrilae

45. The immunoglobulin present in mother's milk is
(a) IgD (b) IgE (c) IgM (d) IgA

46. Which of the following is natural method of contraception ?
(a) Sterilization (b) IUD (c) Diaphram (d) Periodic abstinence

47. The upper surface of the tongue has small projections, some of which bear taste buds. These projections are called
(a) Papillae (b) Taste pore
(c) Frenulus (d) Sulcus terminals

48. In cockroach, head can move in all directions due to
(a) Absence of neck
(b) Fusion of all 6 segments of head
(c) Flexible neck
(d) Head is small and light in weight

49. The arthropods do not possess
(a) True coelom (b) Exoskeleton
(c) Haemocoel (d) Malpighian body

50. Bacteria occur -
(a) In water only (b) In soil only
(c) As parasite (d) Everywhere

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