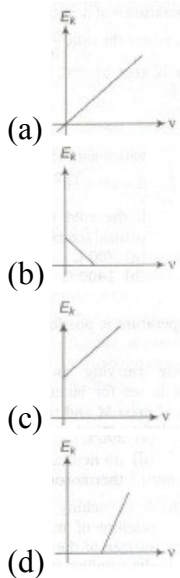


# Physics

1. The cylindrical tube of a spray pump has a cross-section of  $8 \text{ cm}^2$ , one end of which has 40 fine holes each of area  $10^{-8} \text{ m}^2$ . If the liquid flows inside the tube with a speed of  $0.15 \text{ m min}^{-1}$ , the speed with which the liquid is ejected through the holes is

- (a) 50 m/s
- (b) 5 m/s
- (c) 0.05 m/s
- (d) 0.5 m/s

2. Which one of the following graph represents the variation of maximum kinetic energy ( $E_k$ ) of the emitted electrons with frequency  $\nu$  in photoelectric effect correctly?



3. A vessel of height  $2d$  is half filled with a liquid of refractive index  $\sqrt{2}$  and the other half with a liquid of refractive index  $n$  (the given liquids are immiscible). Then, the apparent depth of the inner surface of the bottom of the vessel (neglecting the thickness of the bottom of the vessel) will be

- (a)  $n / d (n + \sqrt{2})$
- (b)  $d (n + \sqrt{2}) / n \sqrt{2}$
- (c)  $\sqrt{2} n / d (n + \sqrt{2})$
- (d)  $nd / d + \sqrt{2}n$

4. A shell of mass  $20 \text{ kg}$  at rest explodes into two fragments whose masses are in the ratio  $2 : 3$ . The smaller fragment moves with a velocity of  $6 \text{ m/s}$ . The kinetic energy of the larger fragment is

- (a) 96 J
- (b) 216 J
- (c) 144 J
- (d) 360 J

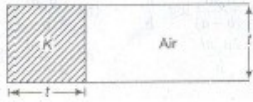
5. An electric bulb has a rated power of  $50 \text{ W}$  at  $100 \text{ V}$ . If it is used on an AC source  $200 \text{ V}$ ,  $50 \text{ Hz}$ , a choke has to be used in series with it. This choke should have an inductance of

- (a) 0.1 mH
- (b) 1 mH
- (c) 0.1 H
- (d) 1.1 H

6. In Young's double slit experiment with sodium vapour lamp of wavelength 589 nm and the slits 0.589 mm apart, the half angular width of the central maximum is

- (a)  $\sin^{-1}(0.01)$
- (b)  $\sin^{-1}(0.0001)$
- (c)  $\sin^{-1}(0.001)$
- (d)  $\sin^{-1}(0.1)$

7. A parallel plate capacitor with air as the dielectric has capacitance  $C$ . A slab of dielectric constant  $K$  and having the same thickness as the separation between the plates is introduced so as to fill one-fourth of the capacitor as shown in the figure. The new capacitance will be

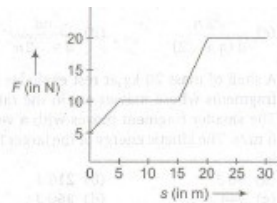


- (a)  $(K + 3) C/4$
- (b)  $(K + 2) C/4$
- (c)  $(K + 1) C/4$
- (d)  $KC/4$

8. Three concurrent coplanar forces 1 N, 2 N and 3 N acting along different directions on a body

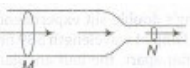
- (a) can keep the body in equilibrium if 2 N and 3 N act at right angle
- (b) can keep the body in equilibrium if 1 N and 2 N act at right angle
- (c) cannot keep the body in equilibrium
- (d) can keep the body in equilibrium in 1 N and 3 N act at an acute angle

9. The work done by a force acting on a body is as shown in the graph. The total work done in covering an initial distance of 20 m is



- (a) 225 J
- (b) 200 J
- (c) 400 J
- (d) 175 J

10. Horizontal tube of non-uniform cross-section has radii of 0.1 m and 0.05 m respectively at M and N. For a streamline flow of liquid, the rate of liquid flow is



- (a) changing continuously with time
- (b) greater at M than at N
- (c) greater at N than at M
- (d) same at M and N

11. A coil of  $n$  number of turns is wound tightly in the form of a spiral with inner and outer radii  $a$  and  $b$  respectively. When a current of strength  $I$  is passed through the coil, the magnetic field at its centre is

- (a)  $\mu_0 nI / (b - a) \log_e a/b$
- (b)  $\mu_0 nI / 2(b - a)$

- (c)  $2\mu_0 nl / b$   
 (d)  $\mu_0 nl / 2(b - a) \log_e b/a$

12. A certain vector in the xy-plane has an x-component of 4 m and a y-component of 10 m. It is then rotated in the xy-plane so that its x-component is doubled. Then, its new y-component is (approximately)

- (a) 20 m  
 (b) 7.2 m  
 (c) 5.0 m  
 (d) 4.5 m

13. A police party is moving in a jeep at a constant speed  $v$ . They saw a thief at a distance  $x$  on a motorcycle which is at rest. The moment the police saw the thief, the thief started at constant acceleration  $a$ . Which of the following relations is true if the police is able to catch the thief?

- (a)  $v^2 < ax$   
 (b)  $v^2 < 2ax$   
 (c)  $v^2 \geq 2ax$   
 (d)  $v^2 = ax$

14. If two soap bubbles of different radii are connected by a tube, then

- (a) air flows from bigger bubble to the smaller bubble till sizes become equal  
 (b) air flows from bigger bubble to the smaller bubble till sizes are interchanged  
 (c) air flows from smaller bubble to bigger  
 (d) there is no flow of air

15. The thermo emf of a hypothetical thermocouple varies with the temperature  $\theta$  of hot junction as  $E = a\theta + b\theta^2$  in volts, where the ratio  $a / b$  is  $700^\circ\text{C}$ . If the cold junction is kept at  $0^\circ\text{C}$ , then the neutral temperature is

- (a)  $700^\circ\text{C}$   
 (b)  $1400^\circ\text{C}$   
 (c)  $390^\circ\text{C}$   
 (d) no neutral temperature is possible for this thermocouple

16. A launching vehicle carrying an artificial satellite of mass  $m$  is set for launch on the surface of the earth of mass  $M$  and radius  $R$ . If the satellite is intended to move in a circular orbit of radius  $7R$ , the minimum energy required to be spent by the launching vehicle on the satellite is (Gravitational constant =  $G$ )

- (a)  $GMm / R$   
 (b)  $- 13 GMm/14R$   
 (c)  $GMm/7 R$   
 (d)  $- GMm / 14R$

17. The two lenses of an achromatic doublet should have

- (a) equal powers  
 (b) equal dispersive powers  
 (c) equal ratio of their power and dispersive power  
 (d) sum of the product of their powers and dispersive power equal to zero

18. If the ratio of lengths, radii and Young's modulus of steel and brass wires shown in the figure are  $a$ ,  $b$  and  $e$  respectively, the ratio between the increase in lengths of brass and steel wires would be



- (a)  $b^2 / 2c$
- (b)  $bc / 2a^2$
- (c)  $ba^2 / 2c$
- (d)  $a / 2b^2c$

19. A soap bubble of radius  $r$  is blown up to form a bubble of radius  $2r$  under isothermal conditions. If  $T$  is the surface tension of soap solution, the energy spent in the blowing

- (a)  $3\pi Tr^2$
- (b)  $6\pi Tr^2$
- (c)  $12\pi Tr^2$
- (d)  $24\pi Tr^2$

20. A current of  $1.6\text{ A}$  is passed through solution of  $\text{CuSO}_4$ . How many  $\text{Cu}^{++}$  ions are liberated in one minute? (Electronic charge  $= 1.6 \times 10^{-19}\text{ C}$ )

- (a)  $3 \times 10^{20}$
- (b)  $3 \times 10^{10}$
- (c)  $6 \times 10^{20}$
- (d)  $6 \times 10^{10}$

21. A magnetic field exerts no force on

- (a) a magnet
- (b) an unmagnetised iron bar
- (c) a moving charge
- (d) stationary charge

22. In an L-C-R circuit inductance is changed from  $L$  to  $L/2$ . To keep the same resonance frequency,  $C$  should be changed to

- (a)  $2C$
- (b)  $C/2$
- (c)  $4C$
- (d)  $C/4$

23. The sound waves after being converted into electrical waves are not transmitted as such because

- (a) they travel with the speed of sound
- (b) the frequency is not constant
- (c) they are heavily absorbed by the atmosphere
- (d) the height of antenna has to be increased several times

24. The tip of a needle does not give a sharp image on a screen. This is due to

- (a) polarisation
- (b) interference

- (c) diffraction  
(d) None of these

25. An engine moving towards a wall with a velocity 50 m/s emits a note of 1.2 kHz. Speed of sound in air is 350 m/s. The frequency of the note after reflection from the wall as heard by the driver of the engine is

- (a) 2.4 kHz  
(b) 0.24 kHz  
(c) 1.6 kHz  
(d) 1.2 kHz

26. The surface temperature of the sun which has maximum energy emission at 500 nm is 6000 K. The temperature of a star which has maximum energy emission at 400 nm will be

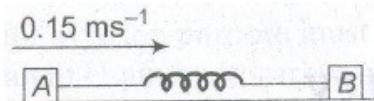
- (a) 8500 K  
(b) 4500 K  
(c) 7500 K  
(d) 6500 K

27. The truth table given below is for (A and B are the inputs, Y is the output)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

- (a) NOR  
(b) AND  
(c) XOR  
(d) NAND

28. Two rectangular blocks A and B of masses 2 kg and 3 kg respectively are connected by a spring of spring constant  $10.8 \text{ Nm}^{-1}$  and are placed on a frictionless horizontal surface. The block A was given an 'initial velocity of  $0.15 \text{ ms}^{-1}$  in the direction shown in the figure. The maximum compression of the spring during the motion is



- (a) 0.01 m  
(b) 0.02 m  
(c) 0.05 m  
(d) 0.03 m

29.  $0.1 \text{ m}^3$  of water at  $80^\circ\text{C}$  is mixed with  $0.3 \text{ m}^3$  of water at  $60^\circ\text{C}$ . The final temperature of the mixture is

- (a)  $65^\circ\text{C}$   
(b)  $70^\circ\text{C}$   
(c)  $60^\circ\text{C}$   
(d)  $75^\circ\text{C}$

30.  $y = 3 \sin \pi(t/2 - x/4)$  represents an equation of a progressive wave, where t is in second and x is in metre. The distance travelled by the wave in 5 s is

- (a) 8 m

- (b) 10 m
- (c) 5 m
- (d) 32 m

31. A body of mass  $m_1 = 4$  kg moves at  $5i$  m/s and another body of mass  $m_2 = 2$  kg moves at  $10i$  m/s. The kinetic energy of centre of mass is

- (a)  $200/3$  J
- (b)  $500/3$  J
- (c)  $400/3$  J
- (d)  $800/3$  J

32. A wheel of radius 0.4 m can rotate freely about its axis as shown in the figure. A string is wrapped over its rim and a mass of 4 kg is hung. An angular acceleration of  $8 \text{ rad} \cdot \text{s}^{-2}$  is produced in it due to the torque. Then, moment of inertia of the wheel is ( $g = 10 \text{ ms}^{-2}$ )

- (a)  $2 \text{ kg} \cdot \text{m}^2$
- (b)  $1 \text{ kg} \cdot \text{m}^2$
- (c)  $4 \text{ kg} \cdot \text{m}^2$
- (d)  $8 \text{ kg} \cdot \text{m}^2$

33. An object start sliding on a frictionless inclined plane and from same height another object start falling freely.

- (a) both will reach with same speed
- (b) both will reach with same acceleration
- (c) both will reach in same time
- (d) None of the above

34. A boy on a cycle pedals around a circle of 20 metres radius at a speed of 20 m/s, The combined mass of the body and the cycle makes with the vertical so that it may not fall is ( $g = 9.8 \text{ m/s}^2$ ).

- (a)  $60.25^\circ$
- (b)  $63.90^\circ$
- (c)  $26.12^\circ$
- (d)  $30.00^\circ$

35. A coin is dropped in a lift. It takes time  $t_1$  to reach the floor when lift is stationary. It takes time  $t_2$  when lift is moving up with constant acceleration. Then,

- (a)  $t_1 \geq t_2$
- (b)  $t_2 > t_1$
- (c)  $t_1 = t_2$
- (d)  $t_1 \gg t_2$

36. The engine of a jet aircraft applies a thrust force of  $10^5$  N during take off and causes the plane to attain a velocity of 1km/s in 10 s. The mass of the plane is

- (a)  $10^2$  kg
- (b)  $10^3$  kg
- (c)  $10^4$  kg
- (d)  $10^5$  kg

37. A stone weighing 1 kg and sliding on ice with a velocity of 2 m/s is stopped by friction in 10 s. The force of friction (assuming it to be constant) will be

- (a) - 20 N
- (b) - 0.2 N
- (c) 0.2 N
- (d) 20 N

38. The potential energy of a body is given by  $U = A - Bx^2$  (where  $x$  is the displacement) The magnitude of force acting on the particle is

- (a) constant
- (b) proportional to  $x$
- (c) proportional to  $x^2$
- (d) inversely proportional to  $x$

39. When a ceiling fan is switched on, it makes 10 revolution in the first 3 s. Assuming a uniform angular acceleration, how many rotation it will make in the next 3 s

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

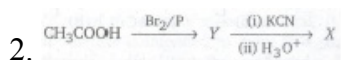
40. A hollow sphere of volume  $V$  is floating on water surface with half immersed in it. What should be the minimum volume of water poured inside the sphere so that the sphere now sinks into the water

- (a)  $V/2$
- (b)  $V/3$
- (c)  $V/4$
- (d)  $V$

## Chemistry

1. Which one of the following sets of quantum numbers represents the highest energy level in an atom?

- (a)  $n = 4, l = 0, m = 0, s = + 1/2$
- (b)  $n = 3, l = 1, m = 1, s = + 1/2$
- (c)  $n = 3, l = 2, m = -2, s = + 1/2$
- (d)  $n = 3, l = 0, m = 0, s = + 1/2$



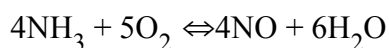
Here, X is

- (a) glycollic acid
- (b)  $\alpha$ -hydroxy propionic acid
- (c) succinic acid
- (d) malonic acid

3. Acetic anhydride is prepared in the laboratory by heating sodium acetate with

- (a) ethyl chloride
- (b) acetyl chloride
- (c) cone.  $\text{H}_2\text{SO}_4$
- (d) zinc dust

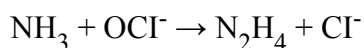
4. For the homogeneous reaction,



the equilibrium constant K; has the units

- (a) cone.  $^{+10}$
- (b) cone.  $^{+1}$
- (c) cone.  $^{-1}$
- (d) it is dimensionless

5. For the reaction,



occurring in basic medium, the coefficient of  $\text{N}_2\text{H}_4$  in the balanced equation will be

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

6. Which one of the following has a coordinate bond?

- (a)  $\text{NH}_4\text{Cl}$
- (b)  $\text{AlCl}_3$
- (c)  $\text{NaCl}$
- (d)  $\text{Cl}_2$

7. Which of the following would exert maximum osmotic pressure ? .

- (a) Decinormal aluminium sulphate
- (b) Decinormal barium chloride
- (c) Decinormal sodium chloride
- (d) A solution obtained by mixing equal volumes of (b) and (c) and filtering

8. Cow milk, an example of natural emulsion, is stabilised by

- (a) fat
- (b) water
- (c) casein
- (d)  $\text{Mg}^{2+}$  ions

9. For a zero order reaction

- (a)  $t_{1/2} \propto R_0$
- (b)  $t_{1/2} \propto \text{II } R_0$
- (c)  $t_{1/2} \propto R_0^2$
- (d)  $t_{1/2} \propto \text{II } R_0^2$

10. The extraction of which of the following metals involves bessemerisation?

- (a) Fe
- (b) Ag
- (c) Al
- (d) Cu

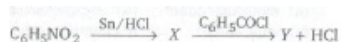
11. The correct order of decreasing first ionisation energy is

- (a)  $\text{C} > \text{B} > \text{Be} > \text{Li}$



- (b)  $C > Be > B > Li$
- (c)  $B > C > Be > Li$
- (d)  $Be > Li > B > C$

12. Consider the following reaction,



What is Y?

- (a) Acetanilide
- (b) Benzinilide
- (c) Azobenzene
- (d) Hydrazobenzene

13. Which of the following is most basic in nature?

- (a)  $NH_3$
- (b)  $CH_3NH_2$
- (c)  $(CH_3)_2NH$
- (d)  $C_6H_5N(CH_3)_2$

14. An example of natural biopolymer is

- (a) teflon
- (b) nylon-66
- (c) rubber
- (d) DNA

15. Which of the following is known as invert soap?

- (a) Pentaerythritol monostearate
- (b) Sodium stearyl sulphate
- (c) Trimethyl stearyl ammonium bromide
- (d) Ethoxylated nonyphenol

16. Le-blanc process is employed in the manufacture of

- (a) baking soda
- (b) washing soda
- (c) potash
- (d) plaster of paris

17. Which one of these is not true for benzene?

- (a) It forms only one type of monosubstituted product
- (b) There are three carbon-carbon single bonds and three carbon-carbon double bonds
- (c) Heat of hydrogenation of benzene is less than its theoretical value
- (d) The bond angle between carbon-carbon bonds is  $120^\circ$

18. The IUPAC name of acryldehdye is

- (a) prop-2-en-I-al
- (b) propenylaldehyde
- (c) but-2-en-I-al
- (d) propenal

19. The structures of  $(CH_3)_3CBr$  and  $CH_3[CH_2]_3Br$  represent

- (a) chain isomerism

- (b) position isomerism
- (c) chain as well as position isomerism
- (d) functional isomerism

20. Petrol for aviation purpose must contain

- (a) straight chain hydrocarbons
- (b) aromatic hydrocarbons
- (c) olefinic hydrocarbons
- (d) highly branched 'chain paraffins

21. The solubility product of  $\text{Hg}_2\text{I}_2$  is equal to

- (a)  $[\text{Hg}_2^{2+}] [\text{I}^-]$
- (b)  $[\text{Hg}^{2+}] [\text{I}^-]$
- (c)  $[\text{Hg}_2^{2+}] [\text{I}^-]^2$
- (d)  $[\text{Hg}^{2+}] [\text{I}^-]^2$

22. The number of atoms contained in a fcc unit cell of a monoatomic substance is

- (a) 1
- (b) 2
- (c) 4
- (d) 6

23. In the first order reaction, 75% of the reactant gets disappeared in 1.386 h. The rate constant of the reaction is

- (a)  $3.0 \times 10^{-3} \text{ s}^{-1}$
- (b)  $2.8 \times 10^{-4} \text{ s}^{-1}$
- (c)  $17.2 \times 10^{-3} \text{ s}^{-1}$
- (d)  $1.8 \times 10^{-3} \text{ s}^{-1}$

24. Moist hydrogen peroxide can not be dried over conc.  $\text{H}_2\text{SO}_4$  because

- (a) it can catch fire
- (b) it is reduced by  $\text{H}_2\text{SO}_4$
- (c) it is oxidised by  $\text{H}_2\text{SO}_4$
- (d) it is decomposed by  $\text{H}_2\text{SO}_4$

25. Glauber's salt is

- (a)  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
- (b)  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$
- (c)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
- (d)  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$

26. The most basic element is

- (a) fluorine
- (b) iodine
- (c) chlorine
- (d) bromine

27. Propyne on passing through red hot copper tube forms

- (a) benzene

- (b) toluene
- (c) chlorine
- (d) bromine

28. Which one of the following is mainly responsible for depletion of ozone layer?

- (a) Methane
- (b) Carbon dioxide
- (c) Water
- (d) Chlorofluorocarbons

29. On warming with silver powder, chloroform is converted into

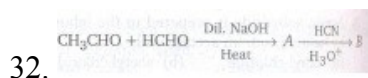
- (a) acetylene
- (b) hexachloroethane
- (c) 1, 1, 2, 2-tetrachloroethane
- (d) ethylene

30. Ammonia is a Lewis base and it forms complexes with many cations. Which one of the following cations does not form a complex with ammonia?

- (a)  $\text{Ag}^+$
- (b)  $\text{Cu}^{2+}$
- (c)  $\text{Cd}^{2+}$
- (d)  $\text{Pb}^{2+}$

31. Argol, a brown crust, formed during the fermentation of grape juice contains

- (a)  $\text{CO}_2$
- (b) fused oil
- (c) potassium hydrogen tartarate
- (d) lye



The structure of compound B is

- (a) 
$$\begin{array}{c} \text{CH}_3-\text{CH}-\text{COOH} \\ | \\ \text{OH} \end{array}$$
- (b) 
$$\begin{array}{c} \text{CH}_2=\text{CH}-\text{CH}-\text{OH} \\ | \\ \text{CN} \end{array}$$
- (c) 
$$\begin{array}{c} \text{CH}_3\text{CH}_2-\text{CH}-\text{COOH} \\ | \\ \text{OH} \end{array}$$
- (d) 
$$\begin{array}{c} \text{CH}_2=\text{CH}-\text{CH}-\text{COOH} \\ | \\ \text{OH} \end{array}$$

33. The pH value of 0.001 M aqueous solution of NaCl is

- (a) 7
- (b) 4
- (c) 11
- (d) unpredictable

34. Which buffer solution comprising of the following has its pH value greater than 7?

- (a)  $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$
- (b)  $\text{HCOOH} + \text{HCOOK}$
- (c)  $\text{CH}_3\text{COONH}_4$
- (d)  $\text{NH}_4\text{OH} + \text{NH}_4\text{Cl}$

35. Which of the following has  $sp^2$ -hybridisation?
- (a)  $C_2H_6$
  - (b)  $C_2H_5$
  - (c)  $BeCl_2$
  - (d)  $C_2H_2$
36. Hydrogen molecule differs from chlorine molecule in the following respect.
- (a) Hydrogen molecule is non-polar but chlorine molecule is polar
  - (b) Hydrogen molecule is polar while chlorine molecule is nonpolar
  - (c) Hydrogen molecule can form intermolecular hydrogen bonds but chlorine molecule does not
  - (d) Hydrogen molecule cannot participate in
37. The ratio of the difference in energy between the first and the second Bohr orbit to that between the second and the third Bohr orbit is
- (a)  $1/2$
  - (b)  $1/3$
  - (c)  $4/9$
  - (d)  $27/5$
38. Graphite is a
- (a) molecular solid
  - (b) covalent solid
  - (c) ionic solid
  - (d) metallic solid
39. Which one of the following transition metal ions is diamagnetic?
- (a)  $CO^{2+}$
  - (b)  $Ni^{2+}$
  - (c)  $Cu^{2+}$
  - (d)  $Zn^{2+}$
40. Which of the following metal carbonates decomposes on heating?
- (a)  $MgCO_3$
  - (b)  $Na_2CO_3$
  - (c)  $K_2CO_3$
  - (d)  $Rb_2CO_3$

## Zoology

1. Gel electrophoresis is used for
- (a) cutting of DNA into fragments
  - (b) separation of DNA fragments according to their size
  - (c) construction of recombinant DNA by joining with cloning vectors
  - (d) isolation of DNA molecule
2. Polysome is formed by
- (a) several ribosomes attached to a single mRNA
  - (b) many ribosomes attached to a strand of endoplasmic reticulum
  - (c) a ribosome with several sub-units

(d) ribosomes attached to each other in a linear arrangement

3. Which type of white blood cells are concerned with the release of histamine and the natural anticoagulant heparin?

- (a) Neutrophils
- (b) Basophils
- (c) Eosinophils
- (d) Monocytes

4. Which one of the following in birds, indicates, their reptilian ancestry?

- (a) Scales on their hindlimbs
- (b) Four-chambered heart
- (c) Two special chambers crop and gizzard in their digestive tract
- (d) Eggs with a calcareous shell

5. Select incorrect pair

- (a) Porifera – Choanocytes
- (b) Coelenterata – Nematocysts
- (c) Annelida – Segmentation
- (d) Monera – Eukaryote

6. Bilateral symmetry, metameric segmentation, coelom and open circulatory system are the features of

- (a) Annelida
- (b) Arthropoda
- (c) Mollusca
- (d) Echinodermata

7. Ancestor of man who first stood erect was

- (a) Australopithecus
- (b) Cro-magnon
- (c) Java-ape man
- (d) Peaking man

8. Core zone, buffer zone and manipulation zone. are found in

- (a) national park
- (b) sanctuary
- (c) tiger reserve
- (d) biosphere reserve

9. Which insecticide is more hazardous to human health?

- (a) Rotenone
- (b) Pyrethrum
- (c) DDT
- (d) Humulin

10. Universal donor is

- (a) O Rh<sup>+</sup>
- (b) O Rh<sup>-</sup>
- (c) AB Rh<sup>+</sup>
- (d) AB Rh<sup>-</sup>

11. One of these is not concerned with wildlife conservation

- (a) IVF
- (b) IUCN
- (c) WWF
- (d) IBWL

12. Largest tiger population is found in

- (a) Sunderban national park
- (b) Corbett national park
- (c) Ranthambhor national park
- (d) Kanha national park

13. Genetic material found in human Immunodeficiency Virus (HIV) is

- (a) double stranded RNA
- (b) single stranded RNA
- (c) double stranded DNA
- (d) single stranded DNA

14. Gigantism and acromegaly are due to

- (a) hypothyroidism
- (b) hyperthyroidism
- (c) hypopituitarism
- (d) hyperpituitarism

15. If a child is of O blood group and his father is of B blood group, the genotype of father is

- (a)  $I^O I^O$
- (b)  $I^A I^B$
- (c)  $I^O I^B$
- (d)  $I^O I^A$

16. Spermatogenesis is under the regulatory influence of

- (a) ADH
- (b) FSH
- (c) LH
- (d) STH

17. Which of the following can be controlled by using biopesticides?

- (a) Insects
- (b) Diseases
- (c) Weeds
- (d) All of these

18. Which hormone is secreted in a woman if pregnancy has occurred?

- (a) Estrogen
- (b) Progesterone
- (c) Luteinizing hormone
- (d) Human chorionic gonadotropin

19. Product of biotechnology is

- (a) transgenic crops (GM crops)
- (b) humulin
- (c) biofertilizer
- (d) All of the above

20. Phase common in aerobic and anaerobic respiration is

- (a) Krebs' cycle
- (b) glycolysis
- (c) glycogenolysis
- (d) ETS

21. Oxyntic cells secrete

- (a) HCl
- (b) trypsin
- (c) NaOH
- (d) pepsinogen

22. Menstruation is due to sudden

- (a) reduction of FSH
- (b) increase of LH
- (c) reduction in estrogen and progesterone
- (d) None of the above

23. Correctly matched set of phylum, class and example is

- (a) Protozoa-Mastigophora-Entamoeba
- (b) Mollusca-Bivalvia-Cyprina
- (c) Arthropoda-Diplopoda-Scolopendra
- (d) Chordata-Cyclostomata-Phrynosoma

24. Urea synthesis occurs in

- (a) kidney
- (b) liver
- (c) brain
- (d) muscles

25. Which is common to kidney and skeleton in mammals?

- (a) Cortex
- (b) Medulla
- (c) Pelvis
- (d) Radius

26. Which is regarded as urinary bladder of embryo?

- (a) Amnion
- (b) Allantois
- (c) Chorion
- (d) Yolk sac

27. Deficiency of vitamin -B<sub>12</sub> causes

- (a) cheilosis
- (b) thalassemia
- (c) beri-beri
- (d) pernicious anaemia

28. Blood is a kind of

- (a) areolar tissue
- (b) connective tissue
- (c) fluid connective tissue
- (d) reticular connective tissue

29. Which of these is used to control human population?

- (a) Estrogen + progesterone
- (b) IUCD and MTP
- (c) Tubectomy and vasectomy
- (d) All of the above

30. Addiction to alcohol causes

- (a) cirrhosis
- (b) epilepsy
- (c) neurosis
- (d) psychosis

31. The most primitive vertebrates are

- (a) ostracoderms
- (b) cephalochordates
- (c) placoderms
- (d) cyclostomes

32. Change in the number of body parts is called

- (a) continuous variation
- (b) discontinuous variation
- (c) meristic variation
- (d) substantive variation

33. Which has an additional X-chromosome?

- (a) Turner's syndrome
- (b) Klinefelter's syndrome
- (c) Super female
- (d) Down's syndrome

34. Origin of life occurred in

- (a) Precambrian
- (b) Coenozoic
- (c) Palaeozoic
- (d) Mesozoic

35. Branch of zoology dealing with the study of fishes is called

- (a) Arthrology
- (b) Ichthyology
- (c) Saurology
- (d) herpetology

36. Theory of continuity of germplasm was propounded by

- (a) Mendel
- (b) Lamarck
- (c) Weismann
- (d) Haeckel

37. Which extraembryonic membrane in humans prevents desiccation of the embryo inside the uterus?

- (a) Chorion
- (b) Allantois
- (c) Yolk sac



(d) Amnion

38. The most active phagocytic white blood cells are

- (a) neutrophils and eosinophils
- (b) lymphocytes and macrophages
- (c) eosinophils and lymphocytes
- (d) neutrophils and monocytes

39. During the propagation of a nerve impulse, the action potential results from the movement of

- (a)  $K^+$  ions from extracellular fluid to intracellular fluid
- (b)  $Na^+$  ions from intracellular fluid to extracellular fluid
- (c)  $K^+$  ions from intracellular fluid to extracellular fluid
- (d)  $Na^+$  ions from extracellular fluid to intracellular fluid

40. Darwin's finches are an excellent example of

- (a) adaptive radiation
- (b) seasonal migration
- (c) brood parasitism
- (d) connecting links

## Botany

1. In which one of the following, the male and female gametophytes don't have free-living independent existence?

- (a) Pteris
- (b) Funaria
- (c) Polytrichum
- (d) Cedrus

2. A transgenic food crop, which may help in solving the problem of nightblindness in developing countries is

- (a) Flavr savr tomatoes
- (b) Starlink maize
- (c) Bt soyabean
- (d) Golden rice

3. Vascular tissues in flowering plants develop from

- (a) phellogen
- (b) plerome
- (c) periblem
- (d) dermatogen

4. Nitrogen-fixation in root nodules of *Alnus* is brought about by

- (a) Bradyrhizobium
- (b) Clostridium
- (c) Frankia
- (d) Azorhizobium

5. A mature pollen grain of *Pinus* has

- (a) 2 cells
- (b) 3 cells
- (c) 4 cells

(d) 5 cells

6. Polyploidy can be induced by the application of

- (a) auxin
- (b) kinetin
- (c) colchicine
- (d) ethylene

7. Quantasome are present in

- (a) chloroplast
- (b) mitochondria
- (c) Golgi body
- (d) lysosome

8. In mitochondria, enzyme cytochrome oxidase is present in

- (a) outer membrane
- (b) perimitochondrial space
- (c) inner membrane
- (d) matrix

9. Which of the following bio-engineered bacteria is utilized for cleaning of marine oil slicks?

- (a) *Escherichia coli*
- (b) *Pseudomonas syringae*
- (c) *Pseudomonas putida*
- (d) *Rhizoctonia solani*

10. Green potatoes are toxic due to

- (a) phytoalexins
- (b) solanin
- (c) triazine
- (d) hormones

11. Cells obtained from cancerous tumours are known as

- (a) hybridomas
- (b) myelomas
- (c) lymphocytes
- (d) monoclonal cells

12. The plant of *Triticum aestivum* is

- (a) haploid
- (b) diploid
- (c) tetraploid
- (d) hexaploid

13. Which of the following is a total root parasite?

- (a) *Cuscuta*
- (b) *Rafflesia*
- (c) *Santalum*
- (d) *Monotropa*

14. Which of the following tissues consist of living cells?

- (a) Vessels
- (b) Tracheids

- (c) Companion cell
- (d) Sclerenchyma

15. Which is a useful product of epidermal origin?

- (a) Saffron
- (b) Cotton fibres
- (c) Clove
- (d) Jute

16. Fern spores are usually

- (a) haploid
- (b) diploid
- (c) triploid
- (d) tetraploid

17. When pollen tube enters through micropyle, the process is called

- (a) porogamy
- (b) chalazogamy
- (c) mesogamy
- (d) apogamy

18. Outer wall of pollen grain is made up of

- (a) cellulose
- (b) sporopollenin
- (c) pectocellulose
- (d) lignin

19. Nucleotides are formed by

- (a) purine, sugar and phosphate
- (b) purine, pyrimidine and phosphate
- (c) purine, pyrimidine sugar and phosphate
- (d) pyrimidine, sugar and phosphate

20. DNA replication occurs in

- (a) G<sub>1</sub>-phase
- (b) S-phase
- (c) G<sub>2</sub>-phase
- (d) M-phase

21. Which of the following plant cells is not surrounded by a cell wall?

- (a) Root hair cell
- (b) Stem hair cell
- (c) Gamete cell
- (d) Bacterial cell

22. Which of the following cell organelles stores hydrolytic enzymes?

- (a) Centriole
- (b) Lysosome
- (c) Chromoplast
- (d) Chloroplast

23. A monocarpic plant is one, which

- (a) has only one carpel

- (b) flowers once in a life-time
- (c) produces only one seed
- (d) produces only one fruit

24. AIDS virus contains

- (a) RNA with protein
- (b) DNA with protein
- (c) DNA without protein
- (d) bNA only

25. Calyptra develops from

- (a) venter wall of archegonium
- (b) outgrowth of gametophyte
- (c) neck wall of archegonium
- (d) paraphysis of the archegonial branch

26. Protonema is the stage in the life cycle of

- (a) Cycas
- (b) Funaria
- (c) Selaginella
- (d) Mucor

27. A fern differs from a moss in having

- (a) swimming archegonia
- (b) swimming antherozoids
- (c) independent gametophytes
- (d) independent sporophytes

28. Female cone of Pinus is a

- (a) modified needles
- (b) modified long shoot
- (c) modified dwarf shoot
- (d) modified scale

29. Development of an embryo without fertilization is called as

- (a) apomixis
- (b) polyembryony
- (c) parthenocarpy
- (d) parthenogenesis

30. Which of the following floral parts forms pericarp after fertilization?

- (a) Nucellus
- (b) Outer integument
- (c) Ovary wall
- (d) Inner integument

31. Prothallus of the fern produces

- (a) spores
- (b) gametes
- (c) Both (a) and (b)
- (d) cones

32. Which of the following cell organelles is associated with photorespiration?

- (a) Mitochondria
- (b) Peroxisome
- (c) Chloroplast
- (d) All of these

33. The thickness of unit membrane is

- (a) 20 Å
- (b) 35 Å
- (c) 55 Å
- (d) 75 Å

34. Chromosomes are arranged along the equator during

- (a) prophase
- (b) metaphase
- (c) anaphase
- (d) telophase

35. Width of the DNA molecule is

- (a) 15 Å
- (b) 20 Å
- (c) 25 Å
- (d) 34 Å

36. In gymnosperms, the Ovule is naked because

- (a) ovary wall is absent
- (b) integuments are absent
- (c) perianth is absent
- (d) nucellus is absent

37. The rupture and fractionation do not usually occur in the water column in vessel/tracheids during the ascent of sap because of

- (a) lignified thick walls
- (b) cohesion and adhesion
- (c) weak gravitational pull
- (d) transpiration pull

38. The fleshy receptacle of syconus of fig encloses number of

- (a) achenes
- (b) samaras
- (c) berries
- (d) mericarps

39. Which one of the following is linked to the discovery of bordeaux mixture as a popular fungicide?

- (a) Bacterial leaf blight of rice
- (b) Downy mildew of grapes
- (c) Loose smut of wheat
- (d) Black rust of wheat

40. Unisexuality of flowers prevents

- (a) autogamy, but not geitonogamy
- (b) Both geitonogamy and xenogamy

- (c) geitonogamy, but not xenogamy
- (d) autogamy and geitonogamy

## English

Directions (Q 1-5) Out of the four alternatives choose the one which expresses the correct meaning of the given word and blacken the appropriate rectangle [ ] in the Answer Sheet.

1. Irreproachable

- (a) remarkable
- (b) extraordinary
- (c) faultless
- (d) immense

2. Felicity

- (a) prosperity
- (b) honesty
- (c) bliss
- (d) sorrow

3. Knave

- (a) emperor
- (b) enchanter
- (c) soldier
- (d) scoundrel

4. Frontier

- (a) edge
- (b) landmark
- (c) boundary
- (d) corner

5. Rout

- (a) death
- (b) defeat
- (c) loss
- (d) crash

Directions (Q 6-8) Choose the word opposite in meaning to the given word and blacken the appropriate rectangle [ ] in the Answer Sheet.

6. Niggardly

- (a) hastily
- (b) lavishly
- (c) likely
- (d) gorgeously

7. Melodious

- (a) harmonious
- (b) tuneless
- (c) odious
- (d) mellifluous

8. Advanced

- (a) progressed
- (b) outpaced
- (c) receded
- (d) retarded

Directions (Q 9-12) In these questions four words are given in each question out of which only one word. is wrongly spelt. Find the word and. indicate it in the .Answer Sheet by blackening the appropriate rectangle

9.

- (a) quadruple
- (b) quagmaire
- (c) quadrangle
- (d) quadrant

10.

- (a) postar
- (b) pastor
- (c) posture
- (d) pasture

11.

- (a) reference
- (b) preference
- (c) difference
- (d) performance

12.

- (a) agreeably
- (b) cruelly
- (c) doubtfully
- (d) fatally

Directions (Q 13-16) Four alternatives are given for the underlined or given idiom/phrase. Choose the alternative which best expresses the meaning of the underlined or given idiom/phrase and blacken the appropriate rectangle [ ] in the Answer Sheet.

13. His parents cut him off, without a shilling

- (a) disinherited him
- (b) snubbed him
- (c) gave him only a shilling
- (d) sent him away with a shilling

14. The carefully worked -out plan fell through because of an unexpected event

- (a) came out successfully
- (b) had a steep fall
- (c) was shattered
- (d) failed

15. He has too many irons in the fire

- (a) is engaged in too many enterprises at the same time
- (b) has several problems
- (c) has many ideas in his head
- (d) has a fire burning constantly in his house

16. We wanted to give Rita a surprise party but John let the cat out of the bag

- (a) spoiled the party with a cat
- (b) gave her a party himself
- (c) told her about it unintentionally
- (d) prevented her from attending it

Directions (Q. 17-21) Out of the four alternatives, choose the one which can be substituted for given words/sentence and blacken the appropriate rectangle in the Answer Sheet.

17. Study of insects is

- (a) Etymology
- (b) Entomology
- (c) Ecology
- (d) Embryology

18. Careful in the spending of money time etc.

- (a) Punctual
- (b) Economical
- (c) Miserly
- (d) Calculative

19. Reproducing or memorizing word for word

- (a) Verbatim
- (b) Verbose
- (c) Verbiage
- (d) Verbalism

20. That which cannot be captured

- (a) Untakable
- (b) Ungrippable
- (c) Impregnable
- (d) Slippery

21. One who breaks the law .

- (a) Aggressor
- (b) Politician
- (c) Transgressor
- (d) Pedestrian

Directions (Q. 22-25) A part of the sentence is underlined. Below are given alternatives to the underlined part at (a), (b) and (c). Which may improve the sentence. Choose the correct alternative. In case no improvement is needed your answer is (d). Blacken the appropriate rectangle in the Answer Sheet.

22. The only way to solve the racial problem is by education.

- (a) because of
- (b) thanks to
- (c) on account of
- (d) no improvement

23. He may be poor now but he appears to be rich.

- (a) to seem rich
- (b) rich to be
- (c) to have been rich



(d) no improvement

24. The suspected couple was taken away from the airport through a side entrance to the police station for interrogation.

(a) whisked

(b) rushed

(c) guided

(d) No improvement

25. She left the room feeling contrite.

(a) sorry for what she had done

(b) rather ill

(c) extremely irritated

(d) No improvement

Directions (Q. 26-30) In these questions the first and the last parts of the sentence are numbered 1 and 6. The , rest of the sentence is split into four parts and named P, Q, R and S. These four parts are not given in their proper order. Read the parts and find out which of the four combinations is correct. Then find the correct answer and blacken the appropriate rectangle in the Answer sheet.

26.

1. I think the essence of wisdom is emancipation as far as possible, from the tyranny of the here and now.

P. If anyone could, he would hardly be able to remain alive.

Q. But it is possible to make a continual approach towards impartiality.

R. No one can view the world with complete impartiality.

S. This is of course a matter of degree.

6. It is this approach towards impartiality that constitutes growth in wisdom.

(a) QRSP

(b) RQPS

(c) SRPQ

(d) PRSQ

27. 1. But at the moment I glanced round at the crowd that had followed me.

P. It was immense crowd, two thousand at the least and' growing every minute.

Q. They were watching me as they would watch a conjurer about to perform a trick.

R. I looked at the sea of yellow faces above the garish clothes-faces all happy and excited over this -bit of fun, all certain that the elephant was going to be shot.

S. It blocked the road for a long distance on either side.

6. They did not like me, but with the magical rifle in my hands, I was momentarily worth watching.

(a) RPQS

(b) QSRP

(c) SRPQ

(d) PSRQ

28. 1. There are many roads into the world of the books, but way of fiction is probably the most common.

P. Then too the appeal of the story, whether told as poem, play, history, biography or novel is primitive and strong.

Q. The reason is plain.

R. They are to us what epic poetry was to the Greeks and Romans, what the stage was to the

Elizabethans.

S. The novel and the short story come closer to the experience. If the modern reader then any other form of contemporary writing.

6. Mankind's delight in stories is as timeless and universal as the art of the story teller.

- (a) QSRP
- (b) SRPQ
- (c) RSQP
- (d) PRSQ

29. 1. Nehru spent most part of his childhood in studies.

P. He rushed back to India and led an active political life joining hands with Gandhi.

Q. His studies went on uninterrupted abroad until he received a call from India.

R. He went to Cambridge to study.

S. But now and then, he could not help listening to political discussions in his house.

6. Till the end of his career, he made Gandhi his political master.

- (a) RSQP
- (b) SRQP
- (c) PQRS
- (d) SRPQ

30. 1. Venice is a strange and beautiful city in the North of Italy.

P. There are about four hundred old stone bridges joining the Islands of Venice.

Q. In this city, there are no motor-cars, no horses and no buses.

R. These small Islands are near one another.

S. It is not one Island but a hundred and seventeen Islands.

6. This is because Venice has no streets.

- (a) PQRS
- (b) RSPQ
- (c) SRPQ
- (d) PSQR

Directions (Q 31-35) Sentences are given which blanks to be filled in with an appropriate and suitable word. Four alternatives are suggested for each question. Choose the correct alternative out of the four and blacken the appropriate rectangle in the Answer Sheet.

31. We warned her the danger

- (a) from
- (b) about
- (c) against
- (d) of

32. We all laughed the affair.

- (a) over
- (b) about
- (c) for
- (d) on

33. The chairman, as well as the members, to blame for this misfortune.

- (a) are
- (b) were
- (c) is

(d) has

34. The streets are lighted electricity

(a) with

(b) by

(c) on

(d) in

35. Homeopathic treatment, they say, cuts ..... the need for operation and risk from surgery.

(a) off

(b) out

(c) down

(d) away

Directions (Q 36-40) You have two brief passages with five questions following each passage. Read the passages carefully and choose the best answer to each question out of the four alternatives and blacken the appropriate rectangle in the Answer Sheet. .

“The beauty of the Japanese landscape is that it conveys philosophical messages through each feature. The use of curving pathways rather than straight lines, for instance. This feature springs from the belief that only evil travels in straight lines, good forces tend to wander. Then odd numbers of plants on trees are used in these gardens because these numbers are considered auspicious. Even the plants used are symbolic. For example, the cyprus represents longevity and the bamboo symbolisms abundance,” says Sadhana Roy Choudhary.

In Japan, nature is “said to be so closely intertwined with human life that parents actually plant a sapling in their garden when a child is born in the family, letting the growth of the child coincide with the growth of the plant.

36. They prefer curving pathways because

(a) they are inauspicious

(b) they can walk easily

(c) they stumble over straight ones

(d) good spirits walk in them

37. ‘Abundance’ means

(a) long life

(b) happiness

(c) plenty

(d) permanent

38. The Japanese parents plant a sapling at the time of birth of a child because

(a) it is auspicious to plant a sapling

(b) it is closely associated with the growth of the child

(c) it gives longevity to the child

(d) it gives happiness to the child

39. According to the passage the Japanese are

(a) superstitious

(b) philosophical

(c) lovers of nature

(d) lovers of numerology

40. The Japanese pathways tend to be

(a) Symbolic

- (b) beautiful
- (c) curved
- (d) straight

**Physics**

1. (b) 2. (d) 3. (b) 4. (a) 5. (d) 6. (c) 7. (a) 8. (c) 9. (b) 10. (c)  
11. (d) 12. (b) 13. (c) 14. (c) 15. (\*) 16. (b) 17. (d) 18. (d) 19. (d) 20. (a)  
21. (d) 22. (a) 23. (c) 24. (c) 25. (c) 26. (c) 27. (d) 28. (c) 29. (a) 30. (b)  
31. (c) 32. (a) 33. (a) 34. (b) 35. (a) 36. (b) 37. (b) 38. (b) 39. (c) 40. (a)

**Chemistry**

1. (c) 2. (d) 3. (b) 4. (b) 5. (a) 6. (a) 7. (a) 8. (c) 9. (a) 10. (d)  
11. (b) 12. (b) 13. (c) 14. (d) 15. (c) 16. (c) 17. (b) 18. (a) 19. (c) 20. (d)  
21. (c) 22. (c) 23. (b) 24. (d) 25. (a) 26. (b) 27. (c) 28. (d) 29. (a) 30. (d)  
31. (c) 32. (a) 33. (a) 34. (d) 35. (b) 36. (d) 37. (b) 38. (b) 39. (d) 40. (a)

**Zoology**

1. (b) 2. (a) 3. (b) 4. (d) 5. (d) 6. (b) 7. (a) 8. (d) 9. (c) 10. (b)  
11. (a) 12. (a) 13. (b) 14. (d) 15. (c) 16. (b) 17. (d) 18. (d) 19. (d) 20. (b)  
21. (a) 22. (c) 23. (b) 24. (b) 25. (c) 26. (b) 27. (d) 28. (b) 29. (a) 30. (a)  
31. (a) 32. (c) 33. (b) 34. (a) 35. (b) 36. (c) 37. (d) 38. (d) 39. (d) 40. (a)

**Botany**

1. (a) 2. (d) 3. (b) 4. (c) 5. (c) 6. (c) 7. (a) 8. (c) 9. (c) 10. (b)  
11. (b) 12. (d) 13. (b) 14. (c) 15. (b) 16. (a) 17. (a) 18. (b) 19. (c) 20. (b)  
21. (c) 22. (b) 23. (b) 24. (d) 25. (a) 26. (b) 27. (d) 28. (b) 29. (d) 30. (c)  
31. (c) 32. (d) 33. (d) 34. (d) 35. (b) 36. (a) 37. (b) 38. (a) 39. (b) 40. (a)

**English**

1. (b) 2. (b) 3. (a) 4. (c) 5. (d) 6. (c) 7. (a) 8. (c) 9. (c) 10. (d)  
11. (d) 12. (b) 13. (a) 14. (d) 15. (b) 16. (c) 17. (a) 18. (d) 19. (b) 20. (c)  
21. (c) 22. (a) 23. (c) 24. (c) 25. (c) 26. (c) 27. (b) 28. (a) 29. (a) 30. (c)  
31. (b) 32. (d) 33. (c) 34. (a) 35. (c) 36. (c) 37. (c) 38. (d) 39. (c) 40. (d)