

## Physics

1. A car of mass 1000 kg moves on a circular track of radius 40 m. If the coefficient of friction is 1.28. The maximum velocity with which the car can be moved, is

- (a) 22.4 m/s
- (b) 112 m/s
- (c)  $(0.64 \times 40) / (1000 \times 100)$  m/s
- (d) 1000 m/s

2. The escape velocity for the earth is 11.2 km/s. The mass of another planet 100 times mass of earth and its radius is 4 times radius of the earth. The escape velocity for the planet is

- (a) 280 km/s
- (b) 56.0 km/s
- (c) 112 km/s
- (d) 56 km/s

3. Light travels faster in air than that in glass. This is accordance with

- (a) wave theory of light
- (b) corpuscular theory of light
- (c) neither (a) nor (b)
- (d) Both (a) and (b)

4. The speed of air flow on the upper and lower surfaces of a wing of an aeroplane are  $v_1$  and  $v_2$  respectively. If A is the cross section area of the wing and  $\rho$  is the density of air, then the upward lift is

- (a)  $\frac{1}{2}\rho A(v_2 - v_1)$
- (b)  $\frac{1}{2}\rho A(v_1 + v_2)$
- (c)  $\frac{1}{2}\rho A(v_1^2 - v_2^2)$
- (d)  $\frac{1}{2}\rho A(v_1^2 + v_2^2)$

5. A body is thrown with a velocity of 9.8 m/s making an angle of  $30^\circ$  with the horizontal. It will hit the ground after a time

- (a) 1.5s
- (b) 1s
- (c) 3s
- (d) 2s

6. A radioactive element  ${}_{90}\text{X}^{238}$  decays into  ${}_{83}\text{Y}^{222}$ . The number of  $\beta$ -particles emitted are

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

7. Minimum excitation potential of Bohr's first orbit in hydrogen atom is

- (a) 3.6V
- (b) 10.2 V
- (c) 13.6 V
- (d) 3.4V

8. A gas expands  $0.25 \text{ m}^3$  at constant pressure  $10^3 \text{ N/m}^2$ , the work done is

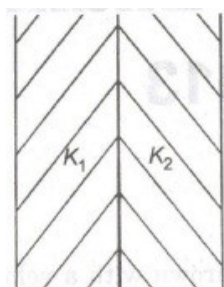
- (a) 250 N
- (b) 250W
- (c) 250 J
- (d) 2.5 erg

9. The work done in increasing the size of a soap film for 10 cm x 6m to 10 cm x 11cm is  $3 \times 10^{-4} \text{ J}$ . The surface tension of the film is

- (a)  $1.0 \times 10^{-2} \text{ N/m}$
- (b)  $6.0 \times 10^{-2} \text{ N/m}$
- (c)  $3.0 \times 10^{-2} \text{ N/m}$
- (d)  $1.5 \times 10^{-2} \text{ N/m}$

10. A parallel plate condenser is filled with two dielectrics as shown in figure. Area of each plate is  $A \text{ m}^2$  and the separation is  $d$  metre.

The dielectric constants are  $K_1$  and  $K_2$  respectively. Its capacitance in farad will be



- (a)  $\frac{2\epsilon_0 A}{d} \left( \frac{K_1 + K_2}{K_1 K_2} \right)$
- (b)  $\frac{2\epsilon_0 A}{d} \left( \frac{K_1 K_2}{K_1 + K_2} \right)$
- (c)  $\frac{\epsilon_0 A}{d} \left( \frac{K_1 + K_2}{2K_1 K_2} \right)$
- (d)  $\frac{\epsilon_0 A K_1 K_2}{2(d_2 K_1 + d_1 K_2)}$

11. A luminous object is placed at a distance of 30 cm from the convex lens of focal length 20 cm. On the other side of the lens, at what distance from the lens a convex mirror of radius of curvature 10 cm be placed in order to have an upright image of the object coincident with it

- (a) 30 cm
- (b) 60 cm
- (c) 50 cm
- (d) 12 cm

12. A battery of emf 10 V and internal resistance of 0.5 ohm is connected across a variable resistance R. The maximum value of R is given by

- (a)  $0.5\Omega$
- (b)  $1.00\Omega$
- (c)  $2.0\Omega$
- (d)  $0.25\Omega$

13. For a  $R/C_v$  gas = 0.67. This gas is made up of cv molecules which are

- (a) mono atomic
- (b) poly atomic
- (c) mixture of diatomic and poly atomic molecules
- (d) diatomic

14. A point source of light is placed 4 m below the surface of water of refractive index  $5/3$ .

The minimum diameter of a disc which should be placed over the source on the surface of water to cut-off all light coming out of water is

- (a) 6 m
- (b) 3 m
- (c) 4 m
- (d) 2 m

15. A moving body of mass m and velocity 3 km/h collides with a rest body of mass 2 m and stick to it. Now the combined mass starts to move. What will be the combined velocity?

- (a) 4 km/h
- (b) 1 km/h

- (c) 2 km/h
- (d) 3 km/h

16. A transverse wave is represented by the equation

$$y = y_0 \sin (2\pi/\lambda) - 27c (vt - k)$$

For what value of X is the particle velocity equal to two times the wave velocity

- (a)  $\lambda = \pi y_0$
- (b)  $\lambda = (\pi y_0/2)$
- (c)  $\lambda = (\pi y_0/3)$
- (d)  $\lambda = 2\pi/y_0$

17. Ionisation potential of hydrogen atom is 13.6 eV. Hydrogen atom on the ground state rarely excited by monochromatic radiation of photon 12.1 eV. The special line emitted by a hydrogen atom according to Bohr's theory will be

- (a) one
- (b) two
- (c) three
- (d) four

18. The internal resistance of a primary cell is  $4\Omega$ . It generates a current of 0.2 A in an external resistance of  $21\Omega$ . The rate at which chemical energy is consumed in providing current is

- (a) 1 J/s
- (b) 5 J/s
- (c) 0.42 J/s
- (d) 0.8 J/s

19. The binding energy per nucleon is maximum in the case

- |                             |                              |
|-----------------------------|------------------------------|
| (a) ${}_{92}^{235}\text{U}$ | (b) ${}_{56}^{141}\text{Ba}$ |
| (c) ${}_{26}^{56}\text{Fe}$ | (d) ${}_{2}^4\text{He}$      |

20. Two rigid bodies A and B rotate with rotational kinetic energies  $E_A$  and  $E_B$  respectively. The moments of inertia of A and B about the axis of rotation are  $I_A$  and  $I_B$  respectively.

If  $I_A = I_B$  and  $E_A = 100 = E_B$  the ratio of angular momentum ( $L_A$ ) of A to the angular momentum ( $L_B$ ) of B is

- (a) 25
- (b) 5/4
- (c) 5
- (d) 1/4

21. The working principle of a ball point pen is

- (a) Bernoulli's theorem
- (b) surface tension
- (c) gravity
- (d) viscosity

22. Progressive waves are represented by the equation

$$y_1 = a \sin (\omega t - x)$$

$$\text{and } y_2 = b \cos (\omega t - x)$$

The phase difference between waves is

- (a)  $0^\circ$
- (b)  $45^\circ$
- (c)  $90^\circ$
- (d)  $180^\circ$

23. Two simple pendulums of length 0.5 m and 20 m respectively are given small linear displacement in one direction at the same time. They will again be in the phase when the pendulum of shorter length has completed x oscillations, where k is

- (a) 1
- (b) 3
- (c) 2
- (d) 5

24. A balloon contains  $500 \text{ m}^3$  of helium at  $27^\circ\text{C}$  and 1 atmosphere pressure. The volume of the helium at  $-3^\circ\text{C}$  temperature and 0.5 atmosphere pressure will be

- (a)  $1000 \text{ m}^3$
- (b)  $900 \text{ m}^3$
- (c)  $700 \text{ m}^3$
- (d)  $500 \text{ m}^3$

25. 220 V, 50 Hz, AC source is connected to an inductance of 0.2 H and a resistance of  $20 \Omega$  in series. What is the current in the circuit?

- (a) 3.33 A
- (b) 33.3 A
- (c) 5A
- (d) 10 A

26. In 0.2 s, the current in a coil increases from 2.0 A to 3.0 A. If inductance of coil is 60 mH, then induced current in external resistance

of  $3\ \Omega$  will be

- (a) 1 A
- (b) 0.5 A
- (c) 0.2 A
- (d) 0.1 A

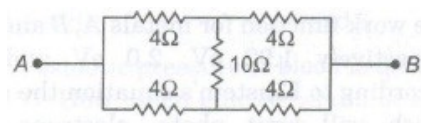
27. Two coherent light beams of intensities  $I$  and  $4I$  are superposed. The maximum and minimum possible intensities in the resulting beam are

- (a)  $5I$  and  $I$
- (b)  $5I$  and  $3I$
- (c)  $9I$  and  $I$
- (d)  $9I$  and  $3I$

28. A galvanometer acting as a voltmeter should have

- (a) low resistance in series with its coil
- (b) low resistance in parallel with its coil
- (c) high resistance in series with its coil
- (d) high resistance in parallel with its coil

29. The equivalent resistance across A and B is



- (a)  $2\ \Omega$
- (b)  $3\ \Omega$
- (c)  $4\ \Omega$
- (d)  $5\ \Omega$

30. A black body has a wavelength of  $\lambda$  at temperature 2000 K. Its corresponding wavelength at temperature 3000 K will be

- (a)  $2\lambda/3$
- (b)  $3\lambda/2$
- (c)  $4\lambda/9$
- (d)  $9\lambda/4$

31. At room temperature, copper has free electron density of  $8.4 \times 10^{28}\ \text{m}^{-3}$ . The electron drift velocity in a copper conductor of cross-sectional area of  $10^{-6}\ \text{m}^2$  and carrying a current of 5.4 A, will be

- (a)  $4\ \text{ms}^{-1}$
- (b)  $0.4\ \text{ms}^{-1}$

- (c)  $4 \text{ cm s}^{-1}$   
 (d)  $0.4 \text{ mm s}^{-1}$

32. A uniform wire of resistance  $R$  and length  $L$  is cut into four equal parts, each of length  $L/4$  which are then connected in parallel combination.

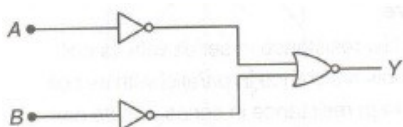
The effective resistance of the combination will be

- (a)  $R$   
 (b)  $4R$   
 (c)  $R/4$   
 (d)  $R/16$

33. The half-life of radio isotope is 4 h. If initial mass of the isotope was 200 g, then mass remaining after 24 h will be

- (a) 1.042 g  
 (b) 2.084 g  
 (c) 3.125g  
 (d) 4.167g

34. Which logic gate is represented by the following combination of logic gates?



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

35. The work function for metals A, B and C are respectively 1.92 eV, 2.0 eV and 5eV.

According to Einstein's equation the metals which will emit photo, electrons for a radiation of wavelength  $4100 \text{ \AA}$  is/are

- (a) none  
 (b) A only  
 (c) A and B only  
 (d) All the three metals

36. Two boys are standing at the ends A and B of a ground, where  $AB = a$ . The boy at B starts running in a direction perpendicular to AB with velocity  $v_1$ . The boy at A starts running simultaneously with velocity  $u$  and catches the other boy in a time  $t$ , where  $t$  is

$$\begin{array}{ll} \text{(a)} \frac{a}{\sqrt{v^2 + v_1^2}} & \text{(b)} \sqrt{\frac{a^2}{v^2 - v_1^2}} \\ \text{(c)} \frac{a}{(v - v_1)} & \text{(d)} \frac{a}{(v + v_1)} \end{array}$$

37. A 5 amp fuse wire can withstand a maximum power of 1 W in circuit. The resistance of the fuse wire is

- (a)  $0.2 \, \Omega$
- (b)  $5 \, \Omega$
- (c)  $0.4 \, \Omega$
- (d)  $0.04 \, \Omega$

38. A force  $F$  is given  $F = at + bt^2$ , where,  $t$  is time. What are the dimensions of  $a$  and  $b$ ?

- (a)  $[MLT^{-1}]$  and  $[MLT^0]$
- (b)  $[MLT^{-3}]$  and  $[ML^2T^4]$
- (c)  $[MLT^{-4}]$  and  $[MLT^1]$
- (d)  $[MLT^{-3}]$  and  $[MLT^{-4}]$

39. Two equal negative charges  $-q$  are fixed at the point  $(0, a)$  and  $(0, -a)$  on the  $y$ -axis. A positive charge  $Q$  is released from rest at the point  $(2a, 0)$  on the  $x$ -axis. The charge will

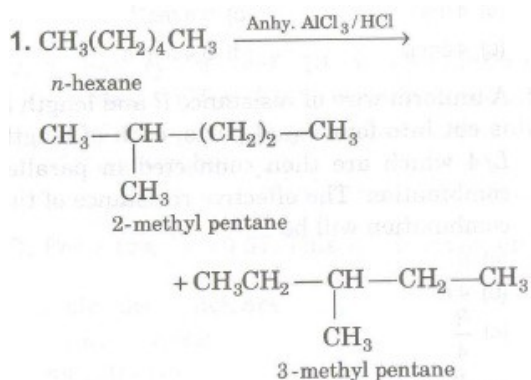
- (a) execute SHM about the origin
- (b) move to the origin and remain at rest
- (c) move to infinity
- (d) execute oscillatory but not SHM

40. An ice-cube of density  $900 \, \text{kg/m}^3$  is floating in water of density  $1000 \, \text{kg/m}^3$ . The percentage of volume of ice-cube outside the water is

- (a) 20%
- (b) 35%
- (c) 10%
- (d) 25%



# Chemistry



- (a) aromatisation
- (b) pyrolysis
- (c) isomerisation
- (d) oxidation

2. Number of hydrogen-bonded water molecules associated in  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  is

- (a) one
- (b) two
- (c) three
- (d) All the five

3. Which of the following species do not show disproportionation on reaction?



- (a)  $\text{ClO}_4^-$
- (b)  $\text{ClO}_3^-$
- (c)  $\text{ClO}^-$
- (d) None of these

4. Which one of the following acts as a nucleophile?

- (a)  $(\text{CH}_3)_3\text{N}$
- (b)  $\text{BF}_3$
- (c)  $\text{NO}_2^+$
- (d)  $\text{CH}_3 - \overset{+}{\text{C}} = \text{O}$

5. During estimation of nitrogen in the organic compound by Kjeldahl's method, the ammonia evolved from 0.5 g of the compound in Kjeldahl's estimation of nitrogen, neutralised 10 mL of 1M  $\text{H}_2\text{SO}_4$ .

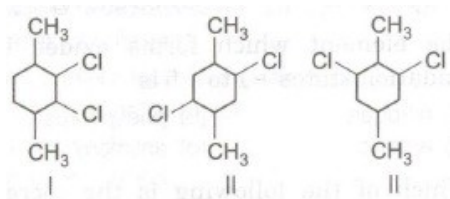
Find out the percentage of nitrogen in the compound.

- (a) 14%
- (b) 28%

(c) 56%

(d) 68%

6. Which of the following compounds have highest melting point?



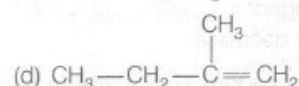
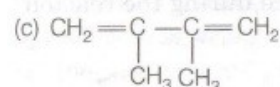
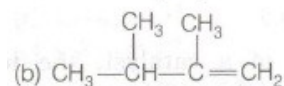
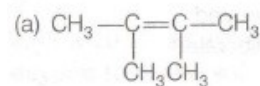
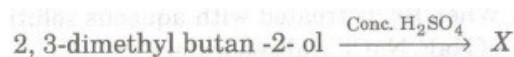
(a) Only I

(b) Only II

(c) I and II

(d) II and III

7. Identify the major product 'X' obtained in the following reaction.



8. Addition of water to alkynes occurs in acidic medium and in the presence of  $\text{Hg}^{2+}$  ions as a catalyst. Which of the following products will be formed on addition of water to but-1-yne under these conditions?

(a)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$

(b)  $\text{CH}_3\text{CH}_2\text{COCH}_3$

(c)  $\text{CH}_3\text{CH}_2\text{COOH} + \text{CO}_2$

(d)  $\text{CH}_3\text{COOH} + \text{HCHO}$

9. The correct order of increasing acidic strength is

(a) phenol < ethanol < chloroacetic acid < acetic acid

(b) ethanol < phenol < chloroacetic acid < acetic acid

(c) ethanol < phenol < acetic acid < chloroacetic acid

(d) chloroacetic acid < acetic acid < phenol < ethanol

10. KF has ccp structure. How many  $\text{F}^-$  ions and octahedral voids are there in this unit cell respectively?

- (a) 4 and 4
- (b) 4 and 8
- (c) 8 and 4
- (d) 6 and 6

11. The osmotic pressure of blood is 8.21 atm at 37°C. How much glucose would be used for an injection that is at the same osmotic pressure as blood?

- (a) 22.17 gL<sup>-1</sup>
- (b) 58.14 gL<sup>-1</sup>
- (c) 61.26 gL<sup>-1</sup>
- (d) 75.43 gL<sup>-1</sup>

12. At equilibrium, the rate of dissolution of a solid solute in a volatile liquid solvent is

- (a) less than the rate of crystallisation
- (b) greater than the rate of crystallisation
- (c) equal to the rate of crystallisation
- (d) zero

13. A chelating agent has two or more than two donor atoms to bind a single metal ion.

Which of the following is not a chelating agent?

- (a) Thiosulphato
- (b) Glycinato
- (c) Oxalato
- (d) Ethane-1, 2-diamine

14. On addition of small amount of  $\text{KMnO}_4$  to conc.  $\text{H}_2\text{SO}_4$ , a green oily compound is obtained which is highly explosive in nature. Identify the compound from the following.

- (a)  $\text{Mn}_2\text{O}_7$
- (b)  $\text{MnO}_2$
- (c)  $\text{MnSO}_4$
- (d)  $\text{Mn}_2\text{O}_3$

15. The magnetic nature of elements depends on the presence of unpaired electrons.

Identify the configuration of transition element, which shows highest magnetic moment.

- (a)  $3d^7$
- (b)  $3d^5$
- (c)  $3d^8$
- (d)  $3d^2$

16. Which of the following elements can be involved in  $p\pi - d\pi$  bonding?

- (a) Carbon
- (b) Nitrogen
- (c) Phosphorus
- (d) Boron

17. On addition of conc.  $H_2SO_4$  to a chloride salt, colourless fumes are evolved but in case of iodide salt, violet fumes come out. This is because.

- (a)  $H_2SO_4$  reduces HI to  $I_2$
- (b) HI is of violet colour
- (c) HI gets oxidised to  $I_2$
- (d) HI changes to  $HIO_3$

18. Affinity for hydrogen decreases in the group from fluorine to iodine. Which of the halogen acids should have highest bond dissociation enthalpy?

- (a) HF
- (b) HCl
- (c) HBr
- (d) HI

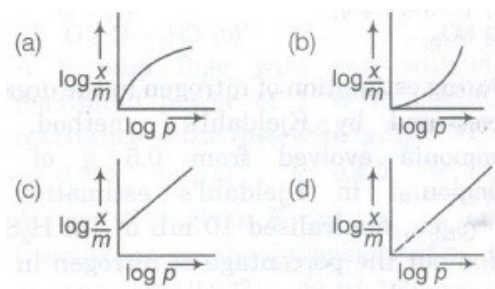
19. Which of the following statement is not correct about an inert electrode in a cell?

- (a) It does not participate in the cell reaction.
- (b) It provides surface either for oxidation or for reduction reaction.
- (c) It provides surface for conduction of electrons.
- (d) It provides surface for redox reaction

20. Which of the following statement is correct?

- (a)  $E_{\text{cell}}$  and  $\Delta_r G$  of cell reaction both are extensive properties.
- (b)  $E_{\text{cell}}$  and  $\Delta_r G$  of cell reaction both are intensive properties.
- (c)  $E_{\text{cell}}$  is an intensive property while  $\Delta_r G$  of cell reaction is an extensive property.
- (d)  $E_{\text{cell}}$  is an extensive property while  $\Delta_r G$  of cell reaction is an intensive property.

21. Which of the following curves is in accordance with Freundlich adsorption isotherm?



22. A number of elements available in earth's crust but most abundant elements are

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

23. The element which forms oxides in all oxidation states + 1 to + 5 is

- (a) nitrogen
- (b) phosphorus
- (c) arsenic
- (d) antimony

24. Which of the following is the increasing order of enthalpy of vaporization?

- (a)  $\text{NH}_3$ ,  $\text{PH}_3$ ,  $\text{AsH}_3$
- (b)  $\text{AsH}_3$ ,  $\text{PH}_3$ ,  $\text{NH}_3$
- (c)  $\text{NH}_3$ ,  $\text{AsH}_3$ ,  $\text{PH}_3$
- (d)  $\text{PH}_3$ ,  $\text{AsH}_3$ ,  $\text{NH}_3$

25. When  $\text{Br}_2$  is treated with aqueous solutions of NaF, NaCl, NaI separately

- (a)  $\text{F}_2$ ,  $\text{Cl}_2$  and  $\text{I}_2$  are liberated
- (b) only  $\text{F}_2$  and  $\text{Cl}_2$  are liberated
- (c) only  $\text{I}_2$  is liberated
- (d) only  $\text{Cl}_2$  is liberated

26. In the presence of a catalyst, the heat evolved or absorbed during the reaction

- (a) increases
- (b) decreases
- (c) remains unchanged
- (d) may increase or decrease

27. The rate of a gaseous reaction is given by the expression  $k[\text{A}][\text{B}]$ . If the volume of the reaction vessel is suddenly reduced to 1/4 th of the initial volume, the reaction rate relating to original rate will be

- (a) 1/10
- (b) 1/8
- (c) 8
- (d) 16

28. Which of the following is 3° amine?

- (a) 1-methylcyclohexylamine
- (b) Triethylamine
- (c) Tert-butylamine
- (d) N-methyl aniline

29. Which of the following enhances lathering property of soap?

- (a) Sodium carbonate
- (b) Sodium rosinat
- (c) Sodium stearate
- (d) Trisodium phosphate

30. The deficiency of vitamin C causes

- (a) scurvy
- (b) rickets
- (c) pyrrhea
- (d) perniciousanaemia

31. Excess fluoride (over 10 ppm) in drinking water can cause

- (a) harmful effect of bones and teeth
- (b) methemoglobinemia
- (c) kidney damage
- (d) laxative effect

32. For the process to occur under adiabatic conditions, the correct condition is

- (a)  $\Delta T = 0$
- (b)  $\Delta p = 0$
- (c)  $q = 0$
- (d)  $W = 0$

33.  $(3/2O_2(g)) \rightarrow O_3(g)$ ;  $K_p$  for this reaction is  $2.47 \times 10^{-29}$ . At 298 K,  $\Delta_r G^\circ$  for conversion of oxygen to ozone will be

- (a)  $100 \text{ kJ mol}^{-1}$
- (b)  $150 \text{ kJ mol}^{-1}$
- (c)  $163 \text{ kJ mol}^{-1}$
- (d)  $2303 \text{ kJ mol}^{-1}$

34. Which one of the following statements about  $C_2$  molecule is wrong?

- (a) The bond order of  $C_2$  is 2.
- (b) In vapour phase,  $C_2$  molecule is diamagnetic.

(c) Double bond in  $C_2$  molecule consists of both  $\pi$ - bonds because of the presence of  $4e^-_s$ ; in two  $\pi$ - molecular orbitals.

(d) double bond in  $C_2$  molecule consists of one  $\sigma$ - bond and one  $\pi$ -bond.

35. The type of hybridisation in  $SF_6$  molecule is

(a)  $sp^3d$

(b)  $dsp^3$

(c)  $sp^3d^3$

(d)  $d^3sp^3$

36. Among  $LiCl$ ,  $BeCl_2$ ,  $BCl_3$  and  $CCl_4$ , the covalent bond character follows the order

(a)  $LiCl < BeCl_2 < BCl_3 < CCl_4$

(b)  $BCl_3 < CCl_4 < BeCl_2 < LiCl$

(c)  $BeCl_2 < LiCl < CCl_4 < BCl_3$

(d)  $CCl_4 < BCl_3 < BeCl_2 < LiCl$

37. Maximum number of electrons in a subshell of an atom determined by the following?

(a)  $4n + 2$

(b)  $2n^2$

(c)  $4n - 2$

(d)  $2n + 1$

38. The average kinetic energy of an ideal gas per molecule in SI units at  $25^\circ C$  will be

(a)  $6.17 \times 10^{21} \text{ JK}^{-1}$

(b)  $6.17 \times 10^{-21} \text{ kJK}^{-1}$

(c)  $6.17 \times 10^{20} \text{ JK}^{-1}$

(d)  $7.16 \times 10^{-21} \text{ JK}^{-1}$

39.  $pK_a$  of acetic acid and  $pK_b$  of ammonium hydroxide are 4.76 and 4.75 respectively.

Calculate the pH of ammonium acetate solution.

(a) 6.02

(b) 7.005

(c) 8

(d) 5.602

40. The value of  $K_c$  for the reaction,  $2A \rightleftharpoons B + C$  is  $2 \times 10^{-3}$ . At a given time, if the composition of reaction mixture is  $[A] = [B] = [C] = 3 \times 10^{-3} \text{ M}$ . Which is true?

- (a) The reaction will proceed in forward direction
- (b) The reaction will proceed in backward direction
- (c) The reaction will proceed in any direction
- (d) None of the above

## Zoology

1. Pellagra is caused by deficiency of vitamins

- (a) B<sub>5</sub>
- (b) B<sub>5</sub>
- (C) B<sub>5</sub>
- (d) B<sub>5</sub>

2. Notochord originates from

- (a) mesoderm
- (b) ectoderm
- (c) endoderm
- (d) None of these

3. Parthenogenesis is a term of

- (a) budding
- (b) asexual reproduction
- (c) sexual reproduction
- (d) regeneration

4. Bartholin's gland is found in

- (a) penis
- (b) stomach
- (c) liver
- (d) vagina

5. Which one of the following statements best characterise the testis?

- (a) The seminiferous epithelium contains only proliferative cells
- (b) Functional compartmentalisation of the seminiferous epithelium depends on tight junctions
- (c) The interstitial tissue contains few capillaries
- (d) The seminiferous epithelium contains numerous capillaries

6. Drugs that cause malformation in developing embryo during pregnancy are called

- (a) teratogens
- (b) nicotine

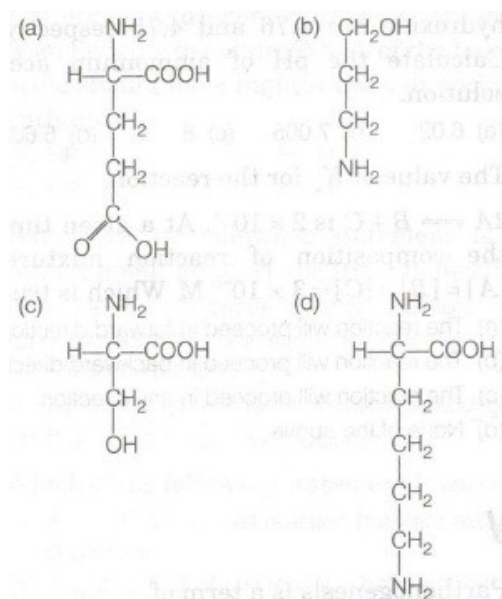


- (c) tranquillisers
- (d) alcoholic beverages

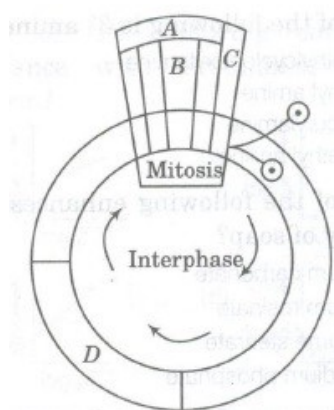
7. Which set is similar?

- (a) Corpus luteum – Graafian follicles
- (b) Sebum – Sweat
- (c) Vitamin-B<sub>7</sub> – Niacin
- (d) Bundle of His – Pacemaker

8. Which one out of (a) to (d) given below correctly represents the structural formula of the basic amino acid?



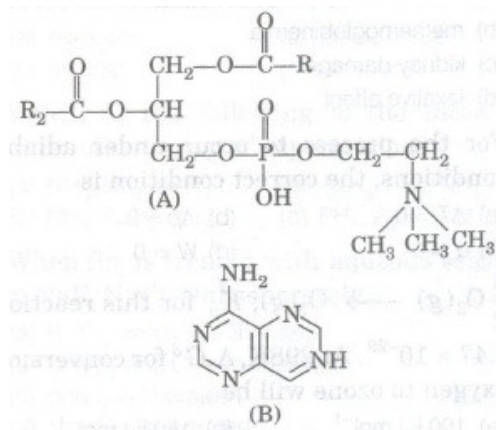
9. Given below is a schematic break-up of the phases/stages of cell cycle. Which one of the following is the correct indication of the stage/ phase in the cell cycle?



- (a) C-karyokinesis
- (b) S-synthetic phase
- (c) A-cytokinesis
- (d) B-metaphase

10. Which one of the following structural formula of two organic compounds is correctly

identified along with its related function?



- (a) B-uracil – a component of DNA
- (b) A-triglyceride – major source of energy
- (c) A-lecithin – a component of cell membrane
- (d) B-adenine – a nucleotide that makes up nucleic

11. Which is substitution of mitochondria in E. coli?

- (a) Golgi body
- (b) Mesosome
- (c) Ribosome
- (d) Glyoxysomes

12. Animal cell differ from plant cell in possessing

- (a) vacuoles
- (b) centrosomes
- (c) plastids
- (d) mitochondria

13. Which of the following organelles does not contain RNA?

- (a) Plasmalemma
- (b) Ribosome
- (c) Chromosome
- (d) Nucleolus

14. Dutrochet has given the concept about cell in

- (a) 1834
- (b) 1814
- (c) 1822
- (d) 1824

15. The scientific name of gharial is

- (a) *Naja bungarus*

- (b) *Gyrodactylus gangeticus*
- (c) *Hemidactylus flaviviridis*
- (d) None of the above

16. Which of the given option is correct regarding the statements?

**Statement I** Cephalochordata bears notochord all along the body throughout life.

**Statement II** Urochordate bears vertebral column only in tail region throughout the life.

- (a) I wrong, II correct
- (b) I correct, II wrong
- (c) Both I and II are wrong
- (d) Both are correct

17. In which of the following haemocyanin pigment is found?

- (a) Lower invertebrates
- (b) Echinodermata
- (c) Insecta
- (d) Annelida

18. Which of the following cells in earthworm play a role similar to liver in vertebrates?

- (a) Amoebocytes
- (b) Mucocytes
- (c) Chloragogen cells
- (d) Epidermal cells

19. Match the following and select the correct option.

<b>List I</b>	<b>List II</b>
A. Cyclostomes	1. Hemichordata
B. Ayes	2. Urochordata
C. Tunicates	3. Aganatha
D. Balanoglossus	4. Pisces
E. Osteichthyes	5. Tetrapod

**codes**

A B C D E

- (a) 3 5 2 1 4
- (b) 3 1 5 2 4
- (c) 1 2 3 4 5
- (d) 2 3 4 1 5

20. Chondrichthyes is characterised by

- (a) placoid scale
- (b) placoid scale and ventral mouth
- (c) ventral mouth
- (d) ctenoid scale and ventral mouth

21. Ichthyology is study of

- (a) aves
- (b) amphibians
- (c) reptiles
- (d) fishes

22. What will happen if ligaments are torn?

- (a) Bone will become unfixed
- (b) Bone will become fixed
- (c) Bone less movable at joint and pain
- (d) Bone will move freely at joint and no pain

23. Achondroplasia is a disease related with the defect in the formation of

- (a) membrane
- (b) mucosa
- (c) bone
- (d) cartilage

24. Yellow bone marrow is found specially in the medullary cavity

- (a) long bones
- (b) spongy bones
- (c) short bones
- (d) All of the above

25. Match the items of column I with column II and choose the correct option from the codes given below.

Column I	Column II
A. Neuron	1. Ossein
B. Bone-matrix	2. Nissl's bodies
C. RBCs of man	3. Antibodies
D. Lymphocytes	4. Non-nucleated

A B C D

- (a) 4 1 2 3

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

26. Space in the jaw bone unoccupied by teeth is called

- (a) dentine
- (b) diastema
- (c) enamel
- (d) crown

27. Identify the correct set, which shows the name of the enzyme from where it is secreted and substrate upon which it acts.

- (a) Ptyalin – Intestine – Maltose
- (b) Ptyalin – Pancreas – Lipid
- (c) Pepsin – Stomach wall – Caesin
- (d) Chymotrypsin – Salivary gland – Lactose

28. Endemic goitre is a state of

- (a) normal thyroid function
- (b) moderate thyroid function
- (c) increased thyroid function
- (d) decreased thyroid function

29. Hormone responsible for the secretion of milk after parturition is

- (a) ACTH
- (b) LH
- (c) ICSH
- (d) Prolactin

30. What is another name for the wind pipe?

- (a) Trachea
- (b) Larynx
- (c) Oesophagus
- (d) Lungs

31. Soil salinity is measured by

- (a) Porometer
- (b) Calorimeter
- (c) Conductivity meter
- (d) Potometer

32. Predation and parasitism are which type of interactions.

- (a) (+, +)
- (b) (+, 0 )
- (c) ( -)
- (d) (+, -)

33. The ultimate source of energy for living being is

- (a) sunlight
- (b) ATP
- (c) fats
- (d) carbohydrates

34. Which of the following species are restricted to an area?

- (a) Sympatric species
- (b) Sibling species
- (c) Allopatric species
- (d) Endemic species

35. Select the incorrect statement.

- (a) Stellar's sea cow and passenger pigeon got extinct due to over exploitation by men
- (b) The mitotic convention on biological diversity was held in 1992
- (c) Species diversity increase as we move away from the equator towards the poles
- (d) Lantana and Eichhomia are invasive weed species in India

36. The effect of cigarette smoking and radon in combination on lungs is

- (a) fatal
- (b) synergistic
- (c) mutualistic
- (d) antagonistic

37. The thermostable enzymes, Taq and Pfu, isolated from thermophilic bacteria are

- (a) RNA polymerases
- (b) DNA ligases
- (c) DNA polymerases
- (d) restriction endonucleases

38. Biolistic technique is used in

- (a) gene transfer process
- (b) tissue culture process
- (c) hybridisation process
- (d) germplasm conservation process

39. The largest gene in man is

- (a) insulin gene
- (b) tumour suppressor gene
- (c) beta globin gene of haemoglobin
- (d) dystrophin

40. Herbicide resistant gene in plant is

- (a) Mt
- (b) Gt
- (c) Ct
- (d) Bt

## Botany

1. In photosynthesis carbon dioxide is converted to carbohydrates. It is a process.

- (a) reductive
- (b) oxidative
- (c) catabolic and exergonic
- (d) None of the above

2. Which of the following is not an auxin?

- (a) IM
- (b) IBA
- (c) Zeatin
- (d) NM

3. Which of the following properties is shown by cytokinins?

- (a) Delay leaf senescence
- (b) Cause leaf abscission
- (c) Promote seed dormancy
- (d) Promote stomatal closing

4. Which of the following characteristics is are exhibited by  $C_4$  -plants?

I. Kranz anatomy.

II. The first product of photosynthesis is oxaloacetic acid.

III. Both PEP carboxylates and ribulosebiphosphate carboxylate act as carboxylating enzymes.

The correct option is

- (a) I and III, but not II
- (b) I and II, but not III
- (c) II and III, but not I
- (d) II and III

5. Which of the following plant keeps its stomata open during night and closed during the day?

- (a) Orchid
- (b) Cactus
- (c) Tea
- (d) Wheat

6. Genetic dwarfism can be overcome by

- (a) gibberellin
- (b) ethylene
- (c) auxin
- (d) ABA

7. Hormone inducing fruit ripening is

- (a) cytokinin
- (b) ethylene
- (c) abscissic acid
- (d) gibberellic acid

8. The year 1900 AD is highly significant for geneticists due to

- (a) discovery of genes
- (b) principle of linkage
- (c) chromosome theory of heredity
- (d) rediscovery of Mendelism

9. F<sub>1</sub>-generation means

- (a) first filial generation
- (b) first seed generation
- (c) first flowering generation
- (d) first fertile generation

10. Skin colour is controlled by

- (a) single gene
- (b) 3 pairs of genes
- (c) 2 pairs of genes
- (d) 2 pairs of genes with an intragene

11. Which of the following cross will produce terminal flower in garden pea?

- (a) AA x Aa
- (b) AA x aa
- (c) Aa x Aa
- (d) Aa x AA



12. Which one of the following pairs of plants are not seed producers?

- (a) Funaria and Ficus
- (b) Fern and Funaria
- (c) Funada and Pinus
- (d) Ficus and Chlamydomonas

13. Which one of the following is heterosporous?

- (a) Equisetum
- (b) Dryopteris
- (c) Salvinia
- (d) Adiantum

14. *Gymnos revoluta* is popularly known as

- (a) sago palm
- (b) royal palm
- (c) date palm
- (d) sea palm

15. Match the following with correct combination.

Column I

Column II

- |                       |                        |
|-----------------------|------------------------|
| A. <i>Cuscuta</i>     | 1. Saprophyte          |
| B. <i>Eichhornia</i>  | 2. Pneumatophore       |
| C. <i>Monotropa</i>   | 3. Insectivorous plant |
| D. <i>Rhizophora</i>  | 4. Parasite            |
| E. <i>Utricularia</i> | 5. Root pocket         |

Codes

A B C D E

- (a) 3 1 5 4 2
- (b) 2 3 1 5 4
- (c) 4 3 1 5 2
- (d) 4 5 1 2 3

16. Bacterial endotoxin is

- (a) a toxic protein that stays inside the bacterial cell
- (b) a toxic protein that is excreted into the medium
- (c) lipopolysaccharide located on the surface of the bacteria
- (d) None of the above

17. Endosperm of gymnosperms is

- (a) haploid
- (b) tetraploid
- (c) diploid
- (d) None of these

18. First vascular plant is

- (a) thallophyta
- (b) pteridophyta
- (c) bryophyta
- (d) spermatophyta

19. Diatomaceous earth is obtained from

- (a) Bacilliarophyceae
- (b) Xanthophyceae
- (c) Rhodophyceae
- (d) Chrysophyceae

20. Which of the following is an epidermal cell containing chloroplast?

- (a) Stomata
- (b) Hydathode
- (c) Guard cell
- (d) None of these

21. The structures present in the roots to absorb water and minerals is

- (a) epidermal extensions
- (b) hypodermis
- (c) endodermis
- (d) epidermal appendages

22. Lady finger belongs to family

- (a) Malvaceae
- (b) Cucurbitaceae
- (c) Brassicaceae
- (d) Liliaceae

23. The interxylary phloem is found in the stem of

- (a) Cucurbita
- (b) Salvia
- (c) Calotropis
- (d) None of these

24. Wound healing is due to

- (a) ventral meristem
- (b) secondary meristem
- (c) primary meristem
- (d) All of these

25. Angular collenchyma occurs in

- (a) Salvia
- (b) Helianthus
- (c) Althaea
- (d) Cucurbita

26. In pteridophytes, phloem is without

- (a) bast fibers
- (b) sieve tubes
- (c) companion cells
- (d) sieve cells

27. Match the following entities of column I with their respective orders of column II and choose the correct combination from the option.

Column I	Column II
A. Wheat	1. Primate
B. Mango	2. Diptera
C. Housefly	3. Sapindales
D. Man	4. Poales

**codes**

A B C D

4 3 2 1

1 2 4 3

3 4 2 1

2 4 1 3

28. Agar-agar is produced by

- (a) fungi
- (b) algae
- (c) bacteria
- (d) blue-green algae

29. In DNA, when AGCT occurs, their association is as per which of the following pair

- (a) A-G, C-T
- (b) A-T, G-C

- (c) A-C, G-T, A-C, E-T
- (d) All of these

30. A segment of DNA has 120 adenine and 120 cytosine bases. The total number of nucleotides present in the segment is

- (a) 60
- (b) 240
- (c) 120
- (d) 480

31. Lactose is composed of

- (a) glucose + glucose
- (b) glucose + galactose
- (c) glucose + fructose
- (d) fructose + galactose

32. Meiosis is best observed in dividing

- (a) cell of lateral meristem
- (b) cells of apical meristem
- (c) microsporocytes
- (d) microspores and anther wall

33. Study the following statements and select the correct option.

- I. Tapetum nourishes the developing pollen grains.
- II. Hilum represents the junction between ovule and funicle.
- III. In aquatic plants such as water hyacinth and water lily, pollination is by water.
- IV. The primary endosperm nucleus is triploid.

- (a) I, II, and IV are correct, but III is incorrect
- (b) I and II are correct, but III and IV are incorrect
- (c) I and IV are correct, but II and III are incorrect
- (d) I, III and IV are correct, but II is incorrect

34. Masses of pollen grains, i.e. ,pollinia is found in

- (a) Gramineae
- (b) Solanaceae
- (c) Orchidaceae
- (d) Malvaceae

35. Morphine, which is used as an analgesic is obtained from

- (a) *Taxusbrevifolia*
- (b) *Berberisnilghiriensis*

- (c) *Cinchona officinalis*
- (d) *Papaver somniferum*

36. Pebrine is a disease of

- (a) fish
- (b) honey bee
- (c) silk worm
- (d) lac insect

37. Factor governing the earth surface is

- (a) topographic
- (b) edaphic
- (c) temperature
- (d) biotic

38. The direction of energy flow is

- (a) Producers → Herbivores → Decomposers → Omnivores
- (b) Producers → Carnivore → Herbivores → Decomposers
- (c) Decomposers → Carnivores → Herbivores → Producers
- (d) Producers → Herbivores → Carnivores → Decomposers

39. If the Bengal tiger become extinct

- (a) hyenas and wolves will become scarce
- (b) its gene pool will be lost forever
- (c) the wild areas will be safe for man and domestic
- (d) the population of beautiful animals like deers will get stabilised

40. Biological treatment of water pollution is done with the help of

- (a) fungi
- (b) lichen
- (c) phytoplanktons
- (d) None of the above

## English

Directions (Q Nos. 1–5) In the following questions, sentences are given with blanks to be filled in with an appropriate word. Four alternatives are suggested for each question. Choose the correct alternative out of the four.

1. The little girl for the light switch in the dark.

- (a) groped
- (b) grappled

- (c) gripped
- (d) grovelled

2. The summit meeting provided him the much shot in the arm.

- (a) required
- (b) desired
- (c) needed
- (d) urgent

3. We must the tickets for the movie in advance.

- (a) draw if
- (b) buy
- (c) remove
- (d) take

4. The State Transport Corporation has a loss of ₹ 5 crore this year.

- (a) obtained
- (b) derived
- (c) incurred
- (d) formulated

5. One and you know who among them is the culprit.

- (a) look
- (b) peep
- (c) sight
- (d) gaze

Directions (Q Nos. 6–10) In the following questions, out of the four alternatives, choose the one which best expresses the meaning of the given word.

6. GAINSAID

- (a) Advantage
- (b) Proposal
- (c) Contradict
- (d) Suggestion

7. PROFOUND

- (a) Profuse
- (b) Boundless
- (c) Deep
- (d) Fathomless

8. FLAK

- (a) Adventure
- (b) Advice
- (c) Criticism
- (d) Praise

9. HOODLUM

- (a) Pioneer
- (b) Criminal
- (c) Devotee
- (d) Scholar

10. SPASMODIC

- (a) Continuous
- (b) Gradual
- (c) Intermittent
- (d) Spontaneous

Directions (Q Nos. 11–15) In the following questions, choose the word opposite in meaning to the given word.

11. FILTHY

- (a) Stainless
- (b) Shining
- (c) Sterilised
- (d) Clean

12. CROWDED

- (a) Deserted
- (b) Lonely
- (c) Empty
- (d) Barren

13. VAGUE

- (a) Known
- (b) Published
- (c) Popular
- (d) Definite

14. SUPERVISE

- (a) Overlook
- (b) Misdirect
- (c) Neglect

(d) Forget

15. MAGNANIMOUS

(a) Selfish

(b) Naive

(c) Generous

(d) Small

Directions (Q Nos. 16–20) In the following questions, four alternatives are given for the idiom/phrase printed in bold in the sentence. Choose the alternative which best expresses the meaning of the idiom/phrase.

16. We have to keep our fingers crossed till the final result is declared.

(a) keep praying

(b) feel suspicious

(c) wait expectantly

(d) feel scared

17. The members of the group were at odds over the selection procedure.

(a) acting foolishly

(b) in dispute

(c) unanimous

(d) behaving childishly

18. The popularity of the yesteryears' superstar is on the wane.

(a) growing more

(b) at its peak

(c) growing less

(d) at rock-bottom

19. His father advised him to be fair and square in his dealings lest he should fall into trouble.

(a) considerate

(b) upright

(c) careful

(d) polite

20. There is no love lost between the two neighbours.

(a) close friendship

(b) intense dislike

(c) a love-hate relationship

(d) cool indifference

Directions (Q Nos. 21–25) In the following questions, a part of the sentence is printed in bold.



Below are given alternatives to the bold part at (a), (b), (c) which may improve the sentence. Choose the correct alternative. In case no improvement is needed, your answer is (d).

21. Ravi has got many friends because he has got much money.

- (a) Enough money
- (b) A lot of money
- (c) Bags of money
- (d) No improvement

22. You must try making him to understand.

- (a) Make him understand
- (b) To making him understand
- (c) To make him understand
- (d) No improvement

23. He has cooked that meal so often he can do it with his eyes closed.

- (a) Mind blank
- (b) Eyes covered
- (c) Hands full
- (d) No improvement

24. Not a word they spoke to the unfortunate wife about it.

- (a) They had spoken
- (b) Did they speak
- (c) They will speak
- (d) No improvement

25. There is sufficient fund to meet the requirement of the entire schools in our zone.

- (a) Schools
- (b) All the schools
- (c) All of the schools
- (d) No improvement

Directions (Q Nos. 26–30) In the following questions, out of the four alternatives, choose the one which can be substituted for the given words/sentence

26. Word for word reproduction.

- (a) Copying
- (b) Mugging
- (c) Verbatim
- (d) Photostat

27. A person who collects coins.

- (a) Philatelist
- (b) Numismatist
- (c) Narcissist
- (d) Fatalist

28. That which is perceptible by touch

- (a) Tangible
- (b) Tenacious
- (c) Contagious
- (d) Contingent

29. One who possesses many talents.

- (a) Versatile
- (b) Gifted
- (c) Exceptional
- (d) Nubile

30. A person who studies the formation of the Earth.

- (a) Meteorologist
- (b) Anthropologist
- (c) Geologist
- (d) Seismologist

Directions (Q Nos. 31–35) In the following 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 named P, Q, R and S. These parts are not given in their proper order. Rearrange these parts in their proper order and find out which of the given four combinations is correct?

31. (1) In reply to a question

- (P) that securing extradition
- (Q) operating from the UK soil remained
- (R) of anti-India elements
- (S) the spokesman said

(6) New Delhi's first priority.

- (a) PROS
- (b) OSPR
- (c) ROSP
- (d) SPRO

32. (1) The first component is

- (P) and vocational training

(Q) so as to enable them  
(R) the provision of further technical  
(S) to both rural and urban youth  
(6) to secure employment in industry and the services sector.

- (a) PRSO
- (b) RPSO
- (c) RSOP
- (d) SRPO

33. (1) The move to revert to a six-day week

(P) among the employees  
(Q) while the leaders represented to the Chief Minister  
(R) that they be taken into confidence  
(T) led to an animated decision  
(6) before any decision was taken.

- (a) OPSR
- (b) RSPO
- (c) SPOR
- (d) SOPR

34. (1) It was obvious

(P) made by him  
(Q) submitted at the meeting  
(R) from the comments  
(T) on the draft proposals  
(6) that he was not satisfied with them.

- (a) PSRQ
- (b) QRSP
- (c) RPSO
- (d) SORP

35. (1) The Minister of state for power

(P) laying emphasis  
(Q) in conservation of electricity in industries  
(R) has written to his counterparts in State Government  
(T) on bringing about improvement  
(6) by introduction of energy efficient equipment.

- (a) OPSR
- (b) RPSO
- (c) SPOR
- (d) SOPR

Directions (Q Nos. 36–40) Read the following passage carefully and answer the questions given below it.

In this work of incessant and feverish activity, men have little time to think, much less to consider ideals and objectives. Yet how are we to act, even in the present, unless we know which way we are going and what our objectives are? It is only in the peaceful atmosphere of a university that these basic problems can be adequately considered.

It is only when the young men and women, who are in the university today and on whom the burden of life's problems will fall tomorrow, learn to have clear objectives and standards of values that there is hope for the next generation. The past generation produced some great men but as a generation it led the world repeatedly to disaster. World Wars I and II are the price that has been paid for the lack of wisdom on man's part in this generation.

I think that there is always a close and intimate relationship between the end we aim at and the means adopted to attain it.

Even, if the end is right, but the means are wrong, it will vitiate the end or divert us in a wrong direction. Means and ends are thus intimately and inextricably connected and cannot be separated.

That indeed has been the lesson of old taught us by many great men in the past, but unfortunately it seldom remembered.

36. People have little time to consider ideals and objectives because

- (a) they consider these ideals meaningless
- (b) they do not want to burden themselves with such ideas
- (c) they have no inclination for such things
- (d) they are excessively engaged in their routine activities

37. 'The burden of life's problems' in the fourth sentence refers to

- (a) the incessant and feverish activities
- (b) the burden of family responsibilities
- (c) the onerous duties of life
- (d) the sorrows and sufferings

38. The World Wars I and II are the price that man paid due to

- (a) the absence of wisdom and sagacity

- (b) his not caring to consider the life's problems
- (c) his ignoring the ideals and objectives of life
- (d) his excessive involvement in feverish activities

39. According to the writer the adoption of wrong means even for the right end would

- (a) not let us attain our goal
- (b) bring us dishonour
- (c) impede our progress
- (d) deflect us from the right path

40. The word 'vitiate' used in the second paragraph means

- (a) negate
- (b) debase
- (c) tarnish
- (d) destroy