SOLUTIONS

Mentors Eduserv

All India Test Series 2018

Unit Test-2

AIPMT PATTERN

Test Date: 26-08-2017

Mentors Eduserv: Plot No.-136/137, Parus Lok Complex, Boring Road Crossing,
Patna-1, Ph. No. : 0612-3223680 / 81, 7781005550 / 51

PHYSICS

1. **(1)**

By using $\frac{1}{2}m(\upsilon_1^2 - \upsilon_2^2) = QV$

$\Rightarrow \frac{1}{2} \times 10^{-3}\{\upsilon_1^2 - (0.2)^2\} = 10^{-8}(600-0)$

$\Rightarrow \upsilon_1 = 22.8\,cm/s$

2. **(1)**

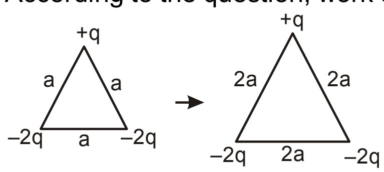
When two particles moves towards each other then $v_1 + v_2 = 6$

When these particles moves in the same direction then $v_1 - v_2 = 4$

By solving $v_1 = 5$ and $v_2 = 1$ m/s.

3. **(4)**

According to the question, work done in increasing the separation from a to 2a is $W = U_f - U_i$



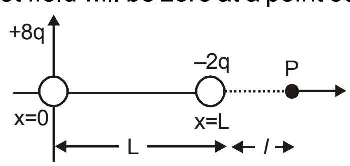
Here, $U_i = \frac{1}{4\pi\varepsilon_0}\left[\frac{q(-2q)}{a} + \frac{q(-2q)}{a} + \frac{(-2q)(-2q)}{a}\right]$

$= \frac{1}{4\pi\varepsilon_0 a}[-2q^2 - 2q^2 + 4q^2] = 0 \Rightarrow \quad U_t - U_i = 0$

Hence, W = 0

4. **(3)**

The net field will be zero at a point outside the charges and near the charge which is smaller magnitude.



Suppose E.F. is zero at P as shown.

Hence at P; k. $\frac{8q}{(L+l)^2} = \frac{k.(2q)}{l^2} \Rightarrow l = L$

So distance of P from origin is L + L = 2L

5. **(3)**

$F_{ini.} = \frac{1}{4\pi\varepsilon_0} \times \frac{12 \times (-8)}{r^1} = \frac{-1}{4\pi\varepsilon_0} \times \frac{96}{r^2}$

$q_1 + q_2 = \frac{12-8}{2} = \frac{4}{2} = 2\mu F$

$\therefore\ F_{final} = \frac{1}{4\pi\varepsilon_0} \times \frac{2 \times 2}{r^2} = \frac{4}{r^2} \times \frac{1}{4\pi\varepsilon_0} = \frac{4}{r^2} \times \frac{1}{4\pi\varepsilon_0}$

$\therefore \frac{|F|_{ini.}}{|F|_{final}} = \frac{96}{4} = 24:1$

6. **(3)**

Number of electrons,

$$n = \frac{6\times10^{23}}{63.5}\times10\times\frac{1}{10^{6}} = \frac{6\times10^{18}}{63.5}$$

$$q = \frac{6\times10^{18}\times1.6\times10^{-19}}{63.5}C = 1.5\times10^{-2}C$$

$$F = \frac{9\times10^{9}\times1.5\times10^{-2}\times1.5\times10^{-2}}{\left(\frac{10}{100}\right)} = 2.0\times10^{8}N$$

7. (3)

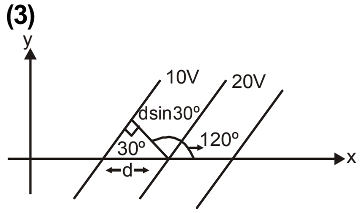
$$\tau = PE\sin\theta$$

$$4 = P\times2\times10^{5}\times\frac{1}{2}$$

$$\Rightarrow \quad P = 4\times10^{-5}cm = q\times2\times10^{-2}$$

So $q = \frac{4\times10^{-5}}{2\times10^{-2}} = 2\times10^{-3}$ coulomb

8. (3)



$$E = \frac{\Delta U}{d\sin30^{o}} = 200V/m$$

9. (2)

10. (3)

V(x, y, z) = 6xy – y + 2yz

$$E_x = \frac{\partial V}{\partial x} = -6y = -6$$

$$E_y = -\frac{\partial V}{\partial y} - 6x + 1 + 2z = -5$$

$$E_z = \frac{\partial V}{\partial z} = -2y = -2$$

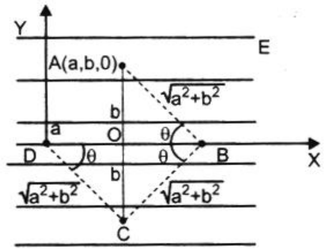
$$\vec{E} = E_x\hat{i} + E_y\hat{j} + E_z\hat{k}$$

$$\vec{E} = -6\hat{j} - 5\hat{j} - 2\hat{k}$$

$$= -(6\hat{i} + 5\hat{i} + 7\hat{k})$$

11. (2)

As electric field is a conservative field.
Hence the work done does not depend on path



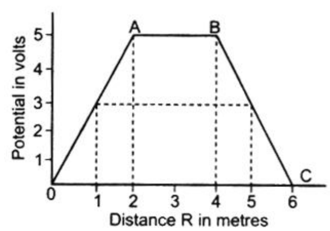
$\therefore \quad W_{ABCD} = W_{AOD} = W_{AO} + W_{OD}$

= Fb cos 90º + Fa cos 180º = 0 + qEa(–1) = –qEa

12. (1)

Intensity at 5m is same as at any point between B and C because the slope of BC is same throughout (i.e., electric field between B and C is uniform). Therefore electric field at R = 5m is equal to the slope of line BC hence by $E = \frac{-dV}{dr}$;

$$E = -\frac{(0-5)}{6-4} = 2.5\frac{V}{m}$$

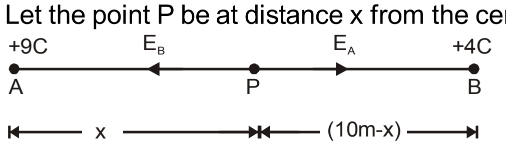


13. (1)

Electric lines of force start (i.e. diverge out) from positive charge and end (i.e. coverage) on negative charge or extends to infinity. Thus, A is positive charge and b is negative charge. Also, density of lines at A is more than that at B, i.e. |A| > |B|.

14. (2)

Let the point P be at distance x from the centre of A where the electric field intensity is zero.



$\therefore$ At point P, $E_A = E_B$

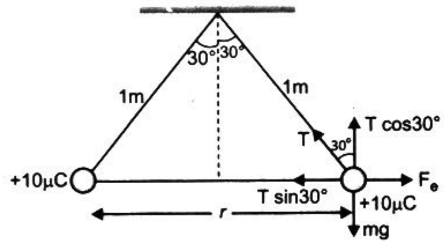
$$\frac{1}{4\pi\varepsilon_0}\frac{9C}{x^2} = \frac{1}{4\pi\varepsilon_0}\frac{4C}{(10m-X)^2} \Rightarrow \frac{9}{x^2} = \frac{4}{(10m-x)^2}$$

$$\frac{3}{x} = \frac{2}{10m-x} \text{ or } 30m - 3x = 2x$$

$$5x = 30m \text{ or } x = \frac{30m}{5} = 6m$$

15. (2)

In the following figure, in equilibrium F_e = T sin 30º, r = 1m

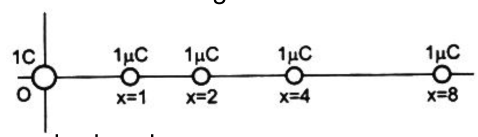


$$\Rightarrow \quad 9\times10^{9}.\frac{Q^{2}}{r^{2}}=T\times\frac{1}{2}$$

$$\Rightarrow \quad 9\times10^{9}.\frac{(10\times10^{-6})^{2}}{1^{2}}=T\times\frac{1}{2}\Rightarrow T=1.8N$$

16. (2)

The schematic diagram of distribution of charges on x-axis is shown in figure.



Total force acting on 1C charge is given by

$$F=\frac{1}{4\pi\varepsilon_0}\left[\frac{1\times1\times10^{-6}}{(1)^2}+\frac{1\times1\times10^{-6}}{(2)^2}+\frac{1\times1\times10^{-6}}{(4)^2}+\frac{1\times1\times10^{-6}}{(8)^2}+....\infty\right]$$

$$=\frac{10^{-6}}{4\pi\varepsilon_0}\left(\frac{1}{1}+\frac{1}{4}+\frac{1}{16}+\frac{1}{64}+....\infty\right)$$

$$=9\times10^{9}\times10^{-6}\left(\frac{1}{1-\frac{1}{4}}\right)$$

$$=9^{3}\times10^{3}\left(\frac{1}{3/4}\right)=12\times10^{3}=12000\ N$$

17. (1)

$$F=\frac{1}{4\pi\varepsilon_0}.\frac{q_1q_2}{r^2}$$

$$(q_1)_{minimum}=(q_2)_{minimum}$$

$$r=1m$$

$$\therefore \quad F=(9.0\times10^{9})(1.6\times10^{-19})^{2}$$

$$=2.3\times10^{-28}N$$

18. (1)

$$dV=-\vec{E}.\vec{d}r$$

$$=-(y\,\hat{i}+x\hat{j}).(dx\hat{i}+dy\,\hat{j}+dz\,\hat{k})$$

$= -(ydx + xdy) = -d(xy)$

Integrating, we get

$V = -xy + \text{constant}.$

19. (3)

$$V_1 - V_2 = kq\left(\frac{1}{r_1} - \frac{1}{r_2}\right) = kg\left(\frac{r_2 - r_1}{r_1 r_2}\right)$$

i.e. $(r_2 - r_1) = \frac{(V_1 - V_2)r_1 r_2}{kq}$

$(r_2 - r_1) = t$

$\therefore \quad t \propto r_1 r_2$

20. (4)

A = (2, 2) and B = (4, 1)

Now $W_{A\to B} = q(V_B - V_A)$ ......(1)

$$\int_A^B dV = -\int_A^B \vec{E}.d\vec{r}$$

or, $V_B - V_A = -\int_{(2.2)}^{(4.1)} (y\hat{i} + x\hat{j}).$

$(dx\,\hat{i} + dy\,\hat{j} + dz\,\hat{k})$

or, $V_B - V_A = -\int_{(2.2)}^{(4.1)} (ydx + xdy)$

$$= -\int_{(2.2)}^{(4.1)} d(xy) = [-xy]_{2.2}^{4.1} = 0$$

$\therefore \quad W_{A\to B} = 0$ [from Eq. (1)]

21. (3)

$$V = \frac{1}{4\pi\varepsilon_0}.\frac{q}{R}$$

$\therefore \quad \frac{q}{4\pi\,\varepsilon_0} = RV \Rightarrow E(r) = \frac{1}{4\pi\,\varepsilon_0}.\frac{q}{r^2} = \frac{RV}{r^2}$

22. (2)

$E = \frac{1}{4\pi\,\varepsilon_0}.\frac{q}{R^2} \propto \frac{1}{R^2}$ (q = constant)

Radius is halved. Therefore, electric field will become 4 times or 4E

Further, $V = \frac{1}{4\pi\,\varepsilon_0}.\frac{q}{R} \propto \frac{1}{R}$ (q = constant)

Radius is halved, so potential will become two times or 2 V.

23. (2)

$\tan\theta = \frac{y}{x} = \frac{2\sqrt{2}}{2} = \sqrt{2}$ or $\cot\theta = \frac{1}{\sqrt{2}}$ $\tan\phi = \frac{\tan\theta}{2} = \frac{\sqrt{2}}{2}$

$= \frac{1}{\sqrt{2}} = \cot\theta$ $\left(\tan\phi = \frac{E_\theta}{E_r} = \frac{\tan\theta}{2}\right)$

$\therefore \; \phi = 90^\circ - \theta$

i.e, $\vec{E}$ is along positive y-axis.

24. (1)

In such situation potential difference depends only on the charge on inner sphere. Since, charge on inner sphere is unchanged. Therefore, potential difference V will remains unchanged.

25. (2) 26. (2) 27. (2)

28. (1)

If t_1 and $2t_2$ are the time taken by particle to cover first and second half distance, respectively

$$t_1 = \frac{x/2}{3} = \frac{x}{6}$$

$$x_1 = 4.5t_2 \text{ and } x_2 = 7.5t_2$$

So, $x_1 + x_2 = \frac{x}{2}$

$$\Rightarrow 4.5t_2 + 7.5t_2 = \frac{x}{2} \Rightarrow t_2 = \frac{x}{24}$$

Total time, $t = t_1 + 2t_2 = \frac{x}{6} + \frac{x}{12} = \frac{x}{4}$

So, average speed = 4 ms^{-1}

29. (3)

$$y = a + bt + ct^2 - dt^4$$

$$\therefore \nu = \frac{dy}{dt} = b + 2ct - 4dt^3$$

and $a = \frac{d\nu}{dt} = 2c - 12dt^2$

Hence, at t = 0, $\nu_{initial} = b$ and $a_{initial} = 2c$

30. (3)

$$\nu = At + Bt^2 \Rightarrow \frac{dx}{dt} = At + Bt^2 \Rightarrow \int_0^x dx = \int_1^2 (At + Bt^2)dt$$

$$\Rightarrow x = \frac{A}{2}(2^2 - 1^2) + \frac{B}{3}(2^3 - 1^3) = \frac{3A}{2} + \frac{7B}{3}$$

31. (3)

Velocity of particle $\nu = \frac{dx}{dt} = 4 - 2t$

When velocity is zero, $0 = 4 - 2t \Rightarrow t = 2\,\text{sec}$

$$X = 4(2) - (2^2) = 4m$$

32. (2)

We know that $S_{nth} = u + \frac{1}{2}a(2n - 1)$

$$S_{3rd} = 0 + \frac{1}{2}a(2 \times 3 - 1) = \frac{5}{2}a \text{ (For } n = 3s)$$

$$S_{4th} = 0 + \frac{1}{2}a(2 \times 4 - 1) = \frac{7}{2}a \text{ (for } n = 4s)$$

$$= \frac{S_{4th} - S_{3rd}}{S_{3rd}} \times 100 = \frac{\frac{7}{2a} - \frac{5}{2a}}{\frac{5}{2a}} \times 100$$

$$= \frac{\frac{2a}{2}}{\frac{5}{2}a} \times 100 = 2 \times 20 = 40\%$$

33. **(1)**

Velocity of the particle is given as

$$u = \sqrt{180 - 16x}\ m/s$$

Squaring on both sides

$$v^2 = 180 - 16x$$

Now compare with

$$v^2 = u^2 + 2as$$

$$\Rightarrow 2a = -16$$

$$\Rightarrow a = -8 m/s^2$$

34. **(3)**

Stopping distance, $S = \frac{u^2}{2a}$

$$\Rightarrow \frac{S_2}{S_1} = \left(\frac{u_2}{u_1}\right)^2 \Rightarrow \frac{S_2}{6} = \left(\frac{100}{50}\right)^2 = 4$$

$$\Rightarrow S_2 = 24m$$

35. **(1)**

Let the initial velocity = u and acceleration = a

In 1st case, $S_1 = ut_1 + \frac{1}{2}at_1^2$

$200 = 2u + 2a \qquad (\because t_1 = 2s)$

$100 = u + a$ ......(i)

In 2nd case, $S_2 = ut_2 + \frac{1}{2}at_2^2$

$420 = 6u + 18a \qquad (\because t_2 = 2 + 4 = 6s)$

$3a + u = 70$ .....(ii)

Solving Eqs. (i) and (ii) we get

$a = -15ms^{-2}$ and $u = 115\ ms^{-1}$

$$\therefore \quad v = u + at = 115 - 15 \times 7 = 10ms^{-1}$$

36. **(3)**

Distance travelled in fifth second for first body = distance travelled in 3rd second for second body.

$S_5 = S_3$

$$S_{n^{th}} = u + \frac{(2n-1)a}{2}$$

$$S_5 = 0 + \frac{9}{2}a_1$$

$$S_3 = 0 + \frac{5}{2}a_2$$

$$\frac{9}{2}a_1 = \frac{5}{2}a_2 \Rightarrow \frac{a_1}{a_2} = \frac{5}{9}$$

37. (1)

Since, body starts from rest u = 0, Let t_1 be time when body accelerates and t_2 when it decelerates.

$\therefore \quad t = t_1 + t_2 \quad \Rightarrow \quad t_2 = t - t_1$

$\therefore \quad \nu = 0 + at_1$ ....(i)

When car finally comes to rest, $\nu = 0$

$\therefore \quad 0 = \nu - b(t - t_1)$ ....(ii)

From Equestion (i) and (ii), we get

$$t_1 = \frac{b}{(a+b)}t \quad \text{and} \quad \nu = \frac{ab}{(a+b)}t$$

38. (4)

By the definition, the slope of displacement time graph is velocity.

i.e., $\nu = \tan\theta$

$$\therefore \frac{\nu_1}{\nu_2} = \frac{\tan\theta_1}{\tan\theta_2} = \frac{\tan 30^\circ}{\tan 45^\circ} \Rightarrow \frac{\nu_1}{\nu_2} = \frac{1}{\sqrt{3}}$$

39. (3)

Initial relative velocity = $v_1 - v_2$, Find relative velocity = 0

From

$$v^2 = u^2 - 2as \Rightarrow 0 = (v_1 - v_2)^2 - 2 \times a \times s$$

$$\Rightarrow \quad s = \frac{(v_1 - v_2)^2}{2a}$$

If the distance between two cars is 's' then collision will take place. to avoid collision d > s

$$\therefore \quad d > \frac{(v_1 - v_2)^2}{2a}$$

Where d = actual initial distance between two cars.

40. (1)

Given line have positive intercept but negative slope. So its equation can be written as

$v = -mx + v_0$ ....(i)

[where $m = \tan\theta = \frac{v_0}{x_0}$]

By differentiating with respect to time we get

$$\frac{dv}{dt} = -m\frac{dx}{dt} = -mv$$

Now substituting the value of v from eq. (i) we get

$$\frac{dv}{dt} = -m[-mx + v_0] = m^2x - mv_0 \therefore a = m^2x - mv_0$$

i.e., the graph between a and x should have positive slope but negative intercept on a - axis.

41. **(4)**

Let the height of tower be h and the body takes time n to reach the ground when it falls freely.

$$\therefore \quad h = \frac{1}{2}gn^2 \qquad \text{...(i)}$$

In the last second. i.e., in nth second the body travels 0.36h. In |t –1| sec, it travels.

1h – 0.36h = 0.64 h

From Equation (i) $0.64h = \frac{1}{2}g(n-1)^2$ ...(ii)

$$\frac{0.64}{1} = \frac{(n-1)^2}{n^2} \Rightarrow \frac{8}{10} = \frac{n-1}{n}$$

$$\Rightarrow \quad 8n = 10n - 10$$

$$\Rightarrow \quad n = 5$$

From Equation (i) $h = \frac{1}{2} \times 9.8 \times 25$

h = 12.5 × 9.8 = 122.5 = 123 m

42. **(3)**

Since, direction of v is opposite to the distance of g and h, so from equation of motion

$$h = -\nu t + \frac{1}{2}gt^2 \quad \Rightarrow gt^2 - 2\nu t - 2h = 0$$

$$\Rightarrow \quad t = \frac{2\nu \pm \sqrt{4\nu^2 + 8gh}}{2g} \Rightarrow \quad t = \frac{\nu}{g}\left(1 + \frac{\sqrt{1+2gh}}{\nu^2}\right)$$

43. **(4)**

Total time of flight $T = t_1 + t_2 = \frac{2u}{g}$

$$\Rightarrow \quad u = \frac{g(t_1 + t_2)}{2}$$

44. **(2)**

Taking downward motion of the first stone from A to ground, we have

$$h = -ut_1 + \frac{1}{2}gt_1^2 \qquad \text{.......(i)}$$

Taking downward motion of second stone from a to ground, we have

$$h = ut_2 + \frac{1}{2}gt_2^2 \qquad \text{......(ii)}$$

Third stone $h = \frac{1}{2}gt_3^2$ .....(iii)

Multiplying Equation (i) by t_2 and Equation (ii) by t_1 and adding, we get

$$h(t_1 + t_2) = \frac{1}{2}gt_1t_2(t_1 + t_2)$$

$$\Rightarrow \quad h = \frac{1}{2}gt_1t_2 \qquad \text{.......(iv)}$$

From Equation (iii) and (iv), we get

$$t_3^2 = t_1t_2 \quad \text{or} \quad t_3 = \sqrt{t_1t_2} = \sqrt{9 \times 4} = 6s$$

45. **(1)**

Let v_{PG} = velocity of police w.r.t. ground

v_{TG} = velocity of thief w.r.t. ground = $v_{TG} - v_{PG}$

$$= \left(\frac{153-45}{18}\right) \times 5 = 30\,m/s$$

v_{BC} = velocity of bullet w.r.t. car

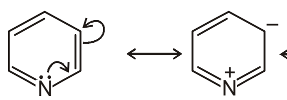
= 180 – 30 = 150 m/s

CHEMISTRY

46. **(2)**
As N imparts more resonance than 'O'.

47. **(4)**
Cross conjugation is present in (4) as in a set of three π – bond only two π – bonds interact with each - other by conjugation while the 3rd one is excluded from interation.

48. **(2)**

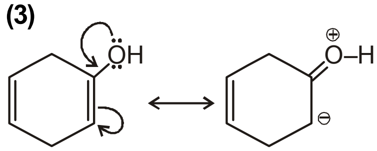


49. **(3)**
Due to SIR -effect

50. **(2)**
(iv > iii > i > ii) In case of (iv) $-NH_2$ group is attached to sp^3 hybridized c-atom while in others d. b character appears. In case of (iii) bond-length is slightly greater then (i) as $-OCH_3$ gr. is presed at p-pasition while in (ii) $-NO_2$ strecture decreases their bond length.

51. **(1)**
(x – y i.e. 7 – 3 = 4)

52. **(3)**

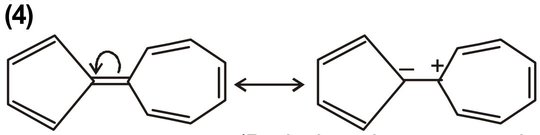


Due to resonance d.b.appears b/w O & C which shortened their bond length

53. **(4)**
is (4) as aromatic behaviour does not appear.

54. **(1)**

55. **(4)**



(Both rings have aromatic behaviors)

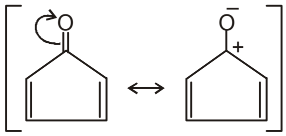
56. **(4)**
Does not obey huckel's rule

57. **(1)**
As product plus intermediate is formed and intermediate is aromatic stabilized

58. **(2)**
Due to more conjngation C – O bond length is maximum in (ii) and then (i) = (iii) & minimum in (iv) because only d.b. character is present b/w C & O.
ii > i = iii > iv

59. **(3)**
Ionisation of C – X bond α stability of carbocation

60. (3)



In polar form it is unstable due to anti aromatic behaviours

61. (1)

70% by mass 70g $H_3PO_4 \rightarrow 100g$ solution / sample

$$V = \frac{w}{d} = \frac{100}{1.54}; M = \frac{70 \times 1000}{98 \times 100 / 1.54} = 11\,M$$

62. (2)

$KMnO_4$ oxalic acid

$$\frac{M_1V_1}{n_1} = \frac{M_2V_2}{n_2} \Rightarrow \frac{20 \times 0.1}{2} = \frac{M_2V_2}{5} \Rightarrow M_2V_2 = 5$$

63. (1)

$N_2H_4 \rightarrow (Y) + 10e$

$\because$ Y contains all N-atoms.

$\therefore$ $N_2^{2-} \rightarrow (2N)^a + 10e$

$\therefore$ $2a + 2 \times (2) = 10$

$\therefore$ $a = +3$

64. (2)

$\underset{+4}{SO_2} + \underset{-2}{2H_2S} \rightarrow \underset{0}{3S} + 2H_2O$

$$\text{Eq. mass} = \frac{M}{4} = \frac{64}{4} = 16;$$

Twice 16×2=32

65. (1)

$\because$ 1.12 litre H_2 displace by 1.2g metal

$\therefore$ 22.4 litre H_2 displace by = 24g metal

66. (1)

The ion which is not affected during the course of reaction is known as spectator ion.

67. (3)

$\overset{0}{P} + NaOH \rightarrow \overset{-3}{P}H_3 + NaH_2\overset{+1}{P}O_2$

In above reaction, the the ox. no. of P increases from zero to +1 in NaH_2PO_2 and decrease zero to –3 in PH_3. Thus P is oxidised as well as reduced and it is redox reaction.

68. (1)

$\overset{0}{P} + NaOH \rightarrow \overset{-3}{P}H_3 + NaH_2\overset{+1}{P}O_2$

$$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$$

$$Cr_2O_7^{2-} + 14H^+ + 3Sn^{2+} \rightarrow 3Sn^{4+} + 2Cr^{3+} + 7H_2O$$

$\because$ 3 mole of Sn^{2+} reduced =1 mole of $Cr_2O_7^{2-}$

$\therefore$ 1 mole of Sn^{2+} reduced $= \frac{1}{3}$ mole of $Cr_2O_4^{2-}$

69. (2)

$\overset{a}{S}_2O_4^{2-}$: $2a + 4 \times (-2) = -2$

$\therefore$ $a = +3$

$\overset{a}{S}O_3^{2-}$: $a + 3 \times (-2) = -2$

$\therefore \quad a = +4$

$\overset{a}{S}_2 O_6^{2-} : 2a + 6 \times (-2) = -2$

$\therefore \quad a = +5$

$\therefore \quad S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

70. (2)

$\frac{\text{Molecular}}{6}$, Because in KIO_3 effective oxidation number is 6.

71. (3)

$$2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O_5 + 5O$$

$$\frac{2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O_5 + 5O}{2KMnO_4 + 3H_2SO_4 + 5H_2O_2 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 5O_2}$$

$\because$ 2mole of $KMnO_4$ decolorised by 5 mole of H_2O_2

$\therefore$ 1 mole of $KMnO_4$ decolorised by 5/2 mole of H_2O_2

72. (3)

$$K\overset{+7}{Mn}O_4 + \overset{+4}{S}O_3^{2-} \rightarrow Mn^{2+} + \overset{+6}{S}O_4^{2-}$$

$n = 5 \quad n = 2$

$\because$ 5 mole of SO_3^{2-} react with 2 mole $KMnO_4$

$\therefore$ 1 mole of SO_3^{2-} react with 2/5 mole $KMnO_4$.

73. (3)

$\overset{a}{I}O_3^- : \quad a + 3 \times (-2) = -1$

$\therefore \quad a = +5$

$\overset{a}{I}O_4^- : \quad a + 4 \times (-2) = -1$

$\therefore \quad a = +7$

$K\overset{a}{I} : \quad 1 + a = 0$

$\therefore \quad a = -1$

$I_2^a : \quad 2a = 0$

$\therefore \quad a = 0$

74. (4)

$$8KMnO_4 + 3NH_3 \rightarrow 3KNO_3 + 8MnO_2 + 5KOH + 2H_2O$$

75. (2)

In NH_2OH ox. state of N=–1

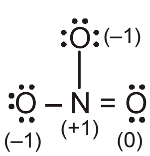
In N_2O ox. state of N=+1

$\therefore$ Change in ox. state = 2

$\therefore$ Eq. mass = M/2

76. (3)

$NO_3^{\ominus}$



77. (3) 78. (2)

79. (4)

Among given non-metals, O-atom has high electron affinity and strong ionic bond is formed between Al and O-atom.

80. (4) 81. (3) 82. (4) 83. (3)

84. (3) 85. (3) 86. (2) 87. (2)

88. (1) 89. (4)

90. (4)

Lattice energy released in case of MgO is maximum giving highest contribution to ionic nature of ionic bond.

BOTANY

91. **(4)**
Cell growth results in low metabolic activity & low nucleocyto-plasmic ratio so cell divides.

92. **(2)** **93.** **(1)**

94. **(4)**
G_1,S,G_2 phases are part of interphase

95. **(4)**
M-Phase is the phase of actual cell division

96. **(2)**
Interphase comes between 2-successive M-Phases.

97. **(3)**

98. **(1)**
About 5% of total time is consumed during M-Phases

99. **(1)** **100.** **(3)**

101. **(2)**
Inhibited synthesis of tubulin will inhibit cell division at Metaphase

102. **(3)**

103. **(1)**
G_1-Phase comes between M-Phase & The S-Phase.

104. **(2)**

105. **(1)**
G_1-Phase does not include Genomic Duplication

106. **(3)** **107.** **(2)**

108. **(2)**
During G_0-Phase cell cannot divide.

109. **(4)** **110.** **(1)** **111.** **(1)**

112. **(2)**
Prophase is marked by chromosomal condensation

113. **(1)**

114. **(1)**
Figure belongs to Metaphase

115. **(4)** **116.** **(2)** **117.** **(2)** **118.** **(4)**

119. **(2)** **120.** **(1)** **121.** **(3)**

122. **(1)**
Syncytium arise due to Nuclear Div. without cytoplasmic Div.

123. **(1)** **124.** **(2)** **125.** **(3)** **126.** **(2)**

127. **(2)** **128.** **(3)** **129.** **(3)** **130.** **(4)**

131. **(2)** Anaphase- I does not involve centromeric division.

132. **(3)** **133.** **(1)** **134.** **(2)** **135.** **(4)**

ZOOLOGY

136. **(4)**

Raffinose = glucose + fructose + galactose
Sucrose = glucose + fructose
Lactose = glucose + galactose] Fructose is not produced by their mixture
Maltose = glucose + glucose

137. **(3)**

Cellulose is a secondary metabolite.

138. **(4)**

Glucose has aldehyde group as functional group which reduces Cu^{++} to Cu^{+}. So, it is a reducing sugar.

139. **(4)**

Pentose and hexoses both show open chains as well as ring forms.

140. **(1)**

Oligosaccharides are made up to 2 to 9 molecules of mono saccharides.

141. **(1)**

Sucrose is the non-reducing sugar.

142. **(1)**

Fructose is the source of energy found in human's semen. It is secreted by seminal vesicle.

143. **(1)**

Dental carries are prevented by Fluorine.

144. **(2)**

Raffinose is a trisaccharide carbohydrate.

145. **(2)**

Agar is mucopolysaccharide

146. **(4)**

147. **(1)**

Agar is mucopolysaccharide.

148. **(1)**

Linoleic acid has two double bonds, linolenic acid has three double bonds. Arachidonic acid has four double bonds. Palmitic acid has no double bonds.

149. **(1)**

Wax-D - Bacteria wax

Cutin - Lipid occurs in the aerial epidermal cell walls.

Lanolin - Protective water insoluble coating on animal far

Cerumen - ear wax

150. **(1)**

151. **(1)**

Acidic amino acids -

(i) Aspartic acid/aspartate

(ii) Glutamic acid

Basic amino acids -

(i) Arginine

(ii) Lysine

152. **(1)**

153. **(4)**

Melatonin is synthesized from amino acid tryptophan.

154. **(3)**

Primary structure of proteins are linear polypeptide chains in which acids are held together with peptide bonds.

155. **(4)**

156. **(3)**

Nicotinamide and riboflavin are nucleotides of vitamins which do not participates in the formation of nucleic acids.

157. (4)

A = G and C = T are not constant.

but A = T and G = C because they show pairing.

158. (4)

RNA - Sugar - Ribose, pyrimidine uracil

DNA - Sugar - Dexoyribose, pyrimidine - thymine in place of uracil as that in RNA

A.G. (Purines), pyrimidine (cytosine) and phosphate are same in DNA and RNA.

159. (1)

m-RNA - 1 - 5%

r-RNA - 80% - 85%

t-RNA - 10 - 15%

160. (3)

161. (1)

Z-form DNA = 12 bp per turn

A form DNA = 11 bp per turn

B DNA = 10 bp per turn

C DNA = 9 bp per turn

D DNA = 8 bp per turn

E DNA = 7.5 bp per turn

162. (3)

163. (3)

Both strands of DNA are held together with the help of H-bonding in between N-base pairs.

164. (3)

The width between the two back bone of DNA is constant due to H-bonding of a purine with an other pyrimidine. Purine is a double ring structure while a pyrimidine is a single ring structure.

165. (1)

166. (1)

Sulpha drugs (e.g., salphanilamide) inhibit the synthesis of folic acid in bacteria by competing with P-amino benzoic acid (PABA) for the active site of enzyme.

ATP inhibits the activity of phosphofructosekinase and isoleucine inhibits the activity of theonine deaminase by allosteric modulation.

167. (4) **168. (2)**

169. (1)

α-amylase of wheat endosperm has 16 isoenzymes lactic acid dehydrogenase has 5 isoenzymes. Alcohol dehydrogenase has 4 isoenzymes.

170. (4)

In a non-competitive inhibition K_m value is constant or remain same, while V_{max} decreases by adding inhibitor.

171. (4)

172. (4)

The functioning of catalysts is not controlled by regulators molecules.

173. (4) **174. (1)** **175. (4)** **176. (2)**

177. (2) **178. (1)** **179. (3)** **180. (4)**