

## Manipal (Medical) • Solved Paper 2011 | 13

**Directions (Q. Nos. 10-13)** Choose the most suitable alternative to fill in the blank.

10. If a universal language really existed, people like tourists and businessmen would find it easier to ..... with foreigners.  
 (a) transact (b) communicate  
 (c) deal (d) exchange
11. On account of his humiliating defeat in the recent elections, he appeared unusually ..... when I called on him the other day.  
 (a) oppressed (b) repressed  
 (c) depressed (d) suppressed
12. You need ..... shoes for walking in the hills.  
 (a) good (b) comfortable  
 (c) satisfactory (d) sturdy
13. Amongst the two brothers, Sammeer being worthier often ..... the younger Deepak.  
 (a) dominates (b) eclipses  
 (c) subdues (d) overshadows

**Directions (Q. Nos. 14-16)** Choose the alternative which is an improvement upon the italicised part of the sentence. If the sentence is correct as it is, choose (d) as your answer.

14. He enjoys *to tell stories* to children.  
 (a) how to tell stories (b) telling stories  
 (c) to narrate stories (d) No improvement
15. Galileo said that the earth *revolved* around the Sun.  
 (a) has revolved (b) has been revolving  
 (c) revolves (d) No improvement
16. The matter must be considered *in* every point of view.  
 (a) with (b) from  
 (c) at (d) No improvement

**Directions (Q. Nos. 17-20)** Choose the alternative which is nearest in meaning to the word given in capital letters.

17. FOSTER  
 (a) Encourage (b) Fabricate  
 (c) Foment (d) Nurture
18. ENIGMA  
 (a) Elusive (b) Clear (c) Puzzle (d) Praise
19. FILTHY  
 (a) Healthy (b) Ugly (c) Dirty (d) Angry
20. NOSTALGIC  
 (a) Soothing (b) Homesick  
 (c) Diseased (d) Indolent

**Directions (Q. Nos. 21-25)** In each of the following questions, there occurs a specific relations. Fill the vacant space (?) question mark according to that relation.

21. Door : Bang :: Chain : ?  
 (a) Clank (b) Tinkle  
 (c) Thunder (d) Clinch
22. Bread : Wheat :: Brick : ?  
 (a) Cement (b) Building  
 (c) Clay (d) Fire
23. Mouse : Cat :: Fly : ?  
 (a) Horse (b) Spider  
 (c) Rat (d) Animal
24. Mirror : Reflection :: Water : ?  
 (a) Immersion (b) Conduction  
 (c) Refraction (d) Dispersion
25. Tennis : Court :: Boxing : ?  
 (a) Ring (b) Course  
 (c) Pool (d) Arena

**Directions (Q. Nos. 26-30)** In the following questions, choose the option which shows common feature in the relationship given in each question.

26. Sarnath : Kapilavastu : Sanchi  
 (a) These have ancient universities  
 (b) These are places having massive pillars  
 (c) These are linked with Lord Buddha  
 (d) These are famous for stone caves
27. Ebony : Rosewood : Mahogany  
 (a) These are hardwood trees.  
 (b) These are coniferous trees  
 (c) These yield good for fuel  
 (d) These are trees of temperature regions
28. Arjun : Uddhav : Sudama  
 (a) They were all princes  
 (b) They were friends of Krishna  
 (c) They were Pandavas  
 (d) They were great warriors
29. Sherlock Holmes : James Bond : Hercules Poirot  
 (a) They are the only detective agents  
 (b) They are private detectives  
 (c) They are agents of CBI  
 (d) They are characters from detective fiction
30. Goose : Duck : Stork  
 (a) They are white  
 (b) They are water birds  
 (c) These species are disappearing  
 (d) They migrate to India from Siberia.

32. The members of Rajya Sabha are elected for a term of  
 (a) two years (b) four years  
 (c) six years (d) five years
33. Who was the first Governor-General of Bengal?  
 (a) Robert Clive (b) Warren Hastings  
 (c) William Bentinck (d) Cornwallis
34. Jnanpith Award is conferred to those in the field of  
 (a) Literature (b) History  
 (c) Drama (d) Dance
35. What was Lala Lajpat Rai demonstrating against when he succumbed to police brutality?  
 (a) Rowlatt Act  
 (b) Minto-Morley Reforms  
 (c) Simon Commission  
 (d) Pitts India Act
- (c) Convertible Currency System  
 (d) Minimum Reserve System
37. Garba is a dance form of  
 (a) Gujarat (b) Rajasthan  
 (c) Odisha (d) Asom
38. ATM stands for  
 (a) Automatic Teller Machine  
 (b) Automated Teller Machine  
 (c) Automatic Tally Machine  
 (d) Automated Tally Machanism
39. The first African National to become Secretary General of UNO was  
 (a) Kofi Annan (b) Butros Gali  
 (c) Nelson Mandela (d) Winni Mandela
40. Who was the first Indian woman to scale Mt Everest?  
 (a) Bachendri Pal (b) Fu Dorji  
 (c) Aun Sang Suu Kyi (d) Yoko Ono

## Answers

### Physics

1. (b) 2. (b) 3. (d) 4. (b) 5. (b) 6. (b) 7. (c) 8. (b) 9. (b) 10. (b)  
 11. (c) 12. (d) 13. (b) 14. (c) 15. (d) 16. (b) 17. (b) 18. (a) 19. (c) 20. (b)  
 21. (c) 22. (c) 23. (a) 24. (b) 25. (b) 26. (a) 27. (a) 28. (d) 29. (d) 30. (b)  
 31. (a) 32. (b) 33. (c) 34. (b) 35. (c) 36. (a) 37. (c) 38. (d) 39. (a) 40. (b)  
 41. (d) 42. (a) 43. (b) 44. (b) 45. (a) 46. (d) 47. (a) 48. (d) 49. (b) 50. (c)  
 51. (a) 52. (a) 53. (b) 54. (b) 55. (a) 56. (a) 57. (c) 58. (b) 59. (a) 60. (a)

### Chemistry

1. (b) 2. (c) 3. (c) 4. (b) 5. (b) 6. (a) 7. (d) 8. (c) 9. (b) 10. (c)  
 11. (b) 12. (b) 13. (a) 14. (c) 15. (a) 16. (c) 17. (c) 18. (d) 19. (d) 20. (b)  
 21. (a) 22. (a) 23. (a) 24. (d) 25. (c) 26. (b) 27. (b) 28. (a) 29. (c) 30. (a)  
 31. (b) 32. (d) 33. (d) 34. (a) 35. (d) 36. (b) 37. (c) 38. (d) 39. (b) 40. (b)  
 41. (d) 42. (d) 43. (a) 44. (c) 45. (a) 46. (d) 47. (c) 48. (b) 49. (c) 50. (b)  
 51. (a) 52. (b) 53. (b) 54. (a) 55. (b) 56. (b) 57. (a) 58. (a) 59. (a) 60. (c)

### Biology

1. (c) 2. (d) 3. (b) 4. (a) 5. (a) 6. (b) 7. (b) 8. (a) 9. (b) 10. (d)  
 11. (a) 12. (c) 13. (c) 14. (a) 15. (d) 16. (c) 17. (a) 18. (c) 19. (c) 20. (a)  
 21. (d) 22. (a) 23. (b) 24. (c) 25. (d) 26. (c) 27. (d) 28. (c) 29. (d) 30. (b)  
 31. (b) 32. (b) 33. (b) 34. (c) 35. (a) 36. (c) 37. (b) 38. (d) 39. (a) 40. (a)  
 41. (a) 42. (a) 43. (a) 44. (d) 45. (d) 46. (d) 47. (d) 48. (a) 49. (b) 50. (c)  
 51. (d) 52. (a) 53. (a) 54. (a) 55. (d) 56. (b) 57. (d) 58. (b) 59. (b) 60. (a)  
 61. (b) 62. (a) 63. (d) 64. (d) 65. (b) 66. (c) 67. (c) 68. (d) 69. (d) 70. (a)  
 71. (b) 72. (b) 73. (b) 74. (b) 75. (b) 76. (a) 77. (a) 78. (c) 79. (b) 80. (a)

## English

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

## Hints &amp; Solutions

## Physics

1. For coincidence of bands

$$\text{or } \frac{nD\lambda_1}{d} = \frac{(n+1)D\lambda_2}{d}$$

$$\text{or } n\lambda_1 = (n+1)\lambda_2$$

$$7800n = 5200(n+1)$$

$$\text{or } n = 2$$

2. Hubble's law states that the redshift in light coming from distant galaxies is proportional to their distance from the earth

$$v = Hd$$

where  $H$  Hubble's constant.

$$\therefore \text{Dimension of } H = \frac{\text{Dimension of } v}{\text{Dimension of } d}$$

$$= \frac{[LT]^{-1}}{[L]} = [T^{-1}]$$

3. From Archimedes' principle

Weight of (boy + log)

= weight of water displaced

$$(60 + V \times 0.6 \times 10^3)g = V \times 10^3 g$$

$$\Rightarrow 0.4 \times 10^3 V = 60$$

$$\Rightarrow V = \frac{60}{0.4 \times 10^3} = \frac{60}{400} = \frac{3}{20} \text{ m}^3$$

5. When an atom comes down from some higher energy level to the second energy level (
- $n_1 = 2$
- ) and
- $n_2 = 3, 4, 5, \dots$
- , then the lines of the spectrum are obtained in the visible part.

$$\frac{1}{\lambda} = R \left( \frac{1}{2^2} - \frac{1}{n^2} \right), \text{ where } n = 3, 4, 5, \dots$$

The shortest wavelength of the series corresponds to  $n = \infty$  is  $3646 \text{ \AA}$ .

6. From lens formula

$$\frac{1}{f} = (\mu - 1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

If focal length of lens in air is  $f_a$  and in liquid is  $f_l$ , then

$$\frac{1}{f_a} = (\mu_g - 1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\frac{1}{f_l} = (\mu_g - 1) \left( \frac{1}{R_1} - \frac{1}{R_2} \right)$$

$$\frac{f_l}{f_a} = \frac{(\mu_g - 1)}{(\mu_g - 1)}$$

$$\frac{f_l}{20} = \left[ \frac{3}{2} - 1 \right] / \left[ \frac{4}{3} - 1 \right]$$

$$= \frac{3}{2}$$

$$f_l = 30 \text{ cm}$$

7. At low pressure and high temperature real gases behaves like ideal gases.

8. Kinetic energy of satellite,
- $KE = \frac{1}{2} mv^2$

where

$$v = \sqrt{\frac{GM}{r}}$$

Potential energy of satellite,

$$PE = \frac{-GMm}{r} = -mv^2$$

$\therefore$  Total energy = KE + PE

$$= \frac{1}{2} mv^2 - mv^2 = -\frac{1}{2} mv^2$$

9. When the intermolecular distance decreases due to compressive force, there is repulsive force between molecules.

$$10. F = \frac{mv^2}{r}$$

$$F = \frac{0.5 \times 4 \times 4}{0.4}$$

11. Magnetic domains are oriented randomly in the unmagnetised state.

$$12. g = \frac{Gm}{R^2}$$

$$\therefore g \propto \frac{1}{R^2}$$

increase in value of  $g$

$$= 2 \text{ (\% decrease in } R)$$

$$= 2 \times 1 = 2\%$$

$$13. k \propto \frac{1}{l}$$

Since, one-fourth length is cut away.

So remaining length is  $\frac{3}{4}$  th, hence  $k$  become

$$\frac{4}{3} \text{ times ie, } k' = \frac{4}{3}k.$$

14. Maximum acceleration

$$\alpha = \omega^2 y$$

$$\therefore 0.5 = \omega^2 \times 0.02$$

$$\text{or } \omega^2 = \frac{0.5}{0.02} = 25$$

$$\text{So, } \omega = 5$$

Now, maximum velocity is

$$v = a\omega = 0.1 \times 5 = 0.5 \text{ m/s}$$

15. Young's modulus of elasticity

$$Y = \frac{FL}{Al}$$

To double the length  $l = L$

$$\therefore Y = \frac{F}{A} \Rightarrow F = YA$$

$$= 2 \times 10^{11} \times 0.1 \times 10^{-4} = 2 \times 10^6 \text{ N}$$

16. Cohesive force is the intermolecular attraction between like molecules, whereas adhesive force is the intermolecular force between unlike molecules. In the given case cohesive force between mercury molecules is more than adhesive force between mercury molecules and glass rod, hence mercury does not stick to rod.

17. Gas molecules collides with walls of vessels due to which there occurs change in momentum of molecules due to which force is produced and thus pressure.

$$dW = p dV$$

$$\therefore dW = p(V_2 - V_1)$$

$$= p\left(\frac{V}{2} - V\right) \quad \left(\because V_1 = V, V_2 = \frac{V}{2}\right)$$

$$= -\frac{pV}{2}$$

So, the work done by the gas is negative.

20. When X-ray passed through an absorption plate of thickness  $d$ , then transmitted intensity

$$I = I_0 e^{-\mu d}$$

21. Here  $C = 2 \mu\text{F}$ ,  $V = 100$  volt

$$\text{Heat produced } H = \frac{1}{2} CV^2$$

$$= \frac{1}{2} (2 \times 10^{-6}) \times (100)^2$$

$$= 1 \times 10^{-2} \text{ J}$$

$$= 0.01 \text{ J}$$

22. Gauss is the unit of magnetic flux  $\phi$ .

23. According to equation of motion, distance covered in  $n$ th sec.

$$S_n = u + \frac{a}{2} (2n - 1)$$

$$S_n = \frac{a}{2} (2n - 1)$$

$$\therefore S_1 : S_2 : S_3$$

$$= \{2(1) - 1\} : \{2(2) - 1\} : \{2(3) - 1\}$$

$$= 1 : 3 : 5$$

$$24. p^2 = 2mK$$

$$K = \frac{p^2}{2m}$$

As given momentum  $p$  is same for both bodies

$$\frac{K_1}{K_2} = \frac{m_2}{m_1} = \frac{2m}{m}$$

$$\frac{K_1}{K_2} = \frac{2}{1}$$

$$25. R \propto u^2$$

$$R = ku^2$$

$$\frac{dR}{R} = 2 \frac{du}{u} = 2 \times (1\%) = 2\%$$

26. Einstein explained the phenomenon of photoelectric effect on the basis of Planck's theory. According to which the kinetic energy of photoelectrons emitted from the metal surface is  $E$  and  $\phi$  is the work function of the metal, then

$$E = h\nu - \phi \quad \dots(i)$$

where  $h\nu$  is the energy of the photon absorbed by the electron in the metal. If for a given metal, the threshold frequency of light be  $\nu_0$  then an amount of energy  $h\nu_0$  of the photon of light will be spent in ejecting the electron out of the metal.

ie,  $\phi = h\nu_0 \quad \dots(ii)$

From Eqs. (i) and (ii), we get

$$E = h\nu - h\nu_0$$

$$\Rightarrow E = h(\nu - \nu_0)$$

27. In line spectrum, bright coloured lines are observed on a dark background. These are called spectral lines. Each spectral line has a definite wavelength. Line spectrum is obtained per gases and metallic vapours, when they are in the atomic state. It means that line spectrum is related with the atomic state of matter.

28.  $R = R_0 \left(\frac{1}{2}\right)^n$

$$\frac{R}{R_0} = \left(\frac{1}{2}\right)^{t/T_{1/2}}$$

$$\left(\frac{1}{8}\right) = \left(\frac{1}{2}\right)^{t/T_{1/2}}$$

$$\left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^{t/T_{1/2}}$$

$$\frac{t}{T_{1/2}} = 3$$

$$t = 3T_{1/2} = 3 \times 8 = 24 \text{ yr}$$

29. Approximate resistance of  $p$ - $n$  junction in forward bias,  $R_f = 10^2 \Omega$

Approximate resistance of  $p$ - $n$  junction in reverse bias,  $R_r = 10^6 \Omega$

$$\therefore \frac{R_f}{R_r} = \frac{10^2}{10^6} = \frac{10^{-4}}{1}$$

$$\Rightarrow R_f : R_r = 10^{-4} : 1$$

30.  $r \propto \frac{n^2}{Z}$  and  $v \propto \frac{Z}{n^2}$

Time period of revolution of an electron around the nucleus of charge  $Ze$  is

$$T = \frac{2\pi r}{v} = 2\pi \frac{n^2}{Z} \cdot \frac{n}{Z}$$

$$\Rightarrow T \propto \frac{n^3}{Z^2}$$

32. Velocity of sound in air  $v = 336 \text{ m/s}$ .

As we are quite well know that the lowest frequency of audible sound is 20 Hz. Hence maximum length of a closed pipe to produce just audible sound is given by

$$l = \frac{336}{4 \times v} = \frac{336}{4 \times 20}$$

$$= 4.2 \text{ m}$$

33. The phenomena of rotation of plane polarised light is called optical activity.

36. Ionization energy =  $RchZ^2$

$$Z = 3 \text{ for Li}^{2+}$$

$$\text{Ionization energy} = (3)^2 Rch$$

$$= 9 Rch$$

37. Error in radius,  $\frac{\Delta r}{r} = 0.3\%$

$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

$$\therefore \text{Error in volume} = 3 \times \frac{\Delta r}{r}$$

$$= (3 \times 0.3)\% = 0.9\%$$

38. For a rectangular lamina, moment of inertia about a time passing through centre and parallel to longer side is minimum.

Hence, momentum of inertia about  $EG$  will be minimum.

$$\begin{aligned} 39. \text{Maximum speed } v &= \sqrt{2g(h_2 - h_1)} \\ &= \sqrt{2 \times 10 \times (2 - 0.75)} \\ &= \sqrt{(20 \times 1.25)} \\ &= \sqrt{25} = 5 \text{ m/s} \end{aligned}$$

40. Oscillator is an amplifier with positive feedback ie, with feedback more than unity.

41. Relation (d) which is  $x = \sqrt{a - bv^2}$  correctly represent the SHM because, velocity

$$v = \omega \sqrt{a^2 - x^2}$$

$$\text{or } x = \sqrt{a^2 - v^2/\omega^2}$$

$$\text{or } x = \sqrt{a^2 - bv^2}$$

$$\text{where } b = \frac{1}{\omega^2}$$

or slope  $\propto r^2$

For thinnest wire slope is minimum.

i.e, wire OA is thinnest.

43. Time constant =  $\frac{L}{R} = \frac{10}{5} = 2\text{ s}$

i.e, is 2 s, the current sizes to  $\left(1 - \frac{1}{e}\right)$

or  $(1 - e^{-1})$  times.

44. Semiconductor can be used safely between temperature  $0^\circ\text{C}$  and  $75^\circ\text{C}$ .

45. From first law of thermodynamics,  
 $dQ = dU + dW$

we have  $dQ = dU$  (as  $dW = 0$ )

But  $dQ < 0$

$\therefore dU < 0$

$$NC_V \Delta T < 0$$

or  $\Delta T < 0$

Hence, the temperature will decrease.

46. Refractive index of medium  $n = \frac{\lambda_a}{\lambda_m}$

$$= \frac{6000}{4000} = 1.5$$

47. The prism deviates the light rays towards its base.

48. There will be no force on electron due to magnetic field (because of parallel motion); but due to force applied by electric field, velocity of electron will decrease.

49. In case of transistor, constant  $\alpha$  is current gain in common-base configuration and constant  $\beta$  is current gain in common-emitter configuration. Also  $\alpha$  is always less than 1 while  $\beta$  is always greater than 1.

50.  $\frac{\theta_1 - \theta_2}{t} = K \left( \frac{\theta_1 + \theta_2}{2} - \theta_0 \right)$

$$\therefore \frac{80^\circ - 60^\circ}{1} = K \left( \frac{80^\circ + 60^\circ}{2} - 30^\circ \right)$$

$$20 = K \times 40 \Rightarrow K = \frac{1}{2}$$

For next 1 min

$$\frac{60^\circ - \theta}{1} = \frac{1}{2} \left( \frac{60^\circ + \theta}{2} - 30^\circ \right)$$

$$\Rightarrow \theta = \frac{440}{5} = 48^\circ\text{C}$$

51. Hydrogen molecule behaves as diamagnetic as no net magnetic moment is associated with it.

52. In a DC circuit  $X_L = \omega L = 2\pi fL = 0$   
Therefore  $Z = R = 10 \Omega$

53. Gasses cannot be liquified above critical temperature but at high pressure they can be.

54. For meter bridge  
Unknown resistance

$$R = \frac{l_2}{l_1} \times X = \frac{3}{2} \times 5 = 7.5 \Omega$$

55. Fringe width,  $\beta = \frac{D\lambda}{d}$

But here,  $\theta = \frac{d}{D} \Rightarrow d = D\theta$

$$\therefore \beta = \frac{D\lambda}{D\theta} = \frac{\lambda}{\theta}$$

56. Mean kinetic energy of gas depends only on the temperature. Here temperature is given same, so ratio of kinetic energies will be 1 : 1.

57. Phase difference in R-L circuit

$$\phi = \tan^{-1} \left( \frac{X_L}{R} \right)$$

$$\tan 45^\circ = \frac{X_L}{R}$$

$$X_L = R$$

58. The wire does not sink, so net force on it will be zero

$$\therefore mg = T \cdot 2l$$

$$\Rightarrow \pi r^2 l dg = T \cdot 2l$$

$$\therefore r = \sqrt{\frac{2T}{\pi d g}}$$

59. Musical interval produced between two notes of frequencies is given by

$$\frac{320}{240} = 1.33$$

60. Tension,  $T = mg - \text{buoyant force}$

$$= V\rho g - V\sigma g = V(\rho - \sigma)g = l^3(\rho - \sigma)g$$

$$= 8 \times 10^{-6} (8920 - 820) \times 10$$

$$= 0.648 \text{ N}$$

## Chemistry

1. Polarity character is due to the difference in electronegativities of two atoms or molecules.
2.  $\text{PF}_5$  involves  $sp^3d$  hybridisation and hence has trigonal bipyramidal structure.
3. Tetrahedral sites are double comparable to octahedral sites therefore ratio of  $X$  and  $Z$  is 2 : 1, hence formula of the compound should be  $X_2Z$ .
4. At  $A \rightarrow$  temperature = 300 K, volume = 10 L,

pressure =  $p_1$

At  $C \rightarrow$  temperature = 600 K

Volume = 20 L, Pressure =  $p_2$

$$\text{From } \frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$$

$$\frac{p_1 \times 10}{300} = \frac{p_2 \times 20}{600}$$

$$\text{or } p_1 = p_2$$

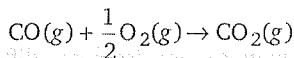
i. e., process is isobaric.

5. During evaporation, molecules having high energy leave the surface of liquid. As a result average kinetic energy of liquid decreases.

$$KE \propto T$$

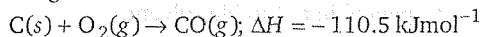
$\therefore$  Temperature of liquid falls.

6.  $\Delta E = Q + W = 600 + (-300) = 300 \text{ J}$
7.  $\text{C(s)} + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$   
 $\Delta H = -393.5 \text{ kJmol}^{-1}$



$$\Delta H = -283 \text{ kJmol}^{-1}$$

On subtracting equation (ii) from equation (i), we get



The enthalpy of formation of carbon monoxide per mole =  $-110.5 \text{ kJmol}^{-1}$

8.  $K_c$  is a characteristic constant for the given reaction.
9. For first order reaction,  $t_{1/2}$  is independent of initial concentration.
10.  $\text{H}_2\text{O} + \text{NH}_3 \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$

In this reaction  $\text{H}_2\text{O}$  acts as acid because it donate a proton.

11.  $\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{H}^+$

On adding  $\text{CH}_3\text{COONa}$ , due to common ion,  $[\text{H}^+]$  decreases.



$$K_h = \frac{10^{-14}}{10^{-5}}$$

So, degree of hydrolysis

$$x = \sqrt{\frac{K_h}{C}} = \sqrt{\frac{10^{-9}}{10^{-1}}} = 10^{-4}$$

% degree of hydrolysis =  $10^{-4} \times 100 = 0.01\%$

13. Electron affinity value of Cl is higher than that of F as Cl belongs to 3rd period while F belongs to 2nd period. In Cl, electron-electron repulsion forces are weaker than that of F.

14. IE of Na, Mg, Al and Si are in the order



15. NaCN is used as a depressant in the separation and concentration of ZnS and PbS ore. Here, NaCN acts as a depressant for ZnS but does not prevent PbS from forming the froth.

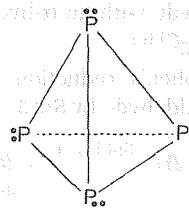
16. Malachite  $[\text{CuCO}_3 \cdot \text{Cu(OH)}_2]$  is an ore of copper.

17.  $\text{P}_4$  molecule,

Bond angle =  $60^\circ$

Six P—P = single bonds

Lone pair = 4



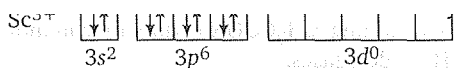
18. Xe is highly polar since the ionisation potential of xenon is quite close to the ionisation of oxygen.

19. Due to free electron, liquid ammonia becomes paramagnetic.

20. Ionic radii  $\propto \frac{1}{\text{atomic number}}$ , ionic radius decreases from left to right in a period.

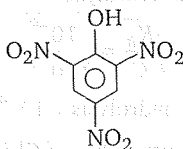
21. Basic character of oxide decreases from left to right in a period of Periodic Table.

22. 22 carat gold is an alloy of copper and gold.

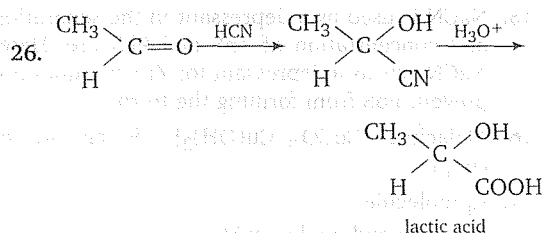


No unpaired electron so, will show diamagnetic character so will weights less when, weighted in magnetic field.

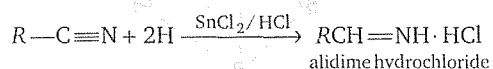
24. 2, 4, 6-trinitrophenol is called picric acid.



25. Lucas reagent is used for distinction between primary, secondary and tertiary alcohols. Tertiary alcohol gives turbidity immediately with Lucas reagent. 2-hydroxy-2-methyl propane is a tertiary alcohol.



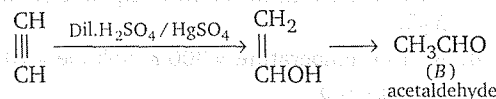
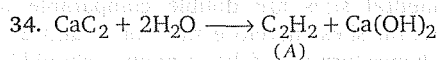
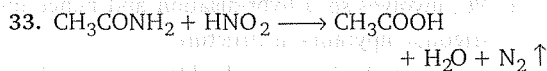
27. Compound A + NaOH  $\longrightarrow$  alcohol + acid.  
Hence, it is cannizzaro's reaction and A should be an aldehyde without  $\alpha$ -hydrogen atom e.g., HCHO, C<sub>6</sub>H<sub>5</sub>CHO.
28. In the Stephen's reduction alkyl cyanide is reduced to aldehyde by SnCl<sub>2</sub>/HCl.



29. Cuprammonium salt is [Cu(NH<sub>3</sub>)<sub>4</sub>]SO<sub>4</sub>. In water it gives two ions, [Cu(NH<sub>3</sub>)<sub>4</sub>]<sup>2+</sup> and SO<sub>4</sub><sup>2-</sup>.

30. Potash alum is an example of double salt.  
31. Metal carbonyl organometallic compounds possess both  $\sigma$  and  $\pi$  characters.

32. formic acid has  $-\text{C}=\text{O}$  (aldehyde) group. it reduces Tollen's reagent to silver mirror like other aldehydes.



35. Isobutene, CH<sub>3</sub>-C(CH<sub>3</sub>)=CH<sub>2</sub> has minimum force of attraction due to steric hindrance hence, it has minimum boiling point.

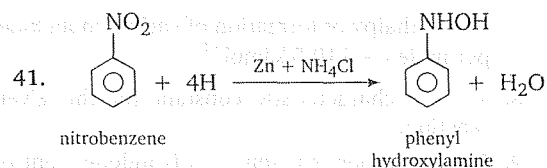
36. The C-X bond energy is maximum in CH<sub>3</sub>F hence, fluoride is less reactive to form the Grignard reagent with Mg.

37. In alkaline hydrolysis of a tertiary halide by aqueous alkali, if concentration of alkali is doubled, then the reaction will remain constant because t-alkyl halides with aqueous alkali give S<sub>N</sub>1 reaction and rate of S<sub>N</sub>1 reaction is not based upon the concentration of nucleophile (i.e., alkali).

38. Amino acids are bifunctional organic compounds, hence it contains both carboxylic group (-COOH) as well as amino group (-NH<sub>2</sub>).

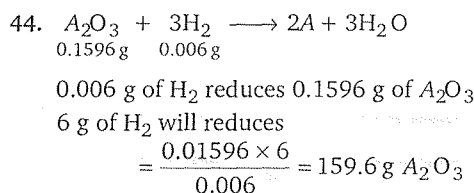
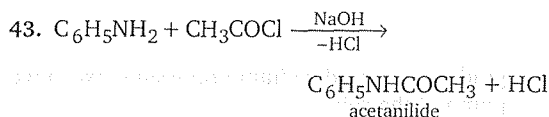
39. Glucose and manose are isomers, differ in configuration at C<sub>2</sub>. Isomers which differ at C<sub>2</sub> position are known as epimers.

40. Dettol is a mixture of chloroxylenol and terpineol in a suitable solvent.



42. Due to resonance of electron pair in aniline, basic strength decreases while in benzylamine, electron pair do not involve in resonance hence, its basic strength is highest.





Hence, molecular weight of  $A_2O_3 = 159.6$

Let molecular weight of  $A = x$

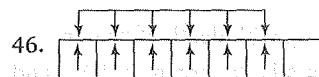
$\therefore 2x \times 3 \times 16 = 159.6$

or  $2x = 159.6 - 48$

or  $2x = 111.6$

or  $x = 55.8$

45. As electron moves away from the nucleus, its potential energy increases.



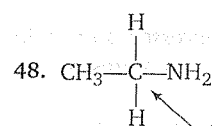
No of exchanges =  $5 + 4 + 3 + 2 + 1 = 15$

47. Oxidation state of P in  $H_3PO_4$

$+3 + x - 8 = 0$

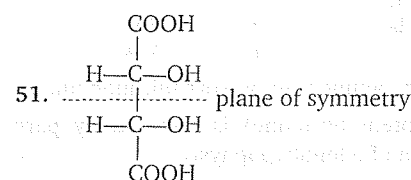
$x - 5 = 0$

$x = +5$



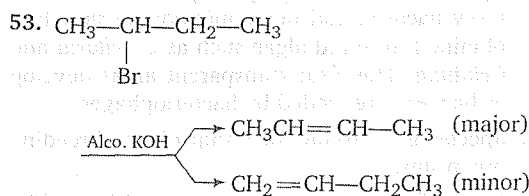
49. Acetaldehyde,  $CH_3CHO$  is the rearrangement product of vinyl alcohol,  $CH_2=CHOH$ .

50. Allyl chloride show formation of very stable  $CH_2=CH-CH_2^+$  ion and rest two have partial double bond character in their C—X bond.



Meso tartaric acid is optically inactive due to the presence of molecular symmetry. It is optically inactive due to internal compensation i. e., the effect of one half of the molecule is neutralised by other.

52. IUPAC name of  $CH_3OC_2H_5$  is methoxy ethane.



This reaction is governed by Saytzeff's rule. According to this rule, the elimination of  $\beta$ -hydrogen atom take place from the carbon having the less number of H-atoms or in other words, a stable alkene is formed. (More substituted alkene is more stable)

54. Raoult's law is not applicable if the total number of particles of solute changes in the solution due to association or dissociation.

55. For NaCl,  $i = 2$

$\Delta T_f = 2K_f m = 2 \times 1.86 \times 1 = 3.72$

$T_s = T - \Delta T_f = 0 - 3.72 = -3.72^\circ C$

56.  $W_{\text{metal}} = \frac{E_{it}}{96500} = \frac{E \times 3 \times 50 \times 60}{96500}$

$E = \frac{96500 \times W}{3 \times 50 \times 60}$

$= \frac{96500 \times 1.8}{3 \times 50 \times 60} = 19.3$

57.  $E_{\text{cell}} = E_{\text{cell}}^\circ - \frac{0.059}{2} \log \frac{[Zn^{2+}]}{[Cu^{2+}]}$

$= 1.10 - \frac{0.059}{2} \log \frac{0.1}{0.1}$

$= 1.10 \text{ V}$

58. Purple of cassius is a colloidal solution of gold (Au).

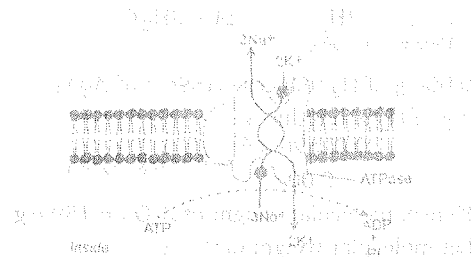
59. Amount of substance adsorbed should increase with decrease in temperature.

60. In  $Fe_3O_4$ , let oxidation number of Fe = x

$3x + 4(-2) = 0$  or  $x = \frac{8}{3}$

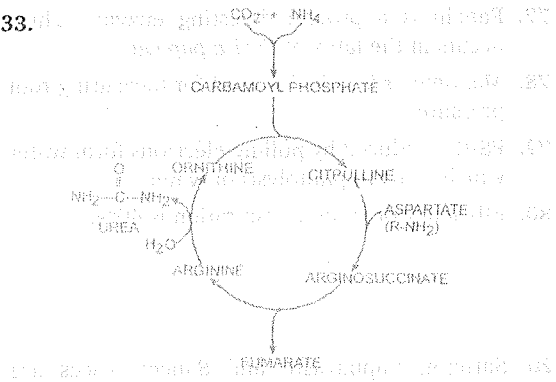
1. Louis Pasteur made this statement with reference to serendipity, discoveries by accident and sagacity.
2. Agar agar is used in preparing culture media to grow bacteria and other microorganisms. It is obtained from red algae such as *Gracilaria* and *Gelidium*. The clear transparent areas develop as bacteria are feeded by bacteriophages.
3. Species is a product of group of interbreeding organisms.
4. Most of the broad spectrum antibiotics like streptomycin, erythromycin, chloromycin, tetracycline, aureomycin, etc, are obtained from different species of *Streptomyces* which belong to Actinomycetes.
5. Plasmids of some bacterial cells have been used as vector for carrying foreign genes for genetic engineering and biotechnological experiments. Cyanophycean forms have not been used for these experiments.
6. Quinine is a white, bitter, crystalline alkaloid extracted from the bark of *Cinchona*, used in antimalarial medication.
7. *Ephedra* is a xerophyte. Its leaves are highly reduced and scaly. The whole plant is used for extraction of ephedrine alkaloid.
8. Tornaria is the larva of *Balanoglossus* which belongs to the sub-phylum-Hemichordata.
9. Metabolism occurs in all living organisms.
10. Complete metamorphosis occurs in the insects belonging to the division-Endopterygota or Holometabola.
11. Horse (*Equus*) is an unguligrade animal running on one digit. The feet are most specialized, with only one digit (third), walton the hoof that covers the end of toe.
12. Janus green B is used for vital staining of mitochondria which contain cytochrome oxidase, an enzyme concerned with cellular respiration.
13. Virus lacks the typical structure of a cell.
14. Energy from ATP cause conformational change in the solute carrier complex. From energy of one ATP,  $3\text{Na}^+$  pumped outside and two  $\text{K}^+$  taken in. This process of expelling out  $\text{Na}^+$  ions and drawing in  $\text{K}^+$  ions against the concentration gradient and electrochemical

gradient is called sodium-protassium exchange pump of the cell.



15. Haematin is a brown ferric iron containing substance obtained from oxyhaemoglobin or from dried blood.
16. Omnivores feed on all types of foods, hence contain maximum number of digestive enzymes.
17. Lethal means dealing with death of bearer.
18. Balbiani rings have a high content of RNA and show a rapid uptake and turnover of RNA precursors in polytene chromosomes.
19. In the double helical model of DNA proposed by Watson and Crick, the nitrogenous bases attached to the pentose sugar moiety.
20. Retroviruses are exception to the central dogma.
21. Regular gene codes for a repressor protein in inducible system and a co-repressor in repressible system.
22. RNA synthesized in the nuclei of eukaryotes comprises heterogenous nuclear RNA (*hn*-RNA). This includes primary messenger RNA.
23.
 

	Bb		dY	
Bd	bd	BY	bY	
1/4	1/4	1/4	1/4	
24. Because the amino acids are organic monomers.
25. MSH (protein hormone) is secreted by pars intermedia of adenohipophysis.
26. Prof. Birbal Sahni (1891-1949) worked on class-Pentoxylae, gymnosperms of Jurassic period from Nipania Chert in Raj Mahal hills of Bihar.

27. In apes, arms are longer than legs. This helps in a form to locomotion called brachiation, a type of suspension and swinging of the body.
28. *Orobanchae* is total root parasite of crucifers and thus found growing in mustard field at the time of harvesting of crop (March).
29. Coconut fruit develops fibrous mesocarp which provide buoyancy to fruit and help in its dispersal through water. Coconut trees usually grow in water logged saline sea shore areas.
30. Outermost layer of bark is the layer of cork or phellem produced by phellogen or cork cambium to protect vital tissues from drought and dessication.
31. Water potential decreases with addition of solute. Water potential of a cell protoplasm is equal but opposite in sign to DPD.
32. Urea is synthesized in liver through ornithine cycle, which was discovered by Hans Krebs and Kurt Henseliet (1933).
33. 
- Ruben and Kamen (1941) states that  $O_2$  evolved during photosynthesis comes from water and not  $CO_2$ .
34. As respiratory substrate  $C_{39}H_{72}O_6$  is poorer in oxygen as compared to C and H. Hence, more  $O_2$  will be required to oxidise it. So, value of R.Q. will be less than one (0.718).
35. Cartilage is semisolid and flexible fibrous connective tissue of skeletal tissue. Blood is the softest tissue in the body. Areolar tissue connects and supports other tissues. Serous glands secrete water fluid, e.g., sweat glands, parotid glands.
36. Liver is endodermal in origin.
37. Corpus luteum, an endocrine structure is formed in the mammalian ovary from ruptured Graafian follicle after ovulation.
38. Amylopsin is another name for pancreatic amylase which digesting starch in alkaline medium.
39. Respiratory centre in medulla is affected by the chemical nature of arterial blood especially  $PCO_2$  or blood pH.
40. Because urea is removed from blood in kidney.
41. Polyuria occurs when excess of urine is produced. In pyuria, WBCs or pus in urine are present. Gout is a condition of high level of uric acid in blood. Haematuria occurs when RBCs are present in urine.
42. Brush border indicates the presence of microvilli.
43. Radius of the lower arm is a cartilaginous bone.
44. Rigor Mortis occurs due to skeletal and cardiac muscles shortly after death.
45. Acetylcholine is a neurotransmitter with a primary function of mediating synaptic activity of the nervous system.
46. The auditory area is located in the temporal lobe of cerebrum.
47. Adrenaline increases heart rate as well as cardiac output. This promotes increase of blood pressure.
48. In pollen culture, anthers are used as nurse cells for successful production of embryoids.
49. Ethylene is a gaseous plant hormone that controls many activities in plants.
50. Root meristem (showing high cell division) is sub-apical in position due to presence of root cap.
51. The central follicular cavity or antrum is lined by membrane granulosa.
52. Foetus is the unborn offspring of a viviparous animal after it has attained the particular form of the species.
53. The pronephros or head kidney derived from the anterior nephrostome are functional in frog's tadpole.
54. Growth hormone of pituitary can work effectively only in the presence of thyroxine.
55. Helical contractile sheath is found around the tail of bacteriophage.

- algae).
58. Mycoplasma is obligate parasite and thus it divides and redivides only inside the body of living host.
  59. It is believed to cause pyorrhoea. Which spread by kissing.
  60. Gills of *Agaricus* produces hymenium layer to develop basidia and basidiospores for reproduction.
  61. Number of microsporangia in monotheous anthers is only two while in ditheous anthers, four.
  62. Turpentine oil is a liquid resin obtained from *Pinus*.
  63. Most cells diameter are in the unit  $\mu\text{m}$ .
  64. It is the most important genus of Gram positive bacterium with many species of great medical importance.
  65. The 'rope like arrangement of microtubules intermediate filaments' is well suited for providing mechanical stability to the cell.
  66. The cells which are metabolically active contain mitochondria in abundance.
  67. Among leucocytes, neutrophils and monocytes are phagocytic.
  69. Crossing over or recombination of genes results in variations.
  70. Ovum or sperm of human beings contains equal number of autosomes, i.e., 22 each.
  71. DNase breaks DNA into nucleotides.
  72. Puromycin is a structural analogue of the aminoacyl end of the tRNA. It reversibly reacts with the peptidyl tRNA, thereby terminating protein synthesis.
  73. A loreal pit between the eye and nostril is found in pit vipers like *Ancistrodon* and *Crotalus* (rattle snake) of North America.
  74. Mammary glands are present in all mammals.
  75. Irregular flowers are isobilaterally symmetrical.
  76. Funnel-shaped style and stigma of *Crocus sativus* are used as saffron.
  77. Papain is a protein digesting enzyme which occurs in the latex of *Carica papaya*.
  78. Manometer is a device used for measuring root pressure.
  79. PS-II is reduced by pulling electrons from water which leads to photolysis of water.
  80. Efficiency of aerobic respiration is 40%.

### English

21. Second is the sound made by the first.
22. Second is used to make the first.
23. Second feeds on the first.
24. As, light rays falling on mirror undergo reflection. Similarly, light rays falling on water undergo refraction.
25. As, 'Tennis' is played on 'Court'. Similarly, 'Boxing' is played on 'Ring'.
26. Sarnath, Kapilavastu and Sanchi places are linked with Lord Buddha.
27. Ebony, Rosewood and Mahogany are hardwood trees.
28. Arjun, Uddhav and Sudama all were friends of Krishna.
29. Sherlock Holmes, James Bond and Hercules Poirot, all are characters from detective fiction.
30. Goose, Duck and Stork, all are water birds.