Sky Tutorials
fly beyond the sky...
IIT-JEE | NEET | Foundation
NEET

OFFICE & CLASSES: SKY TUTORIALS : KABIR NAGAR DURGAKUND, VARANASI
CONTACT No. : 7510020006, 9696571381

CLASSROOM CONTACT PROGRAMME

(ACADEMIC SESSION 2023 - 2024)

Pulse Batch – Neet

Test Type – TOPIC WISE TEST **Test Date: 03/09/2023**

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	B	C	B	A	D	C	C	D	B	C	B	A	B	A	A	A	B	A	A
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	A	B	A	B	D	B	D	D	D	C	B	C	D	C	A	C	B	D	B	C
Que.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	B	C	C	B	C	B	D	D	B	B	C	B	D	B	B	A	D	B	C	D
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	A	C	A	D	C	A	C	A	B	D	B	D	D	D	B	A	B	B	C	*
Que.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans.	C	C	A	C	A	A	A	A	C	B	B	B	C	C	C	B	B	A	B	B
Que.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	C	B	D	C	C	B	D	C	C	B	B	A	D	C	D	A	A	A	A	A
Que.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans.	B	C	D	B	C	B	B	B	A	B	A	A	A	C	B	D	C	B	C	B
Que.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans.	A	D	A	D	B	D	B	C	D	D	D	B	A	D	C	B	B	A	B	D
Que.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans.	A	B	D	B	D	B	A	D	C	B	C	C	C	C	C	C	D	C	B	C
Que.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Ans.	A	D	D	A	A	B	C	B	C	D	A	C	D	A	C	A	A	A	C	B

PHYSICS

1. Ans. (b)
V = u – gt
O = 20 – 10t
t = 2 sec
So total time of flight = 2t
= 2 × 2 = 4 sec.

2. Ans. (b)
Using $v^2 = u^2 - 2$ as with final velocity = 0
$\therefore s \propto u^2$
$$\frac{8}{s^2} = \left(\frac{30}{60}\right)^2$$
$\therefore s_2 = 32m$

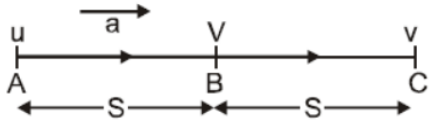
3. Ans. (c)
$S_1 = S_{10} = 1/2 \times a \times 10^2 - 1/2(10)^2$
So $S_2 = 3S_1$

4. Ans.(b)
Here, $x_2 = 30$ m, $x_1 = 10$m, $t_2 = 7$s, $t_1 = 5$
Average velocity between 5s and 7s
i.e., $v = \frac{x_2 - x_1}{t_2 - t_1} = \frac{30.0 - 10.0}{7 - 5}$
$= \frac{200}{2} = 10\,ms^{-1}$

5. Ans. (a)
A particle thrown upward is an example of motion under gravity.
Through the motion of the particle
A = - g = constant
Since, acceleration is negative, slope of v – t graph must be negative

6. Ans. (d)
Given, $x = 8 + 12t - t^3$
We know $v = \frac{dx}{dt}$
And acceleration $a = \frac{dv}{dt}$
So, $v = 12 - 3t^2$ and $a = - 6t$
At t = 2s
v = 0 and a = - 6 × 2
a = 12 ms^{-2}

7. Ans. (c)
Suppose velocity at mid point is V



$V^2 = u^2 + 2as$
$V^2 = V^2 + 2as$
$V^2 - v^2 = u^2 - V^2$
$2V^2 = u^2 + v^2$
$V^2 = u^2 + v^2$
$V = \sqrt{\frac{1}{2}(u^2 + v^2)}$

8. Ans. (c)
Motion from A to B
$s = ut + \frac{1}{2}at^2$
$100 = 4u + \frac{1}{2}a(4)^2 = 4u + 8a$
25 = u + 2a ……..(i)
Motion from A to C
$s = ut + \frac{1}{2}at^2$
$220 = 6u + \frac{1}{2}a(6)^2 = 6u + 18a$
$110 = 3u + 9a$ ……(ii)
On solving eqn. (i) and (ii)
$a = \frac{35}{3} ms^{-2}, u = \frac{5}{3} ms^{-1}$
Agin, v = u + at
$= \frac{5}{3} + \frac{35}{3} \times 8 = \frac{5 + 280}{3} = \frac{285}{3} = 95 ms^{-1}$

9. Ans. (d)
$2ax = (50)^2 - (10)^2$ and $2(-a)(-x) = v^2 - (50)^2$
This gives $v^2 - (50)^2 = (50)^2 - (10)^2$
i.e. v = 70 ms^{-1}

10. Ans. (b)
$I = \frac{1}{2}at^2$ or $t \propto \sqrt{I}, t' \propto \sqrt{\frac{1}{2}}$
$\frac{t'}{t} = \frac{1}{\sqrt{2}}$ or $t' = \frac{1}{\sqrt{2}} = \frac{4}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = 2\sqrt{2}$ sec.

11. Ans. (c)
Given, $\vec{R}_1 = \vec{A} + \vec{B}$ and $\vec{R}_2 = \vec{A} - \vec{B}$
$R_1^2 + R_2^2 = A^2 + B^2 + 2AB\cos\theta + A^2 + B^2 - 2AB$
$\cos\theta$
$= 2\left(A^2 + B^2\right)$

12. Ans. (b)
$|\vec{A} + \vec{B}|^2 = n^2 |\vec{A} - \vec{B}|^2 \Rightarrow |A + B| = n|\vec{A} - \vec{B}|$
$= A^2 + B^2 + 2AB\cos\theta = n^2A^2 + n^2B^2 - 2n^2AB\cos\theta$
$= A^2 + A^2 + 2A^2\cos\theta = n^2A^2 + n^2A^2 - 2n^2A^2\cos\theta$
$= A^2[2 + 2\cos\theta] = A^2[2n^2 - 2n^2\cos\theta]$
$= 2 - 2n^2 = (-2 - 2n^2)\cos\theta$
$$= \cos\theta = \frac{1 - n^2}{-1 - n^2} = \frac{n^2 - 1}{n^2 + 1}$$
$$\Rightarrow \theta = \cos^{-1}\left(\frac{n^2 - 1}{n^2 + 1}\right)$$

13. Ans.(a)
$$\sin\beta = \frac{C}{B} = \frac{B}{2B} = \frac{1}{2}$$
$$\beta = 30^0 = \frac{\pi}{6}$$

14. Ans. (b)

$|\vec{A}\times\vec{B}|^2 + |\vec{A}.\vec{B}|^2$

$A^2B^2\sin^2\theta + A^2B^2\cos^2\theta$

$A^2B^2(\sin^2\theta + \cos^2\theta)$

$= A^2B^2$

15. Ans. (a)

$$\vec{A}\times\vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -3 & 2 & -4 \\ -1 & 2 & 1 \end{vmatrix} = 10\hat{i} + 7\hat{j} - 4\hat{k}$$

$|\vec{A}\times\vec{B}| = \sqrt{100+49+16} = \sqrt{165}$

So, Area of $\Delta = \frac{|\vec{A}\times\vec{B}|}{2} = \frac{\sqrt{165}}{2}$

16. Ans. (a)

Here, $v(x) = 3x^2 - 4x$

$$a = v\frac{dv}{dx} = (3x^2 - 4x)\times\frac{dv}{dx}$$

$= (3x^2 - 4x) \times (6x - 4)$

17. Ans. (a)

$$h = -ut + \frac{1}{2}gt^2$$

$$= -29\times 10 + \frac{1}{2}\times 10\times 100 = 210\,m$$

18. Ans. (b)

Time taken by the same ball to return to the hands of the juggler is $\frac{2u}{g} = \frac{2\times 20}{10} = 4s$. So he is throwing the balls after 1s each.

Let at some instant he throws ball number 4. Before 1s of throwing it, he throws ball3. So the height of ball 3 is

$$h_3 = 20\times 1 - \frac{1}{2}10(1)^2 = 15m$$

Before 2s, he throws ball 2. So the height of ball 2 is

$$h_2 = 20\times 2 - \frac{1}{2}10(2)^2 = 20m$$

Before 3s, he throws ball 1. So the height of ball 1 is

$$h_1 = 20\times 3 - \frac{1}{2}10(3)^2 = 15m$$

19. Ans. (a)

$$u = \frac{1}{2}g(t_1 + t_2)$$

$$u = \frac{1}{2}\times 10\times(10) = 50m/s$$

20. Ans. (a)

$$v = \alpha\sqrt{x}.\frac{dx}{dt} = \alpha\sqrt{x} \Rightarrow \frac{dx}{\sqrt{x}} = \alpha dt$$

$$\int_o^x \frac{dx}{\sqrt{x}} = \alpha\int_o^t dt \Rightarrow \left[\frac{2\sqrt{x}}{1}\right]_o^x$$

$$-\alpha[t]_o^1 \Rightarrow 2\sqrt{x} - \alpha t \Rightarrow x - \frac{\alpha^2}{4}t^2$$

21. Ans. (a)

$$a = A + \frac{B}{S^2}$$

$$V\frac{dv}{ds} = A + \frac{B}{s^2}$$

$$\int v\,dv = \int\left(A + \frac{B}{S^2}\right)ds$$

$$\left[\frac{v^2}{2}\right]_0^V = \left[AS - \frac{B}{S}\right]_1^{10}$$

$$\frac{V^2}{2} = 9A + \frac{9B}{10} \Rightarrow \sqrt{18\left(A + \frac{B}{10}\right)}$$

22. Ans. (b)

Distance is scalar quantity when displacement is zero then distance may or not be zero.

23. Ans. (a)

$$s_1 = \frac{1}{2}a(p-1)^2$$

$$s_1 = \left(\frac{1}{2}ap^2 + \frac{1}{2}a - ap\right)$$

$$s_2 = \frac{1}{2}ap^2$$

$$s_{(p^2-p+1)^{th}} = \frac{1}{2}a\left[2(p^2 - p + 1) - 1\right]$$

$$= \left(ap^2 + \frac{1}{2}a - ap\right)$$

$$\therefore s_{(p^2-p+1)^{th}} = s_1 + s_2$$

24. Ans. (b)

$$a = \frac{slope}{2}, a = \frac{(-8)}{2} \Rightarrow a = -4m/s^2$$

25. Ans. (d)

$a = v\frac{dv}{dx}$

$a = 10\left(-\frac{2}{3}\right)$

$a = -\frac{20}{3} m/s^2$

26. Ans. (b)

After 3 sec velocity & height of parachutist

$v = -u + gt = -10 + 10 \times 3 = 20 m/s$

$h' = -ut + 1/2 gt^2 = 15$

So height from ground 30 m

using

$h = ut - 1/2 at^2$, $30 = 20t - 1/2 \times 5t^2$

$5t^2 - 40t - 60 = 0$, $t^2 - 8t + 12 = 0$

$(t-2)(t-6) = 0$

T = 2 sec

∴ Total time = 3 + 2 = 5 sec

27. Ans. (d)

$\bar{v} = \frac{s}{\frac{2}{5}\frac{s}{v_1} + \frac{3}{5}\frac{s}{v_2}} = \frac{5v_1v_2}{3v_1 + 2v_2}$

28. Ans. (d)

$v = u - gt$

$0 = u - 10 \times 2$

$u = 20 m/s$

29. Ans. (d)

$R = \frac{u^2 \sin 2\theta}{g}$

Max Range = $\frac{u^2}{g}$

$A = \pi R^2$

$A \propto R^2$

$A \propto u^4$

$\frac{A_1}{A_2} = \frac{u_1^4}{u_2^4} = \left[\frac{1}{2}\right]^4 = \frac{1}{16}$ $\frac{A_1}{A_2} = \frac{u_1^4}{u_2^4} = \left[\frac{1}{2}\right]^4 = \frac{1}{16}$

30. Ans. (c)

Range will be same for time t_1 and t_2, so angles of projection will be θ and 90^o - θ

$t_1 = \frac{2u\sin\theta}{g}$ $t_2 = \frac{2u\sin(90^o - \theta)}{g}$

And $R = \frac{u^2 \sin 2\theta}{g}$

$t_1 t_2 = \frac{4u^2 \sin\theta\cos\theta}{g^2} = \frac{2}{g}\left[\frac{2u^2 \sin\theta\cos\theta}{g}\right] = \frac{2R}{g}$

31. Ans. (b)

For same range angle of projection will be θ & $90 - \theta$

$R = \frac{u^2 2\sin\theta\cos\theta}{g}$

$h_1 = \frac{u^2 \sin^2\theta}{2g}$

$h_2 = \frac{u^2 \sin^2(90-\theta)}{2g}$

$\frac{R^2}{h_1 h_2} = 16$

32. Ans. (c)

33. Ans. (d)

34. Ans.(c)

35. Ans. (a)

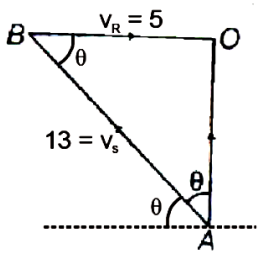
Let the components of $\vec{A}$ makes angles α,β and γ with x, y and z axis respectively then $\alpha = \beta = \gamma$

$\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$

$3\cos^2\alpha = 1 \Rightarrow \cos\alpha = \frac{1}{\sqrt{3}}$

$A_x = A_y = A_z = A\cos\alpha \frac{A}{\sqrt{3}}$

36. Ans. (c)



$\sin\theta = \frac{12}{13}$

37. Ans. (b)

Velocity of girl $V_g = 5\hat{i}$

Let velocity of rain in given by vector, $v_r = v_x\hat{i} + v_y\hat{j}$

Now, it is vertical so $\tan\theta = \frac{v_x - 5}{v_y} = 0$

$\Rightarrow v_x - 5 = 0 \Rightarrow v_x = 5$

On increasing the speed of the girl,

Relative velocity becomes $(v_x - 15)\hat{i} + v_y\hat{j}$

$\tan\theta = \tan 45^o = \frac{v_x - 15}{v_y} = 1 \Rightarrow v_x - 15 = v_y$

$\Rightarrow v_y = -10$.

∴ velocity of rain = $5\hat{i} - 10\hat{j}$

∴ Magnitude of velocity of rain

$= \sqrt{(5)^2 + (10)^3} = \sqrt{125} = 5\sqrt{5}$ ms^{-1}

38. Ans. (d)
Given condition, $h_1 = h_2$

$$\Rightarrow u_1^2 \sin^2 45^\circ = u_2^2 \sin^2\theta \left[h = \frac{u^2 \sin^2\theta}{2g}\right]$$

$$\Rightarrow \sin^2\theta = \frac{u_1^2}{u_2^2}\sin^2 45^\circ = \left(\frac{4\sqrt{2}}{5}\right)^2 \times \frac{1}{2} = \frac{16}{25}$$

$$\Rightarrow \sin\theta = \frac{4}{5} \Rightarrow \theta = 53^\circ$$

39. Ans. (d)
Maximum horizontal range = 80 m

$\because \theta = 45^o m$

$\because \frac{u^2}{g} = 80m$

Maximum height, $h = \frac{u^2}{2g}$

$= \frac{80}{2} = 40m$

40. Ans. (c)
When a body is projected at an angle θ with the horizontal with initial velocity u, then the horizontal range of projectile is $R = \frac{u^2 \sin 2\theta}{g}$

Clearly, for maximum horizontal range $\sin 2\theta = 1$ or $2\theta = 90^o$ or $\theta = 45^o$. Hence, in order to achieve maximum range, the body should be projected at 45o

In this case $R_{max} = \frac{u^2}{g}$

Hence, ranges of A and C are equal and less than that of B.

41. Ans. (b)
Let u be the initial speed.

So speed at highest point = $u\cos\theta = \frac{u}{2} \Rightarrow \theta = 60^o$

$\because R = \frac{u^2 \sin 2\theta}{g}$

$H = \frac{u^2 \sin^2\theta}{2g} \Rightarrow \frac{R}{H} = \frac{4}{\tan\theta} = \frac{4}{\sqrt{3}}$

42. Ans. (c)

Maximum height, $H = \frac{u^2 \sin^2\theta}{2g}$

Horizontal range $R = \frac{u^2 \sin^2\theta}{g}$

Dividing, $\frac{H}{R} = \frac{\tan\theta}{4} \Rightarrow \theta = \tan^{-1}\frac{4H}{R}$

43. Ans. (c)
Initial velocity $v = 2\hat{i} + \hat{j}$ ms-1
Magnitude of velocity,
$v = \sqrt{(2)^2(1)^2} = \sqrt{5} ms^{-1}$
Equation of trajectory of projectile

$$y = x\tan\theta - \frac{gx^2}{2u^2}(1 + \tan^2\theta)$$

$$\left[\tan\theta = \frac{y}{x} = \frac{1}{2} = \frac{1}{2}\right]$$

$$\therefore y = x \times \frac{1}{2} - \frac{10x^2}{2\left(\sqrt{5}\right)^2} = \left(1 + \frac{1}{4}\right)$$

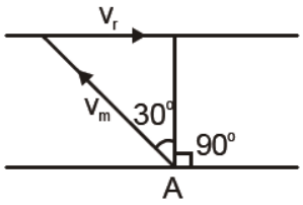
$$y = \frac{x}{2} - \frac{10x^2}{10} \times \frac{5}{4}$$

$4y = 2x - 5x^2$

44. And. (b)
$\vec{v}_{rg}$ =velocity of rain w.r.t. ground
$\vec{v}_{mg}$ = velocity of man w.r.t. ground
$\vec{v}_{rm}$ = velocity of rain w.r.t. man
$\vec{v}_{rg} = \vec{v}_{rm} + \vec{v}_{mg}$ ……..(i)
Taking horizontal components eqn. (i) gives
$v_{rg}\sin 30^o = v_{mg}$ = 10 km/hr

$v_{rg} = \frac{10}{\sin 30^o}$ 20 km/h

45. Ans. (c)

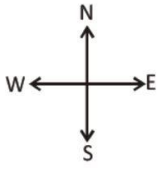


$\sin 30^o = \frac{V_r}{r_m}$

$\frac{1}{2} = \frac{V_r}{V_m} \Rightarrow V_r = \frac{0.5}{2} = 0.25 m/s$

46. Ans. (b)
Relative velocity of parrot w.r.t. train
$= 7 - (-8) = 7 + 8 = 15 m/s$
time taken by parrot
$t = \frac{d}{V_{rel}} = \frac{225}{15} = 15 \sec$

47. Ans. (d)
v_c = 8 m/s E = $v_{passanger}$
v_{TC} = 15 m/s N v_T = ?

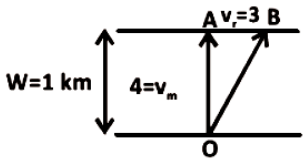


$\bar{V}_{TC} = \bar{V}_T - \bar{V}_C$
$\bar{V}_T = \bar{V}_{TC} + \bar{V}_C$

$= 15\hat{j} + 8\hat{j}$

$|\bar{V}_T| = \sqrt{(15)^2 + 8^2} = 17$ m/s

48. Ans. (d)

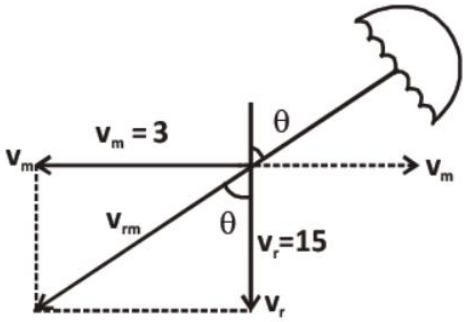


$t = \frac{w}{v_m} = \frac{1}{5} hr = \frac{60}{5} = 12$ min

$AB = v_r \times t = 3 \times 12 / 60 \times 1000 m = 600 m$

49. Ans. (b)

$\tan\theta = \frac{v_m}{v_r} = \frac{3}{15}$

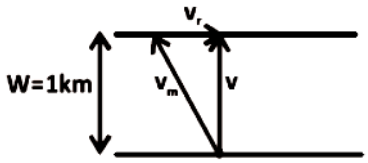


$\theta = \tan^{-1}\frac{3}{15}$ from vertical

50. Ans. (b)

$v_m = v_b = 5$

so $v = \frac{1}{\frac{15}{60} hr} = 4 km / hr$



$v_r = \sqrt{v_b^2 - v^2} = \sqrt{5^2 - 4^2} = 3 km / h$

CHEMISTRY

51. Answer (c)

$$\underset{x}{AgNO_3} + \underset{5.85\ g}{NaCl} \rightarrow \underset{8.5\ g}{NaNO_3} + \underset{14.35\ g}{AgCl}$$

$x + 5.85 = 8.5 + 14.35$

$x = 17$ g

52. Answer (b)

53. Answer (d)

$$\underset{2\ vol}{2CO} + \underset{1\ vol}{O_2} \rightarrow \underset{2\ vol}{2CO_2}$$

1 vol of O_2 reacts with 2 vol of CO

1 L of O_2 reacts with 2 L of CO

CO left after reaction = 3 – 2 = 1 L

1 L of O_2 produces 2 L of CO_2.

Hence, after the reaction, CO = 1 L, CO_2 = 2 L

54. Answer (b)

$$\underset{232\ g}{Fe_3O_4} + 4CO \rightarrow 3Fe + \underset{56 \times 3 = 168\ g}{4CO_2}$$

3 moles of Fe is produced from 1 mole of Fe_3O_4

168 g of Fe is produced from 232 g of Fe_3O_4

3 kg of Fe will be produced from $\frac{232}{168} \times 3000 = 4142.8$ g

or 4.14 kg of Fe_3O_4

55. Answer (b)

C-12 is used as a standard unit for defining atomic mass unit.

56. Answer (a)

$$\text{Number of moles} \propto \frac{1}{\text{Molecular mass}}$$

Molecular mass of CO_2 = 44, N_2 = 28, CH_4 = 16, HCl = 36.5

CO_2 will have least volume.

57. Answer (d)

No. of moles in 34 g of $NH_3 = \frac{34}{17} = 2$

No. of molecules = $2 \times 6.023 \times 10^{23}$

No. of atoms in one molecule of NH_3 = 4

No. of atoms in 2 molecules of NH_3

$= 4 \times 2 \times 6.023 \times 10^{23} = 48.18 \times 10^{23}$

58. Answer (b)

Molar mass of O_2 = 32 g mol^{-1}

32 g of $O_2 = 6.023 \times 10^{23}$ molecules

40 g of $O_2 = \frac{6.023 \times 10^{23} \times 40}{32} = 7.529 \times 10^{23}$ molecules

Mass of 6.023×10^{23} molecules of CO_2 = 44 g

Mass of 7.529×10^{23} molecules of CO_2

$= \frac{44 \times 7.529 \times 10^{23}}{6.023 \times 10^{23}} = 55$ g

59. Answer (c)

Since empirical formula is multiplied by n to get molecular formula.

CH_2O_2 will give only $C_2H_4O_4$ as its molecular formula.

$(CH_2O_2)_n$ where n = 1, 2, 3, … etc.

60. Answer (d)

Element	%	No. of moles	Mole ratio	Whole no. ratio
C	54.2	54.2/12 = 4.5	4.5/2.3 = 2	2
H	9.2	9.2/1 = 9.2	9.2/2.3 = 4	4
O	36.6	36.6/16 = 2.3	2.3/2.3 = 1	1

Empirical formula = C_2H_4O

61. Answer (a)

No. of moles of glucose = $\frac{w}{M} = \frac{2.82}{180} = 0.01567$

No. of moles of water = $\frac{w}{M} = \frac{30}{18} = 1.667$

Total no. of moles of solution = 0.01567 + 1.667 = 1.683

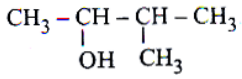
Mole fraction of glucose = $\frac{0.01567}{1.683} = 0.0093 \approx 0.01$

62. Answer (c)

Molality does not change with temperature since it involves weight of solute and solvent and not the volume.

63. Answer (a)

64. Answer (d)



The correct name is 3-methylbutan-2-ol since functional group should get lowest number.

65. Answer (c)

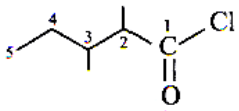
Correct name is 2 – cyclohexylpropane.

66. Answer (a)

Priority of functional groups is

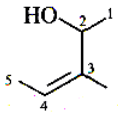
– COOH > – CHO > $\rangle C = O$.

67. Answer (c)



2, 3-Dimethylpentanoyl chloride

68. Answer (a)



3-Methylpent-3-en-2-ol

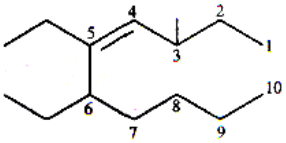
69. Answer (b)

The order of preference of functional groups is as follows:

–COOH >– SO_3H >– COOR > –COCl >–CONH$_2$ >–CN >–CHO > $\rangle C = O$ > –OH > $–NH_2$ > $\rangle C = C \langle$ > –C ≡ C–

70. Answer (d)

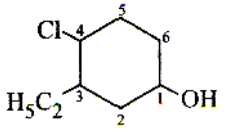
71. Answer (b)



5, 6-Diethyl-3-methyldec-4-ene

72. Answer (d)

73. Answer (d)



4-Chloro-3-ethylcyclohexanol

74. Answer (d)

N and P have 3 unpaired electrons in *2p* and *3p* respectively; V has 3 unpaired electrons in *3d*

75. Answer (b)

These atomic no. gives the configuration ns^2np^5 which are of halogen group or seventeenth group.

76. Answer (a)

By observing principle quantum number (n), Orbital (*s, p, d, f*) and equating no. of e^-'s we are able to find the period, block and group of element in periodic table.

77. Answer (b)

EC of M^{3+} = [Ar] $3d^{10}4s^2$

$\therefore$ EC of M = [Ar] $3d^{10}4s^24p^3$

The last electron enters in a p-subshell hence it belongs to *p*-block.

78. Answer (b)

Isoelectronic species are those which have same no. of electrons.

$K^+ = 19 - 1 = 18$; $Ca^{+2} = 20 - 2 = 18$

(c) $Sc^{+3} = 21 - 3 = 18$; $Cl^- = 17 + 1 = 18$

79. Answer (c)

Z	N^{-3}	O^{-2}	F^-
e^-	7	8	9
Z/e	0.7	0.8	0.9

Radius $\propto \frac{1}{(Z/e)}$

Order of radius = $N^{-3} > O^{-2} > F^-$

80. Answer $Li^+ < Na^+ < K^+ < Rb^+$

With the increase in size of cation the size of the hydrated ion decreases hence ionic conductance increases **[Awarded as Bonus]**

81. Answer (c)

All the species are isoelectronic therefore the greater the nuclear charge the lesser will be the size

82. Answer (c)

As we know that hydration power decreases on moving down the group hence among alkali metals Li has excessive hydration and hence it how low mobility in aqueous solution.

83. Answer (a)

Na^+, order of size $N^{-3} > O^{-2} > F^- > Na^+$

84. Answer (c)

Fe, Co, Ni, Cu. Due to shielding of *d*-electrons, the effect of increased nuclear charge due to increase in atomic no. neutralised. Consequently atomic radius remains almost unchanged after chromium.

85. Answer (a)

X^- ion larger in size than X atoms. Because of low effective nuclear charge on X^-, X has a bigger size.

SECTION - B

86. Answer (a)

Mass of $Al_2O_3 = 2 \times 27 + 3 \times 16 = 102$

0.051 g of $Al_2O_3 = \frac{0.051}{102} = 0.0005$ mol

1 mol of Al_2O_3 contains $2 \times 6.023 \times 10^{23}$ Al^{3+} ions

0.0005 mol of Al_2O_3 contains $2 \times 0.0005 \times 6.023 \times 10^{23}$ Al^{3+} ions

$= 6.023 \times 10^{20}$ Al^{3+} ions

87. Answer (a)

Element	Percentage	Molar ratio	Relative ratio	Simple whole number ratio
Mg	21.9	21.9/24 = 0.91	1	2
P	27.8	27.8/31 = 0.90	1	2
O	50.3	50.3/16 = 3.14	3.48	7

Formula of the compound = $Mg_2P_2O_7$

88. Answer (a)

Molar mass of $CuSO_4 = 63.5 + 32 + 4 \times 16$

$= 159.5$ g

Mass of copper present in 159.5 g of $CuSO_4 = 63.5$ g

∴ Mass of copper present in 50 g of $CuSO_4$

$= \frac{63.5}{159.5} \times 50$

$= 19.90$ g

89. Answer (c)

$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

No. of moles of $AgNO_3 = \frac{3.4}{170} = 0.02$

No. of moles of $NaCl = \frac{5.85}{58.5} = 0.1$

Limiting reagent = $AgNO_3$

1 mole of $AgNO_3$ produces 1 mole of AgCl

0.02 mole of $AgNO_3$ will produce 0.02 mole of AgCl

Weight of AgCl produced = $0.02 \times 143.5 = 2.870$ g

90. Answer (b)

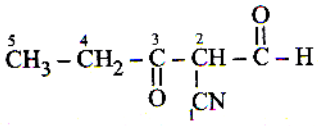
91. Answer (b)

No. of moles of NaOH = $\frac{4.28}{40} = 0.107$

Volume of solution = 250 cm^3

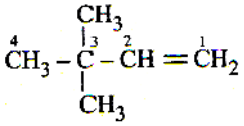
$M = \frac{n}{V \text{ in L}} = \frac{0.107}{250} \times 1000 = 0.428$ mol L^{-1}

92. Answer (b)



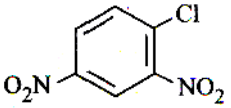
2-Formyl-3-oxopentanenitrile

93. Answer (c)



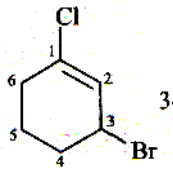
3, 3-Dimethylbut-1-ene

94. Answer (c)



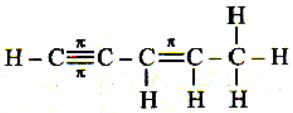
1-Chloro-2,4-dinitrobenzene

95. Answer (c)



3-bromo-1-chlorocyclohexene

96. Answer (b)



No. of σ-bonds = 10 ; No. of π-bonds = 3

97. Answer (b)

98. Answer (a)

Ce > Sm > Yb > Lu

99. Answer (b)

Value of Z for hydrogen = 1

Value of Z for helium = 2

Value of n for both is = 1

$r_H = \frac{0.52 \times 1^2}{1}$ $r_{He^+} = \frac{0.52 \times 1^2}{1}$

$\frac{r_H}{r_{He^+}} = 1:1$ or $r_{He^+} : r_H = 1:1$

100. Answer (b)

BOTANY

101. Ans (c)
Eukaryotes show intracellular compartmentalization i.e., membrane bound cell organelles.

102. Ans (2)
Plasmodesmata form the living component in the dead wall, through which the cytoplasm of one plant cell is in contact with other.

103. Ans. (d)
Centrioles are absent in higher plant cells.

104. Ans. (c)
A special membranous structure is the mesosome which is formed by the invagination of the plasma membrane into the cell. Pill are involved in malting process. In the some bacteria, fimbriae helps in attaching the bacteria to the substratum Chromatophores (membranous extensions) contain pigments

105. Ans. (c)
1 Bivalent = 4. Chromatids (Two sister and two non-sister) or two homologous chromosomes.

106. Ans. (b)
Rudolf Virchow explained that new cells formed from pre-existing cells.

107. Ans. (d)
Lysosome is a single membrane bound organelle.

108. Ans. (c)
Chitinous cell wall is present in fungi.

109. Ans. (c)
In some bacteria glycocalyx may be thick a tough called capsule.

110. Ans. (b)
Cytoplasm is the main arena of cellular activities present in between plasma membrane and nuclear envelope.

111. Ans. (b)
Diakinesis is marked by terminalisation of the chiasmata.

112. Ans. (a)
Mesosomes are the infoldings of cell membrane in bacterial cell, contains the respiratory enzymes required for respiration. They also help in DNA replication.

113. Ans. (d)
Synaptonemal complex forms during zygotene stage and its dissolution takes place in diplotene stage.

114. Ans. (c)
Membrane proteins can be classified as integral and peripheral proteins depending on the ease of extraction.

115. Ans. (d)
Reformation of nuclear membrane occurs in telophase.

116. Ans. (a)
In prokaryotes genetic material is naked.

117. Ans. (a)
Formation of precursor of - RET
Enzyme of lysosomes
Glycosylation of proteins - Golgi body
Protease mediated protein Breakdown - Lysosome
Maintenance of osmotic Concentration of cell - Vacuole

118. Ans. (a)
Pumps are proteins that use energy to carry substances across the cell membrane.

119. Ans. (a)
Anaphase is the best stage of cell cycle to study shape of the chromosomes.

120. Ans. (a)
Several ribosomes when attach to a single mRNA and form a chain then it is called polyribosomes or polysome.

121. Ans. (b)
Position of centromere can divide each chromosome into two arms, the smaller one p-arm and the bigger one q-arm.
Sub-metacentric chromosomes appear L shaped during anaphase.

122. Ans. (c)
Oogenesis first arrested in diplotene of prophase I, known as dictyotene. In oocytes of some vertebrates it lasts for months or years.

123. Ans. (d)
Syncytium is a stage of large number of nuclei present in a single cells, this occurs when karyokinesis is not followed by cytokinesis.

124. Ans. (b)
DNA replicates during interphase (s phase)

125. Ans. (c)
Cytokinesis is achieved by the formation of a furrow, which moves centripetally in animal cell and divides the cell cyloplasm into two cells.

126. Ans. (b)
In plant cell, vacuole is surrounded by tonoplast and can occupy more than 90% volume of cell.

127. Ans. (b)
Fimbriae help in attachment of bacteria with rocks in streams and also to the host tissues.
Flagella helps in the movement of bacterial cell.

128. Ans. (b)
Ulothrix, a green alga, is a eukaryotic organism.

129. Ans. (a)
A cell without cell wall is called protoplast i.e. plasm membrane + protoplasm.

130. Ans. (b)
The steps are as follow :
D – Condensation and coiling of chromatin fibres –Leptotene.
A-occurrence of cynapsis-Zygotene
C-Crossing over between homologous chromosomes – Pachytene
B- Appearance of chiasmata – Diplotene

131. Ans. (a)
Fluid nature of plasma membrane plays an important role in its functioning such as in cell

growth, formation of intercellular junctions secretion etc.

132. Ans. (a)
SER is the major site for synthesis of lipids.

133. Ans. (a)
The number of chromosomes remains same throughout the interphase but amount of DNA doubles in S phase.
Thus number of chromosomes in prophase = 12
Amount of DNA in prophase = 40 pg

134. Ans. (c)
In metaphase, spindle fibres attach to kinetochores.

135. Ans. (b)
Peroxisomes are associated with photorespiration

136.
137.
138.
139.
140.
141.
142.
143.
144.
145.
146.
147.
148.
149.
150.

ZOOLOGY

151. Ans. (d)
The name cnidaria is derived from the cnidoblasts or cnidocytes (which contain thestinging capsules or nematocysts) present on the tentacles and the body. Cnidoblasts are used for anchorage, defense and for the capture of prey

152. Ans. (b)
Those cridarians which exist in both forms exhibit alternation of generation (metagenesis) i.e. polyps produce medusae asexually and medusae from tehpolyps sexually e.j. obelia

153. Ans. (a)
Bioluminescence hte properly of living organism to emit light is well marked ctenophores.

154. Ans.(d)
This pathway of water transport is helpfule in food gathering, respiratory exchange and removal of waste porifera phylum.

155. Ans. (c)
Aschelminthyes- Bilateral symmetry
Sponge– Asymmetrical
Echinoderms– Radical symmetry are present

156. Ans. (b)
Phylum annelida & artropoda have bilateral symmetry are present.

157. Ans. (b)
These are primitive multicellular animals and have cellular level of organisation.

158. Ans.(a)
They are bilaterally symmetrical, triploblastic and pseudocoelomate animals.

159. Ans. (b)
Wuchereria (Filaria worm),

160. Ans.(d)
In arthopoda respiratory organs are gills, book gills, book lungs or tracheal system.

161. Ans. (a)
The body of arthropods is covered by chitinous exoskeleton.

162. Ans. (b)
Specialised cells called flame cells help in osmoregulation and excretion.

163. Ans.(d)
They have a central gastro-vascular cavity with a single opening, mouth on hypostome.

164. Ans.(b)
The body bears eight external rows of ciliated comb plates, which help in locomotion

165. Ans.(d)
Economically important insects – *Apis* (Honey bee), *Bombyx* (Silkworm), *Laccifer* (Lac insect)

166. Ans. (b)
Water vascular system which helps in locomotion, capture and transport of food and respiration. An excretory system is absent.

167. Ans. (a)
Excretion takes place through malpighian tubules

168. Ans. (d)
The body of annlida and mollusca have metameric segmentation is present.

169. Ans. (c)
The space between the hump and the mantle is called the mantle cavity in which feather like gills are present

170. Ans. (b)
Some of the cnidarians, e.g., corals have a skeleton composed of calcium carbonate.

171. Ans. (c)
Nereis, Hirudinaria, Ascaris

172. Ans. (c)
Excretory organ is proboscis gland

173. Ans. (c)
Parapodia is present in Nereis

174. Ans. (c)
Nephridia (sing. nephridium) help in osmoregulation and excretion.

175. Ans. (c)
Taenia– Organ level of organisation

176. Ans. (c)
Pinctada (Pearl oyster)

177. Ans. (d)
The mouth contains a file-like rasping organ for feeding, called radula.

178. Ans. (c)
Body is covered by a calcareous shell and is unsegmented with a distinct head, muscular foot and visceral hump.

179. Ans. (b)
The mouth contains a file-like rasping organ for feeding, called radula.

180. Ans. (c)
Arthropoda are bilaterally symmetrical, segmented and coelomate animals, open circulatory system

181. Ans. (a)
They are bilaterally symmetrical, triploblastic and pseudocoelomate animals. Alimentary canal is complete with a well developed muscular pharynx.

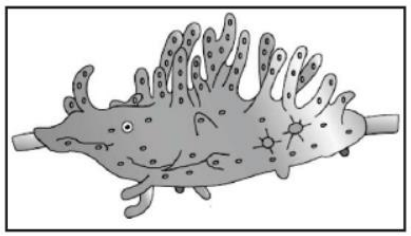
182. Ans. (d)
Saccoyloccus, Hemichordata, *Balanoglossus*

183. Ans. (d)
They possess longitudinal and circular muscles which help in locomotion.

184. Ans. (a)

Cellular level	-	Porifera
Tissue level	-	Ctenophora
Organ level	-	Platyhelminthes
Organ system	-	Mollusca

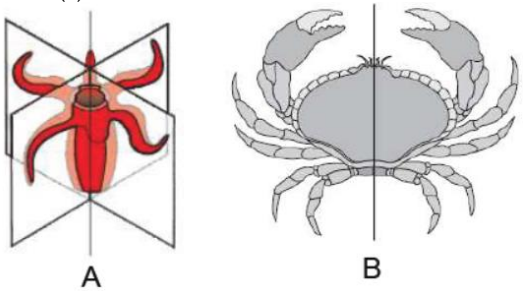
185. Ans. (a)



Correct statement – It is fresh water and Ostia present.

186. Ans. (b)
In porifera fertilization is internal & development is indirect having a larval stage which is morphologicallty distict from the adult.

187. Ans. (c)



Radial symmetry Bilateral symmetry

188. Ans. (b)

Pseudocoelomates	–	Aschelminthes
Asymmetrical	–	Porifera
Metamerism	–	Annelida
Diploblastic	–	Coelenterata

189. Ans. (c)
Fasciola, Wuchereria, Nereis, Hirudinaria

190. Ans. (d)
* They are aquatic, mostly marine, sessile or free-swimming, radially symmetrical animals.
* Cnidarians exhibit tissue level of organization and are diploblastic.
* Those cnidarians which exist in both forms exhibit alternation of generation (Metagenesis), i.e., polyps produce medusae from the polyps sexually (e.g., Obelia)

191. Ans. (a)
Prawn, Scorpion, Locust

192. Ans. (c)
* These are primitive multicellular animals and have cellular level of organisation.
* Sponges have a water transport or canal system.
* Choanocytes or collar cells line the spongocoel and the canals

193. Ans. (d)
Prawn, Honey bee, Bombyx

194. Ans. (a)
The body of the aschelminthes is circular in crosssection, hence, the name roundworms . They may be freeliving, aquatic and terrestrial or parasitic in plants and animals. Roundworms have organ-system level of body organisation. They are bilaterally symmetrical, triploblastic and pseudocoelomate animals.

195. Ans. (c)
Sponges have a water transport or canal system

196. Ans. (a)
Water enters through minute pores (ostia) in the body wall into a central cavity, spongocoel, from where it goes out through the osculum.

197. Ans. (a)
Bombyx, Apis limulus,

198. Ans. (a)

Limulus	–	King crab
Aedes	–	Mosquitoes
Apis	–	Honey bee
Laccifer	–	Lac insect

199. Ans. (c)
These are bilaterally symmetrical, triploblastic, Coelomate with organ-system level of organization. They possess a post anal tail and a closed circulatory system.

200. Ans. (b)
Those cnidarians which exist in both forms exhibit alternation of generation (Metagenesis), i.e., polyps produce medusae asexually and medusae form the polyps sexually (e.g., *Obelia*).