16/03/2026

Code-A

Aakash
Medical | IIT-JEE | Foundations

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Udyog Vihar, Gurugram, Haryana - 122015, ***Ph.***+91-1244168300

MM : 720 Final Test Series(P1)_NEET2026_Test-01A **Time : 180 Min.**

PHYSICS

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ZOOLOGY

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Hints and Solutions

PHYSICS

(1) **Answer :** (1)
Solution:
If the number is less than 1, the zero(s) on the right of decimal point but to the left of the first non-zero digit are not significant.
The trailing zero(s) in a number with a decimal point are significant.

(2) **Answer :** (1)
Solution:

$$v_{av} = \frac{\text{Distance}}{\text{Time}} = \frac{\text{Speed} \times \text{Time}}{\text{Time}} = \frac{v_1 \times \frac{t}{3} + v_2 \times \frac{2t}{3}}{\frac{t}{3} + \frac{2t}{3}}$$

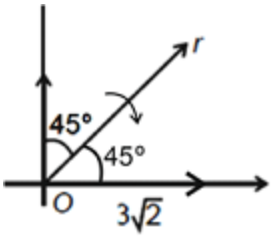
$$\Rightarrow v_{av} = \frac{\frac{v_1}{3} + \frac{2v_2}{3}}{1} = \frac{v_1 + 2v_2}{3}$$

(3) **Answer :** (4)
Hint:
At time of reversal, velocity $v = 0$
Solution:
$\frac{dx}{dt} = v = 0$
$\Rightarrow v = \frac{d}{dt}(4 + 2t - t^2) = 2 - 2t$
$\Rightarrow 0 = 2 - 2t \Rightarrow t = 1$ sec

(4) **Answer :** (3)
Solution:
9 VSD = 6 MSD
$\Rightarrow$ 1 VSD = $\frac{2}{3}$ MSD
$\Rightarrow$ 1 VSD = $\frac{2}{3}$ (0.01 mm)
and L.C. = 1 MSD – 1 VSD
$\Rightarrow$ L.C. = 0.01 mm – $\frac{2}{3}$ (0.01) mm
= $\frac{0.01}{3}$ mm = 0.003 mm

(5) **Answer :** (1)
Solution:

$$\left|\overrightarrow{OA}\right| = \sqrt{9+9} = 3\sqrt{2}$$



(6) **Answer :** (1)
Solution:
$\vec{u} + \vec{a}t = \vec{v}$
$\vec{v} = 4\hat{i} + 6\hat{j} + \left(i + j\right)\left(2\right) = \left(6\hat{i} + 8j\right)$ m/s

(7) **Answer :** (2)
Solution:
Centripetal acceleration has constant magnitude but varying direction in uniform circular motion.

(8) **Answer :** (3)
Solution:

Centripetal acceleration a = $\omega^2 r$

$\frac{a_1}{a_2} = \frac{\omega^2 r_1}{\omega^2 r_2} = \frac{r_1}{r_2}$

(9) **Answer :** (4)
Solution:
Two different physical quantities cannot be added.

(10) **Answer :** (3)
Hint:
1 Newton = 1 kg m s^{-2}
Solution:
Radian and Steradian are supplementary units.
Candela is fundamental unit.
1 Newton = 1 kg m s^{-2}
It is derived from mass, length and time.

(11) **Answer :** (4)
Hint:
Use principle of homogeneity
Solution:

$[A] = \left[\frac{MLT^{-2}}{L^{1/2}}\right]$

$[B] = \frac{\left[MLT^{-2}\right]}{\left[T^2\right]}$

$\left[\frac{A}{B}\right] = \frac{T^2}{L^{1/2}} = \left[L^{-1/2}T^2\right]$

(12) **Answer :** (2)
Solution:
24.36 + 0.0623 + 256.2 = 280.6223
In addition, minimum number of decimal place is retained
∴ 280.6 is correct answer.

(13) **Answer :** (3)
Hint:
Least count = $\frac{\text{Pitch}}{\text{Divisions of circular scale}}$
Solution:
Least count = $\frac{0.02}{150} = 1.33 \times 10^{-4}\,\text{cm}$

(14) **Answer :** (4)
Solution:
Absolute error is defined as the difference between individual measured value and true value of quantity.

(15) **Answer :** (1)
Hint:
$\left|\vec{A} + \vec{B}\right|_{max}$ = A + B
and $\left|\vec{A} + \vec{B}\right|_{min}$ = A – B
Solution:
$\frac{A+B}{A-B} = \frac{4}{3}$
⇒ 3A + 3B = 4A – 4B ⇒ A = 7B

(16) **Answer :** (1)
Solution:
Only statement I is correct while statement II is incorrect because $\left|\lambda\vec{A}\right| \neq \lambda\left|\vec{A}\right|$ if λ is a negative number.

(17) **Answer :** (4)

Solution:
At the highest point, velocity has minimum value and is perpendicular to direction of acceleration.

(18) **Answer :** (4)
Solution:
At point C slope is negative and velocity is given by slope of position time curve.

(19) **Answer :** (3)
Solution:
$t = \frac{200}{50} = 4\ \text{s}$

(20) **Answer :** (3)
Solution:
|Displacement| ≤ distance

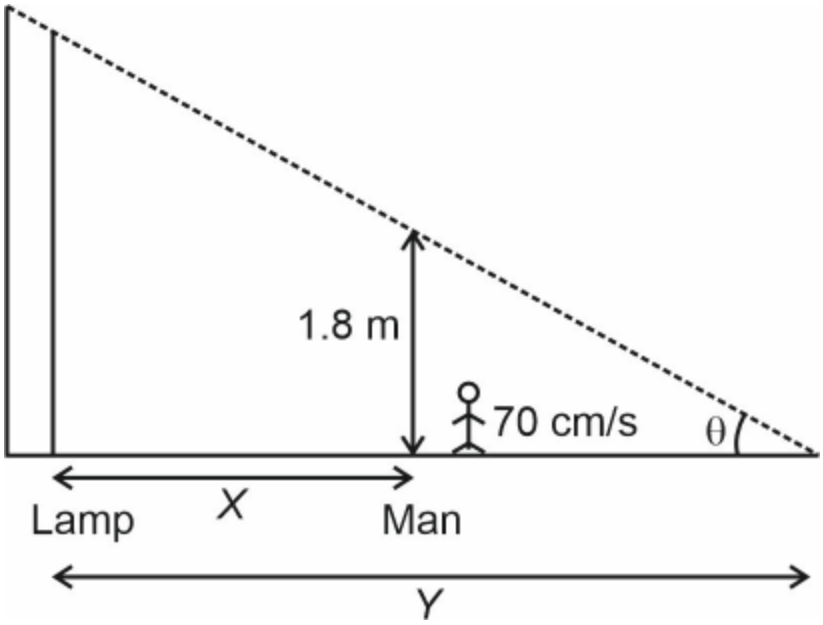
(21) **Answer :** (1)
Hint:
Angular speed, $\omega = \frac{2\pi}{T}$
Solution:
$T = \pi$ s
$\omega = \frac{2\pi}{\pi}$
= 2 rad/s

(22) **Answer :** (4)
Solution:
V = slope of x-t curve
$\frac{V_A}{V_B} = \frac{\tan 30^\circ}{\tan 60^\circ} = \frac{1}{3}$

(23) **Answer :** (2)
Solution:
$a = \frac{d^2x}{dt^2}$
Step-1 $a = \frac{d^2x}{dt^2} = 0$
Step-2 $v = 2ct - 3bt^2$
$a = \frac{dv}{dt} = 2c - 6bt = 0$
$t = \frac{c}{3b}$

(24) **Answer :** (3)
Solution:
Density $\rho = \frac{m}{\pi r^2 l}$
$\frac{\Delta\rho}{\rho} \times 100 = \left(\frac{\Delta m}{m} + \frac{2\Delta r}{r} + \frac{\Delta l}{l}\right) \times 100$
$= \left(\frac{0.003}{0.3} + 2 \times \frac{0.002}{0.2} + \frac{0.05}{5}\right) \times 100$
$= (1\% + 2\% + 1\%) = 4\%$

(25) **Answer :** (4)
Solution:



$\frac{1.8}{Y-X} = \frac{5}{Y}$

$1.8Y = 5Y - 5X$

$5X = 5Y - 1.8Y$

$X = \frac{3.2}{5}Y$

$X = 0.64Y$

$\frac{dx}{dt} = 0.64\frac{dy}{dt}$

$0.70\ \text{m/s} = 0.64\frac{dy}{dt}$

$\frac{0.70}{0.64}\text{m/s} = \frac{dy}{dt}$

$1.1\ \text{m/s} = \frac{dy}{dt}$

Speed of tip of person's shadow w.r.t. person = 110 cm/s – 70 cm/s = 40 cm/s = 0.4 m/s

(26) **Answer :** (1)

Solution:

Let *u* be initial speed of the particle

$v^2 - u^2 = 2gh$

$v^2 + 2gh = u^2$

$v_y^2 + 2gh = u_y^2$

Now, $v_x = u_x$

$\therefore u_y^2 = v_y^2 + 2gh$

$= (2)^2 + 2\left(10\right)\left(0.4\right)$

$u_y = \sqrt{12} = 2\sqrt{3}$

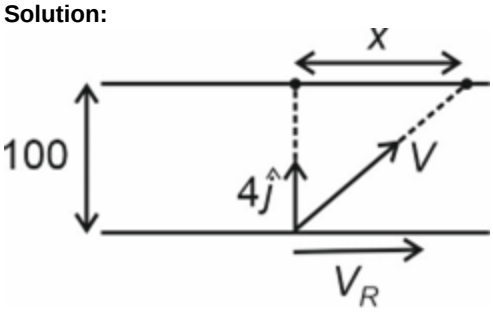
$u_x = v_x = 6$

$\tan\theta = \frac{u_y}{u_x} = \frac{2\sqrt{3}}{6} = \frac{1}{\sqrt{3}}$

$\theta = 30^\circ$

(27) **Answer :** (4)

Solution:



$\vec{V}_B = \vec{V}_{BR} + \vec{V}_R$

$= \left(-2\hat{i} + 4\hat{j}\right) + 4\hat{i}$

$= 2\hat{i} + 4\hat{j}$

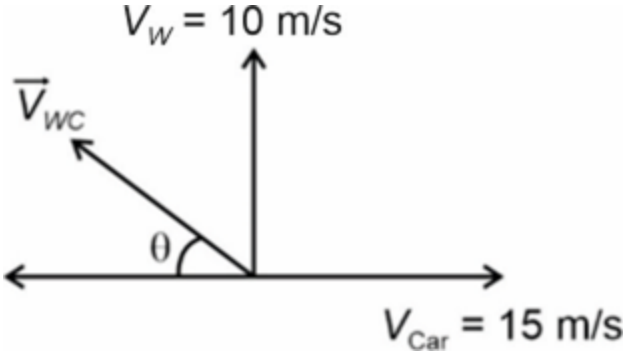
$\left|\vec{V}_B\right| = \sqrt{2^2 + 4^2} = \sqrt{20}\ \text{m/s}$

Time to cross river $= \frac{100}{4} = 25\ \text{s}$

Drift $x = V_R \times$ Time $= 2 \times 25 = 50$ m

(28) Answer : (3)

Solution:



$\vec{V}_{\text{car}} = 15\ \text{m/s}\ \hat{i}$

$\vec{V}_{\text{wind}} = 10\ \text{m/s}\ \hat{j}$

$\vec{V}_{\text{wind / car}} = \left(10\ \hat{j} - 15\ \hat{i}\right)\text{m/s}$

$\tan\ \theta = \frac{10}{15} = \frac{2}{3}$

$\theta = \tan^{-1}\left(\frac{2}{3}\right)$ North of West

(29) Answer : (2)

Solution:

$\vec{r} = 2t\hat{i} + 2t^2\hat{j}$

$x = 2t \quad y = 2t^2$

$\frac{dx}{dt} = V_x = 2 \quad V_y = 4t$

$\tan\theta = \frac{V_y}{V_x} = \frac{4t}{2} = 2t$

Differentiating with respect to time.

$\sec^2\theta . \frac{d\theta}{dt} = 2$

$\left(1 + \tan^2\theta\right)\frac{d\theta}{dt} = 2$

$\left(1 + 4t^2\right)\frac{d\theta}{dt} = 2$

$\frac{d\theta}{dt}\left(t = 2\right) = \frac{2}{1+4(2)^2} = \frac{2}{17}\ \text{rad/s}$

(30) Answer : (3)

Solution:

$a_1 = k$, $a_2 = 2k$, $a_3 = 7k$

Initial velocity = u

Using $S = ut + \frac{1}{2}kt^2$

$p = ut + \frac{1}{2}kt^2$ ...(1)

Velocity (v_1) at the end of first part

$v_1 = u + kt$

Velocity (v_2) at the end of second part

$v_2 = v_1 + a_2t = (u + kt) + 2kt = u + 3kt$

For third part distance $q = v_2 t + \frac{1}{2} a_3 t^2$

$q = (u + 3kt)t + \frac{1}{2}(7k)t^2$

$q = ut + \frac{13}{2}kt^2$ ...(2)

Equation (2) - (1)

$q - p = 6kt^2$

$k = \frac{q-p}{6t^2}$

Now average velocity in second part

$V_{avg} = \frac{V_{initial} + V_{final}}{2} = \frac{u + kt + u + 3kt}{2}$

$V_{avg} = u + 2kt$ ...(3)

Again using (1)

$u = \frac{P}{t} - \frac{1}{2}kt$

Put in equation (3)

$V_{avg} = \frac{p}{t} - \frac{1}{2}kt + 2kt$

$= \frac{p}{t} + \frac{3}{2}kt$

$= \frac{p}{t} + \frac{3}{2}\left(\frac{q-p}{6t^2}\right)t$

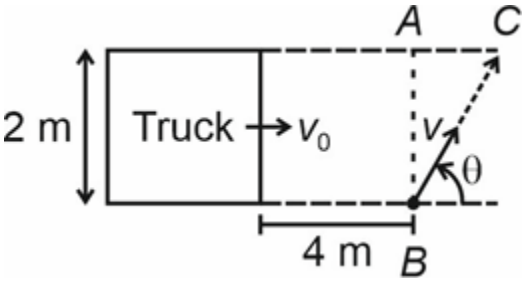
$= \frac{p}{t} + \frac{3}{2}\left(\frac{q-p}{6t}\right) = \frac{P}{t} + \frac{3}{2} \cdot \frac{q}{6t} - \frac{3}{2} \cdot \frac{p}{6t}$

$= \frac{p}{t} + \frac{q}{4t} - \frac{p}{4t}$

$= \frac{3p+q}{4t}$

(31) Answer : (2)

Solution:



$\frac{AB}{AC} = \tan\theta \Rightarrow AC = 2\cot\theta$

$\frac{AB}{BC} = \sin\theta \Rightarrow BC = \frac{2}{\sin\theta}$

For safe crossing, the man must cross the road by the time truck covers distance $4 + AC$.

$\frac{4+AC}{v_0} = \frac{BC}{v}$

$\frac{4+2\cot\theta}{8} = \frac{2}{\sin\theta\, v} \Rightarrow \frac{2+\frac{\cos\theta}{\sin\theta}}{8} = \frac{1}{\sin\theta\, v}$

$v = \frac{8}{2\sin\theta + \cos\theta}$

For minimum *v*, denominator should be maximum

Maximum value of $2\sin\theta + \cos\theta$ is $\sqrt{2^2 + 1^2} = \sqrt{5}$

$\therefore\ v_{min} = \frac{8}{\sqrt{5}}\ \text{m/s}$

(32) Answer : (3)

Solution:

$\frac{dx}{dt} = \frac{dy}{dt} = c$

$\frac{d^2x}{dt^2} = \frac{d^2y}{dt^2} = 0$

$z = ax^3 + by^2$

$\frac{dz}{dt} = 3ax^2\frac{dx}{dt} + 2by\frac{dy}{dt} = 3ax^2c + 2byc$

$\frac{d^2z}{dt^2} = 6ax \times c\frac{dx}{dt} + 2bc\frac{dy}{dt}$

$= 6ac^2x + 2bc^2$

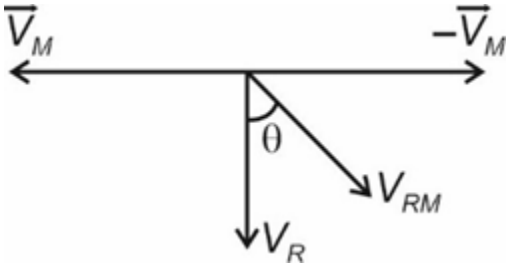
Now acceleration

$\vec{a} = \frac{d^2x}{dt^2}\hat{i} + \frac{d^2y}{dt^2}\hat{j} + \frac{d^2z}{dt^2}\hat{k}$

$= 0 + 0 + \left(6ac^2x + 2bc^2\right)\hat{k}$

(33) Answer : (1)

Solution:



$\vec{V}_{R/M} = \vec{V}_{R/g} - \vec{V}_{R/g}$

$\tan\ \theta = \frac{V_M}{V_R} = \left(\frac{20}{36}\right)$

$\theta = \tan^{-1}\left(\frac{5}{9}\right)$

(34) Answer : (3)

Solution:

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

Now with horizontal acceleration = *g*/3, vertical motion remains unchanged.

$T = \frac{2u \sin\theta}{g}$

New range $R' = u\cos\theta T + \frac{1}{2}\left(\frac{g}{3}\right)T^2$

$R' = u\cos\theta.\ \frac{2u\sin\theta}{g} + \frac{1}{2}\frac{g}{3}\frac{4u^2\sin^2\theta}{g^2}$

$= R + \frac{4}{3}\frac{u^2\sin^2\theta}{2g}$

$= R + \frac{4}{3}H$

(35) Answer : (3)

Solution:

$u = 0$

$\therefore V = an$

Displacement in last 4 seconds is

$= S(n) - S(n-4)$

$= \frac{1}{2}a\left[n^2 - \left(n-4\right)^2\right] = \frac{1}{2}a\left[n^2 - n^2 - 16 + 8n\right]$

$= \frac{1}{2}a\left[8n - 16\right]$

Put $a = \frac{V}{n}$

$= \frac{1}{2}\frac{V}{n}\left[8n - 16\right] = \frac{1}{2}\frac{V}{n}8n - \frac{16V}{2n}$

$= 4V - \frac{8V}{n} = \frac{4V}{n}\left[n - 2\right]$

(36) Answer : (2)

Solution:

$v^2 - u^2 = 2as$

$a = \frac{(5)^2 - (2)^2}{2\times 1000} = \frac{21}{2000}\ \mathrm{m/s^2}$

$\therefore\ t = \frac{v-u}{a} = \frac{(5-2)}{\frac{21}{2000}} = \frac{3}{21} \times 2000 \approx 286\ \mathrm{s}$

(37) Answer : (1)

Solution:

$v = \frac{3}{x+2}$

$\frac{dx}{dt} = \frac{3}{x+2}$

$\int_1^3 \left(x+2\right)dx = 3\int_{t_1}^{t_2} dt$

$\left[\frac{x^2}{2}+2x\right]_1^3 = 3\left(t_2-t_1\right)$

$\frac{3^2-1^2}{2}+2\left[3-1\right] = 3\left(t_2-t_1\right)$

$\frac{8}{2}+2\left(2\right) = 3\left[t_2-t_1\right]$

$\frac{8}{3} = t_2-t_1$

Average velocity $= \frac{3-1}{t_2-t_1} = \frac{2}{\frac{8}{3}} = \frac{2}{8}\times 3 = \frac{3}{4} = 0.75\ \text{m/s}$

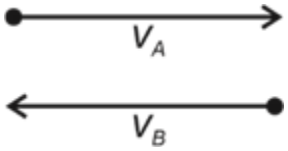
(38) Answer : (4)
Solution:

$\overrightarrow{r} = 2t\hat{i}+3t^2\hat{j}$

$x = 2t,\ y = 3t^2$

$\therefore\ y = 3\left(\frac{x}{2}\right)^2 = \frac{3}{4}x^2$

(39) Answer : (2)
Solution:

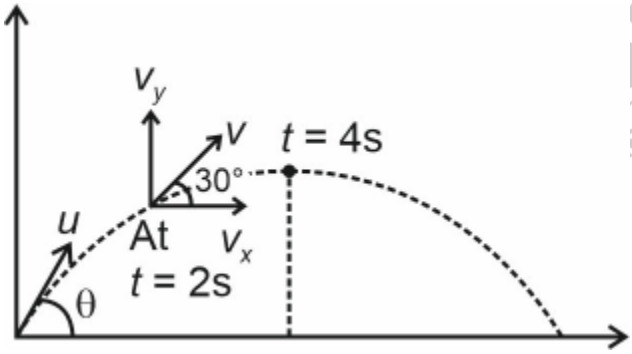


$\left[\overrightarrow{v_A}\right] = \frac{40-10}{4-0} = \frac{30}{4} = 7.5\,\text{m s}^{-1}$

$\left[\overrightarrow{v_B}\right] = \left[\frac{0-40}{4-0}\right] = -10\,\text{m s}^{-1}$

$\overrightarrow{v_{AB}} = \overrightarrow{v_A}-\overrightarrow{v_B} = \left(7.5\right)-\left(-10\right) = 17.5\,\text{m s}^{-1}$

(40) Answer : (2)
Solution:



At $t = 4$, stone is at maximum height

$t = 4 = \frac{u\sin\theta}{g}$

$u\sin\theta = 40$ ...(1)

$v\cos 30^\circ = u\cos\theta$

$v\sin 30^\circ = u\sin\theta - 2g$

$v\sin 30^\circ = 40-20$

$\frac{v}{2} = 20 \Rightarrow v = 40$ m/s

Now $v\cos 30^\circ = u\cos\theta$

$40\times\frac{\sqrt{3}}{2} = u\cos\theta$

$u\cos\theta = 20\sqrt{3}$ ...(2)

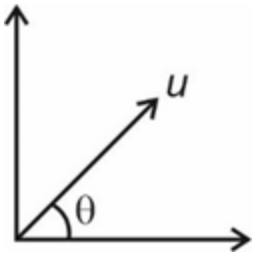
$u^2\left(\sin^2\theta+\cos^2\theta\right) = 40^2+\left(20\sqrt{3}\right)^2$

$u = \sqrt{1600+400(3)} = \sqrt{2800}$

$u = 20\sqrt{7}$ m/s

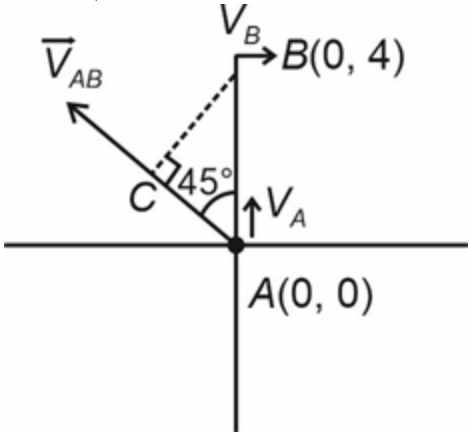
(41) Answer : (4)
Solution:
$v_x = 3\ \mathrm{m/s},\ v_y = 2t\ \mathrm{m/s}$
Displacement of particle along x-direction
$x = 3t = 3(3) = 9\ m$
As $v_y = 2t$
$\frac{dy}{dt} = 2t$
$\int_0^y dy = 2\int_0^t tdt$
$y = t^2$
At $t = 3,\ y = (3)^2 = 9$
Displacement of particle from origin
$\vec{r} = \left(9\hat{i} + 9\hat{j}\right)\mathrm{m}$

(42) Answer : (3)
Solution:



$v_y = u\sin\theta - gt$
(1) v_y vs t graph is straight line with negative slope and positive intercepts.
(2) $x = v\cos\theta t$
$x - t$ graph is a straight line passing through origin.
(3) $y = u\sin\theta - \frac{1}{2}gt^2$
$\therefore y - t$ graph is a parabola
(4) $v_x = u\cos\theta$
$v_x - t$ graph is a straight line parallel to t-axis.

(43) Answer : (2)
Solution:
$\vec{V}_{AB} = \vec{V}_A - \vec{V}_B = \left(2\hat{j} - 2\hat{i}\right)$ m/s
$V_{AB} = 2\sqrt{2}$m/s



Assuming B at rest, A will move with velocity $\vec{V}_{AB}$ in the direction shown. The distance between them will first decrease from A to C, then increases beyond C.

(44) Answer : (4)
Solution:

$c = LT^{-1}$, $h = ML^2T^{-1}$, $G = M^{-1}L^3T^{-2}$

$M^1L^0T^0 = c^a h^b G^c$

$\left(M^1L^0T^0\right) = \left(LT^{-1}\right)^a \left(ML^2T^{-1}\right)^b \left(M^{-1}L^3T^{-2}\right)^c$

$b - c = 1$

$a + 2b + 3c = 0$

$-a - b - 2c = 0$

Solving these equations

$a = \frac{1}{2}$, $b = \frac{1}{2}$, $c = -\frac{1}{2}$

$M = c^{1/2}\, h^{1/2}\, G^{-1/2}$

Again

$\left(M^0L^1T^0\right) = \left(LT^{-1}\right)^a \left(ML^2T^{-1}\right)^b \left(M^{-1}L^3T^{-2}\right)^c$

$b - c = 0$

$a + 2b + 3c = 1$

$-a - b - 2c = 0$

Solving these equations

$a = \frac{-3}{2}$, $b = \frac{1}{2}$, $c = \frac{1}{2}$

$L = c^{-3/2} h^{1/2} G^{1/2}$

Again $\left(M^0L^0T^1\right) = \left(LT^{-1}\right)^a \left(ML^2T^{-1}\right)^b \left(M^{-1}L^3T^{-2}\right)^c$

$b - c = 0$

$a + 2b + 3c = 0$

$-a - b - 2c = 1$

Solving these equations

$a = \frac{-5}{2}$, $b = \frac{1}{2}$, $c = \frac{1}{2}$

$T = c^{-5/2}\, h^{1/2}\, G^{1/2}$

Finally, linear momentum

$P = MLT^{-1} = \left(LT^{-1}\right)^a \left(ML^2T^{-1}\right)^b \left(M^{-1}L^3T^{-2}\right)^c$

$b - c = 1$

$a + 2b + 3c = 1$

$-a - b - 2c = -1$

Solving these equations

$a = \frac{3}{2}, b = \frac{1}{2}, c = \frac{-1}{2} \quad \Rightarrow \quad P = c^{3/2} h^{1/2} G^{-1/2}$

$[M] = \left[c^{1/2} h^{1/2} G^{-1/2}\right]$

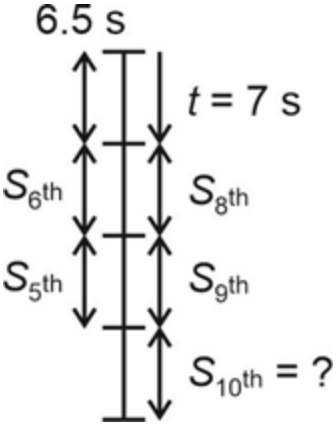
$[L] = \left[c^{-3/2} h^{1/2} G^{1/2}\right]$

$[T] = \left[c^{-5/2} h^{1/2} G^{1/2}\right]$

$[P] = \left[c^{3/2} h^{1/2} G^{-1/2}\right]$

(45) **Answer :** (4)

Solution:



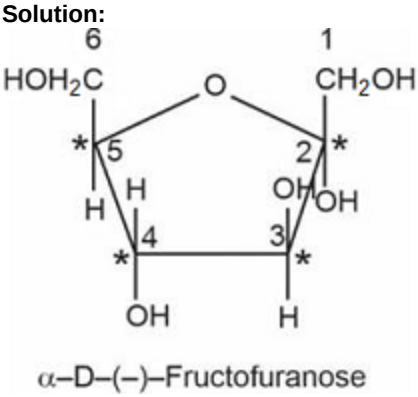
Time taken to reach maximum height = 6.5 s

$S_{10^{th}} = \frac{1}{2} g\left[\left(3.5\right)^2 - \left(2.5\right)^2\right]$ for downward motion

= $5[12.25 - 6.25] = 5 \times 6 = 30$ m

CHEMISTRY

(46) **Answer :** (2)
Hint:
Carbon with all four different valencies is chiral carbon.
Solution:



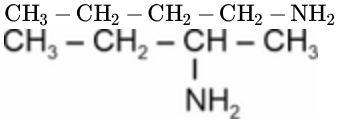
α–D–(–)–Fructofuranose

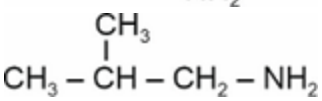
• (*) represents chiral carbon

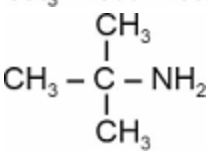
(47) **Answer :** (1)
Hint:
Alcoholic compounds on reaction with ceric ammonium nitrate give a red colouration due to the formation of a complex.
$(NH_4)_2[Ce(NO_3)_6] + 3ROH \rightarrow [Ce(NO_3)_4(ROH)_3] + 2NH_4NO_3$
Solution:
$[Ce(NO_3)_4(ROH)_3]$ – Red complex
$[Cu(NH_3)_4]SO_4$ – Deep blue
$Mg(NH_4)(PO_4)$ – White
$HgO{\cdot}Hg(NH_2)I$ – Brown

(48) **Answer :** (2)
Solution:
α-D-(-)-fructofuranose and β-D-(-)-fructofuranose have no mirror image relationship.

(49) **Answer :** (4)
Solution:
$CH_3 - CH_2 - CH_2 - CH_2 - NH_2$

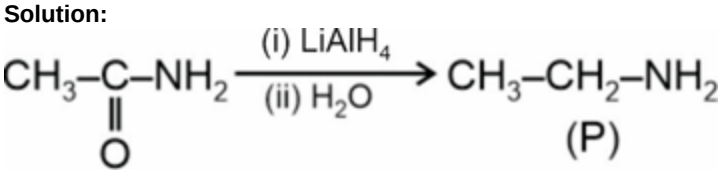






(50) **Answer :** (4)
Solution:
Size of colloidal particle is from 1-1000 nm.
Starch sol is lyophilic and stability of lyophobic sols is due to charge on colloidal particles.

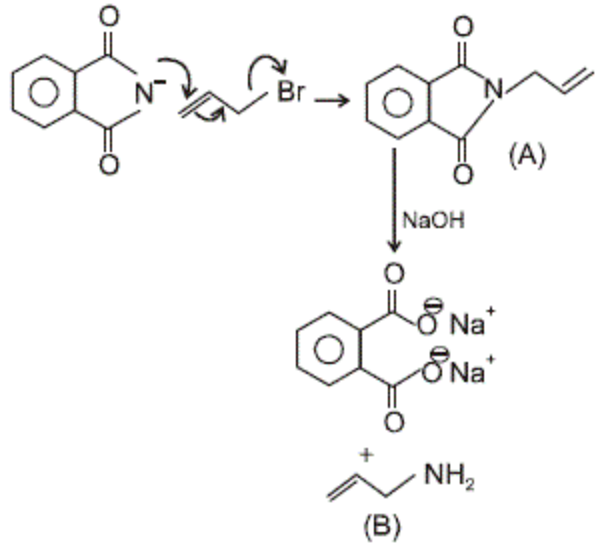
(51) **Answer :** (2)
Solution:



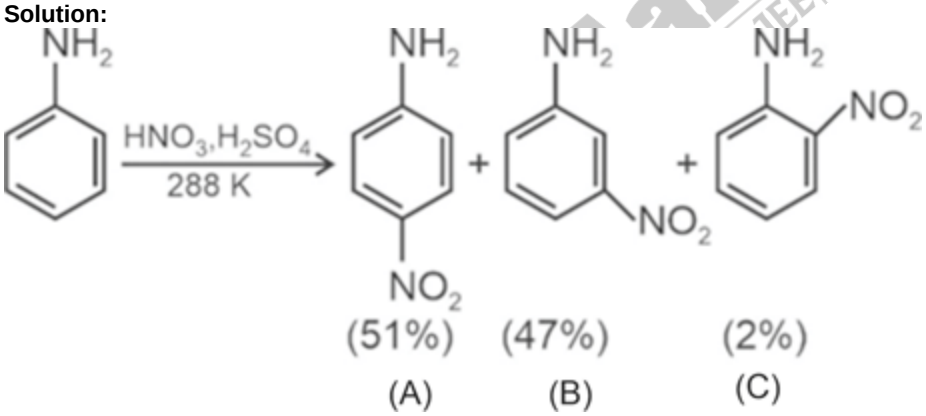
(52) **Answer :** (4)
Solution:

Name of amine	pK_b
Methanamine	3.38
N-Methylmethanamine	3.27
N, N-Dimethylmethanamine	4.22
Ethanamine	3.29

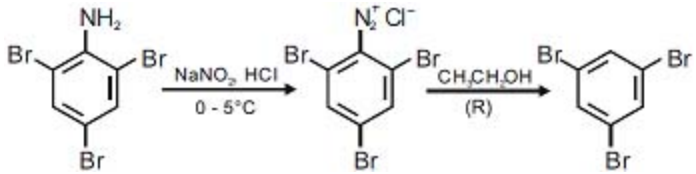
(53) **Answer :** (2)
Hint:
Gabriel's phthalimide synthesis
Solution:



(54) **Answer :** (2)
Solution:

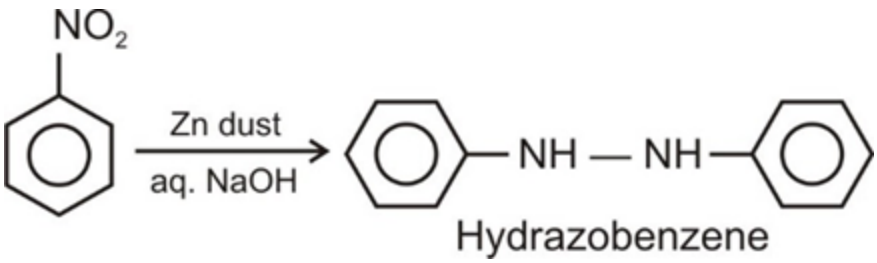


(55) **Answer :** (3)
Solution:

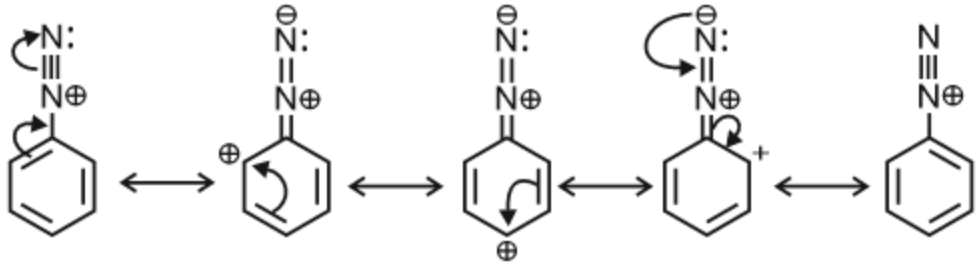


Reagent R is C_2H_5OH with diazonium salt.

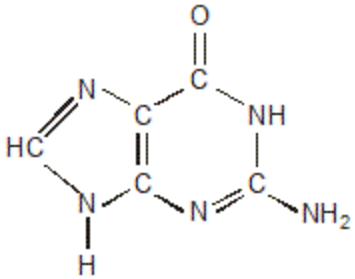
(56) **Answer :** (1)
Hint:
Nitrobenzene gives different products in alkaline medium under different conditions.
Solution:



(57) **Answer :** (4)
Solution:



(58) **Answer :** (2)
Hint:
Guanine is

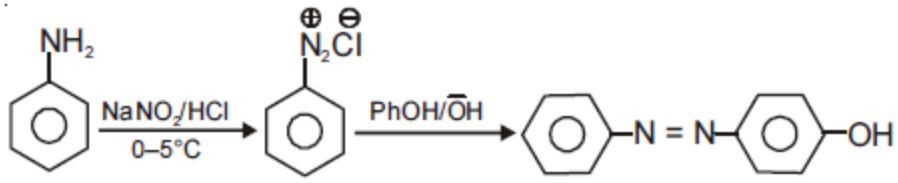


(59) **Answer :** (1)
Solution:
The carbohydrates are stored in animal body as glycogen. It is also known as animal starch because its structure is similar to amylopectin.

(60) **Answer :** (3)
Solution:
Mohr's salt is $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$

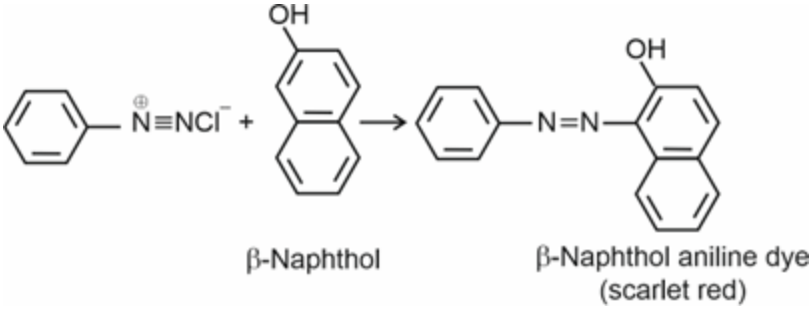
(61) **Answer :** (3)
Solution:
• Abnormally low level of thyroxine leads to hypothyroidism which is characterised by lethargyness and obesity.
• Increased level of thyroxine causes hyperthyroidism.

(62) **Answer :** (3)
Hint:
Coupling reaction of phenol
Solution:

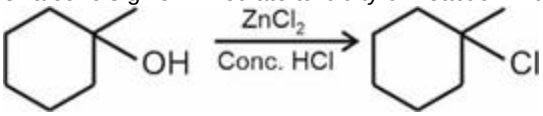


(63) **Answer :** (1)
Solution:
Deficiency of vitamin E leads to muscular weakness and increased fragility of RBCs.

(64) **Answer :** (3)
Solution:

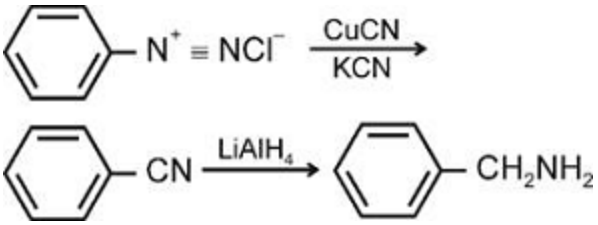


(65) **Answer :** (3)
Solution:
3° alcohols give immediate turbidity on reaction with Lucas reagent.



(66) **Answer :** (4)
Solution:
Acids which are more acidic than H_2CO_3, liberate CO_2 on reaction with $NaHCO_3$.

(67) **Answer :** (2)
Solution:



(68) **Answer :** (3)
Solution:

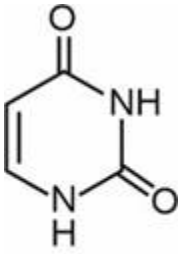
$$NO_3^- + H_2SO_4 \rightarrow HSO_4^- + HNO_3$$
$$4HNO_3 \rightarrow 4NO_2 + O_2 + 2H_2O$$
$$2NO_3^- + 4H_2SO_4 + 3Cu \rightarrow 3CuSO_4 + SO_4^{2-} + 4H_2O + 2NO$$
$$2NO + O_2 \rightarrow \underset{\text{(Brown fumes)}}{2NO_2}$$

(69) **Answer :** (1)
Solution:
Some of the heat released during neutralisation is used for ionisation of weak acid when strong base and weak acid undergoes neutralization.

(70) **Answer :** (2)
Solution:
Ca^{2+} gives brick red colour to flame
Sr^{2+} gives crimson red colour to flame
Ba^{2+} gives apple green colour to flame

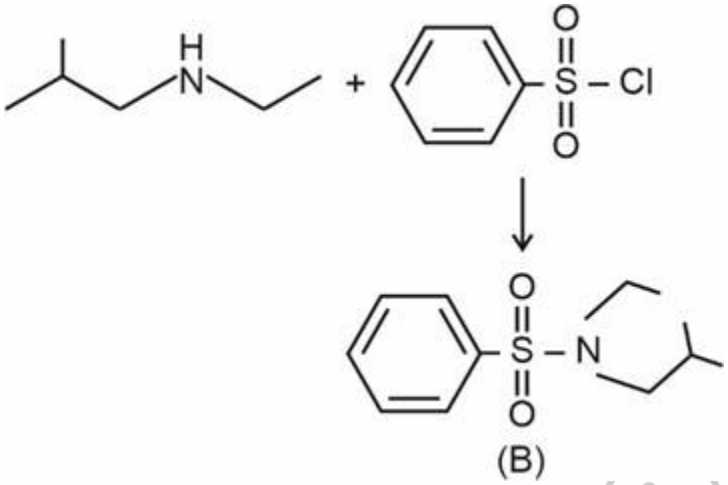
(71) **Answer :** (2)
Solution:
Glucose reacts with hydroxylamine to form an oxime.

(72) **Answer :** (1)
Solution:
DNA contains, adenine, guanine, cytosine and thymine. Uracil is absent in DNA.



Uracil

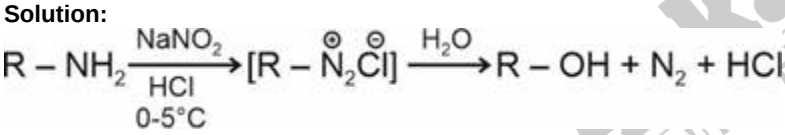
(73) Answer : (2)
Solution:



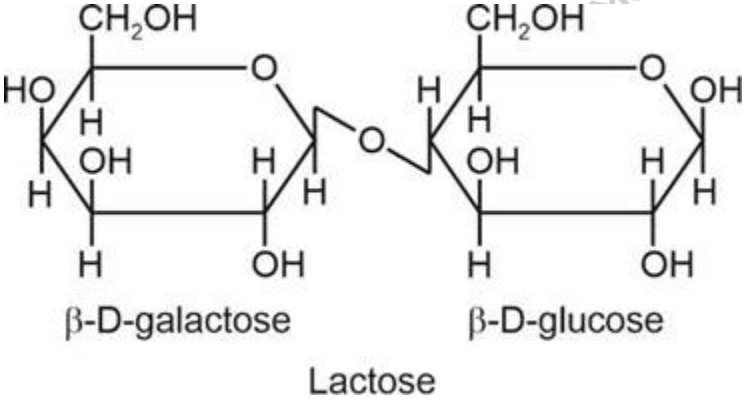
(B)

Compound (B) does not contain any hydrogen atom attached to nitrogen atom. It is not acidic and hence insoluble in aqueous alkali.

(74) Answer : (1)
Solution:

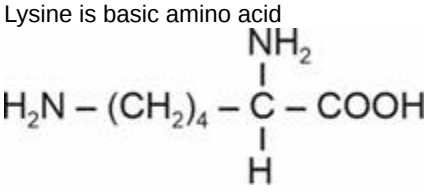


(75) Answer : (1)
Solution:



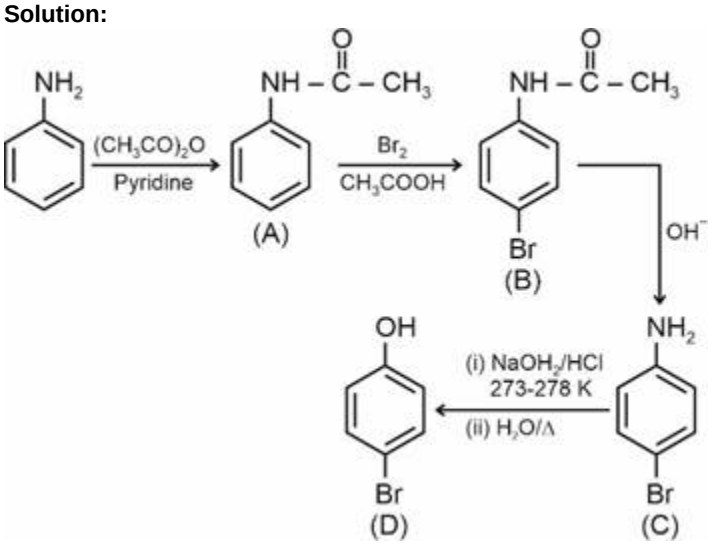
Lactose

(76) Answer : (2)
Solution:
Lysine is basic amino acid



(77) **Answer :** (3)
Solution:
Aromatic primary amine can not be prepared by Gabriel phthalimide synthesis.

(78) **Answer :** (3)
Solution:



(79) **Answer :** (2)
Solution:
Thiamine (vitamin B_1), Ascorbic acid (vitamin C), Vitamin B_2 (Riboflavin) are water soluble vitamins.
Vitamin A and Vitamin K are fat soluble vitamins.

(80) **Answer :** (2)
Solution:
Compounds containing $CH_3-\underset{\displaystyle OH}{\underset{|}{CH}}-$ group or $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-$ groups give positive iodoform test.

(81) **Answer :** (1)
Solution:

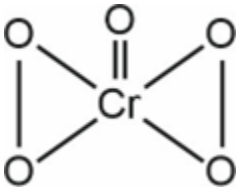
Name of indicators	Working pH range of indicators
Phenol red	6.2 – 8.2
Methyl red	4.2 – 6.2
Methyl orange	3.1 – 4.5
Phenolphthalein	8.2 – 10.2

(82) **Answer :** (2)
Solution:
In sucrose, the reducing groups of glucose and fructose are involved in glycosidic bond formation hence sucrose is a non-reducing sugar. All reducing sugar (except some ketones) undergo mutarotation.

(83) **Answer :** (2)
Solution:

Species	Colour
$Fe_4[Fe(CN)_6]_3 \cdot xH_2O$	Prussian blue
$[Fe(CN)_5NOS]^{4-}$	Violet
$[Fe(SCN)]^{2+}$	Blood red
PbS	Black

(84) **Answer :** (3)
Solution:
$AgCl + 2NH_4OH \rightarrow [Ag(NH_3)_2]Cl + H_2O$ soluble in aqueous medium CrO_5 gets dissolved in amyl alcohol to give blue colour.

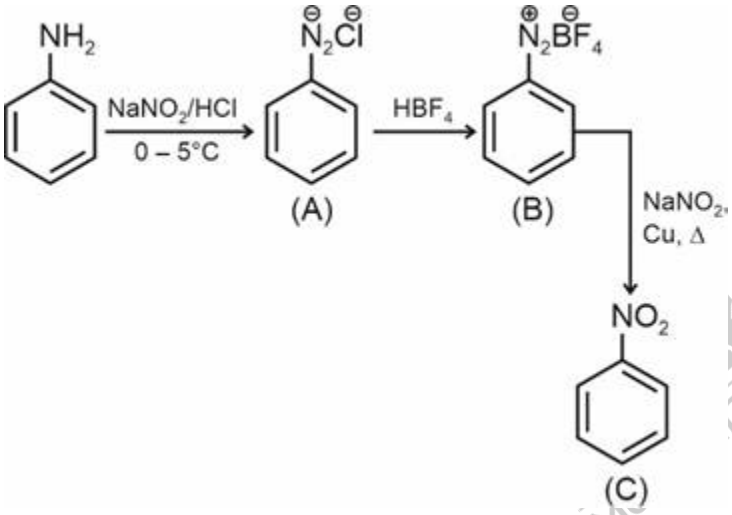


(85) **Answer :** (3)
Solution:
Zn^{2+} is group-IV cation and the group reagent is H_2S in presence of NH_4OH.

(86) **Answer :** (2)
Solution:
$3NiS + 2NHO_3 + 6HCl \rightarrow 3NiCl_2 + 2NO + 3S + 4H_2O$, NiS dissolves in aqua regia and forms $NiCl_2$.

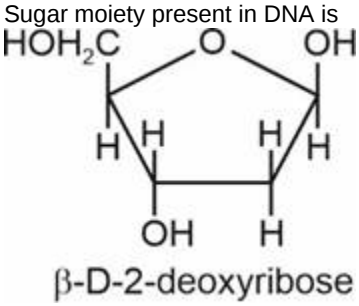
(87) **Answer :** (2)
Solution:
Based on the subtle interplay of the inductive effect, solvation effect and steric hindrance the basic nature of the ethyl substituted ammonia in water is
$(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2$

(88) **Answer :** (3)
Solution:



(89) **Answer :** (2)
Solution:
Myosin is fibrous protein while albumins are globular protein.

(90) **Answer :** (3)
Solution:
Sugar moiety present in DNA is



BOTANY

(91) **Answer :** (2)

Solution:
The number of trophic levels in the grazing food chain is restricted as the transfer of energy follows 10 per cent law – only 10 per cent of the energy is transferred to each trophic level from the lower trophic level.

(92) **Answer :** (4)
Solution:
First trophic level in ecological pyramid is occupied by producers, *i.e.*, plants.
Second trophic level is occupied by primary consumers.
Third trophic level is occupied by predators preying on herbivores.
Fourth trophic level has least number of individuals as compared to the other trophic levels.

(93) **Answer :** (3)
Solution:
The man-made ecosystem, such as crop field, shows high productivity.

(94) **Answer :** (3)
Solution:
More than 650 species are facing threat of extinction in our country as per IUCN (2004) documentation.

(95) **Answer :** (2)
Solution:
David Tilman's long-term ecosystem experiments using outdoor plots gave tentative answers on relation between species richness and stability for a biological community.

(96) **Answer :** (3)
Solution:
Detritus food chain from detritus to detritivore does not follow 10% law of energy transfer.

(97) **Answer :** (3)
Solution:
Humus is slightly acidic and undergoes very slow decomposition.

(98) **Answer :** (2)
Solution:
Of the incident solar radiation, less than 50% is photosynthetically active radiation. Plants capture only 2-10% of PAR or 1-5% of incident solar radiation for the synthesis of organic matter.

(99) **Answer :** (2)
Solution:
Biologists are not sure about how many prokaryotic species there might be because conventional taxonomic methods are not suitable for identifying microbial species and many species are simply not culturable under laboratory conditions.

(100) **Answer :** (1)
Solution:
Food webs are more frequent than food chains and they are not accomodated by the ecological pyramids.

(101) **Answer :** (1)
Solution:
Based on the source of food, organisms occupy a specific place in food chain that is known as their trophic level.

(102) **Answer :** (3)
Solution:
Crows and cockroaches function at more than one trophic level in an ecosystem, as they are omnivores.

(103) **Answer :** (4)
Solution:
Extinction of a species results in the loss of genetic information contained in it.

(104) **Answer :** (2)
Solution:
Plants including gymnosperms, bryophytes, angiosperms, algae and fungi comprise not more than 22% of all species.

(105) **Answer :** (1)
Solution:
A stable community is resistant to invasion by alien species and it does not show too much variation in productivity from year to year.

(106) **Answer :** (2)
Solution:
IUCN stands for International Union for Conservation of Nature and Natural resources.

(107) Answer : (3)
Hint:
Rauwolfia vomitoria contains reserpine.
Solution:
Rauwolfia vomitoria, growing in different ranges of Himalayas, shows genetic diversity.

(108) Answer : (3)
Solution:
The total number food chains in the given food web is seven.

(109) Answer : (1)
Solution:
Biodiversity hotspots are *in-situ* conservation strategies.

(110) Answer : (3)
Solution:
Robert May – Placed global species diversity at about 7 million.
Paul Ehrlich – Explained the importance of key species in an ecosystem through an analogy, 'Rivet Popper hypothesis'.

(111) Answer : (3)
Solution:
Key species drive major ecosystem functions. So, in Rivet popper hypothesis, rivets on the wings are compared with key species.

(112) Answer : (1)
Solution:
In many cultures, tracts of forest are set aside, and all the trees and wildlife within these areas are given total protection and these areas are called sacred groves.

(113) Answer : (4)
Solution:
The most important cause, driving animals and plants to extinction, is habitat loss and fragmentation.

(114) Answer : (4)
Solution:
The components of the ecosystem are seen to function as a unit when we consider the following aspects:
(i) Productivity
(ii) Decomposition
(iii) Energy flow
(iv) Nutrient cycling

(115) Answer : (4)
Solution:
Annual net primary productivity of whole biosphere is approximately. 170 billion tons. The productivity of oceans are only 55 billion tons. Sun is the only source of energy in all ecosystems except deep sea hydrothermal ecosystem.

(116) Answer : (2)
Solution:
Productivity is expressed as $gm^{-2}yr^{-1}$ in terms of biomass and production is expressed as K cal m^{-2} in terms of energy.

(117) Answer : (1)
Solution:
Detritivores perform fragmentation, mineralisation and catabolism.

(118) Answer : (1)
Solution:
Standing crop in an ecosystem is controlled by both production and loss in form of energy.

(119) Answer : (3)
Solution:
Cryopreservation – Preservation in liquid nitrogen at –196°C.

(120) Answer : (4)
Solution:
Ecosystem is not exempted from the 2^{nd} law of thermodynamics.

(121) Answer : (2)
Solution:
Pyramid of number in a tree ecosystem is either inverted or spindle shaped.

(122) Answer : (3)
Solution:
The transition zone, the outermost part of the Biosphere Reserve, is an area wherein activities like settlements, cropping, forestry are allowed.

(123) Answer : (2)
Solution:
Colonisation of tropical Pacific Islands by humans is said to have led to the extinction of > 2000 species of native birds.

(124) Answer : (4)
Solution:
Amazon rainforest is considered as 'Lungs of the Planet'.

(125) Answer : (2)
Solution:
Seed bank is an *ex-situ* conservation strategy.
Nations find *in-situ* conservation unrealistic and economically not feasible.

(126) Answer : (2)
Solution:
The given data represents the biomass and it exemplifies inverted pyramid of biomass in sea ecosystem.

(127) Answer : (3)
Solution:
'X' represents frog and the given is the terrestrial food chain.

(128) Answer : (4)
Solution:
Pyramid of energy is always upright because it follows second law of thermodynamics.

(129) Answer : (2)
Solution:
In the given pie chart:
A – Fishes, B – Mammals,
C – Birds, D – Amphibians
32 per cent of all amphibian species in the world, face the threat of extinction.
Ecologist have discovered that the value of Z lies in the range of 0.1 to 0.2, regardless of the taxonomic group or the region.

(130) Answer : (2)
Solution:
Primary productivity is the rate at which biomass or organic matter is produced per unit area over time period by plants or producers during photosynthesis.
Diversity of scavengers will not affect the primary productivity of an ecosystem.

(131) Answer : (3)
Solution:
Rate of decomposition will be high when moisture and aeration are optimum.

(132) Answer : (1)
Solution:
Ex-situ conservation is a desirable approach for endangered species. Over-exploitation is the major cause for extinction of many species in last 500 years.

(133) Answer : (2)
Solution:
Availability of light and nutrients, such as nitrogen, limit the productivity of oceans.

(134) Answer : (4)
Solution:
Biopiracy is an unethical or illegal appropriation of traditional knowledge and biological resources.
Biotechnology is multidisciplinary field that utilises living organisms and biological systems to develop products.

(135) Answer : (2)
Solution:
Over-exploitation by humans lead to extinction of Stellar's sea cow and passenger pigeon.

ZOOLOGY

(136) Answer : (3)
Solution:
Gnathostomata is the division including the super classes Pisces and Tetrapoda.

(137) Answer : (3)
Hint:
Part of GIT
Solution:
Crop for storage of food and gizzard for grinding are the additional chambers that are common in *Psittacula* and *Periplaneta.*
Chitinous exoskeleton is present in arthropods. Characteristic feature of birds is the presence of feathers.

(138) Answer : (3)
Solution:
Reptiles are not endotherms. They cannot regulate their body temperature. *Chameleon* and *Chelone* are cold-blooded animals.

(139) Answer : (1)
Hint:
It is hollow and single
Solution:
'X' is nerve cord which is dorsal in position. It is found in all chordates.

(140) Answer : (1)
Hint:
These organisms are exclusively marine.
Solution:
Echinus and *Asterias* are echinoderms. These animals have an endoskeleton of calcareous ossicles and hence the name Echinodermata (spiny-bodied). They show external fertilisation.
Aplysia and *Pila* are molluscs and their body is covered by a calcareous shell.

(141) Answer : (2)
Solution:
Cucumaria belongs to the phylum Echinodermata. Its digestive system is complete with mouth on the ventral side and anus on the dorsal side.

(142) Answer : (3)
Solution:
All roundworms are not parasites.*Caenorhabditis elegans* is a free-living roundworm.

(143) Answer : (2)
Hint:
Bilateral symmetry
Solution:
Echinoderms exhibit radial symmetry in their adult stage. Radial symmetry is seen in the members of the phylum Ctenophora and Cnidaria.

(144) Answer : (4)
Solution:
Calotes is a garden lizard and *Chameleon* is a tree lizard.

(145) Answer : (3)
Solution:
Presence of wings is a feature of birds. Three-chambered heart is the characteristic feature of most reptiles. Birds are homeothermous animals and have four-chambered heart while reptiles are cold-blooded.

(146) Answer : (3)
Hint:
Paramecium is a unicellular organism.
Solution:
Presence of 8 rows of ciliated comb plates is a characteristic feature of members of the phylum Ctenophora. *Pleurobrachia* uses ciliated comb plates for locomotion. *Sycon* is a sessile organism.

(147) Answer : (1)
Hint:

Do not possess paired fins
Solution:
Petromyzon (Lamprey) – Class Cyclostomata
Exocoetus – Class Osteichthyes
Hyla, *Ichthyophis* – Class Amphibia
Chelone, *Hemidactylus* – Class Reptilia
Delphinus, *Equus* – Class Mammalia

(148) Answer : (2)
Hint:
Birds show flight adaptations.
Solution:
Endoskeleton of birds (*Corvus*) is fully ossified (bony) and the long bones are hollow with air cavities.
Camelus and *Delphinus* are mammals.
Chelone is a reptile.

(149) Answer : (4)
Solution:
Hirudinaria belongs to the phylum Annelida. *Ancylostoma* and *Wuchereria* are aschelminths.

(150) Answer : (4)
Hint:
Mesoderm is present as scattered pouches in aschelminths.
Solution:

Features	**Platyhelminths (*Planaria*)**	**Aschelminths (*Ascaris*)**
Body cavity	Acoelomate	Pseudocoelomate
Sexual dimorphism	Absent	Present
Digestive system	Incomplete	Complete
Segmentation	Absent	Absent

(151) Answer : (1)
Hint:
Characteristic of crustaceans
Solution:
Statocysts provide the information about the change in position of animal to its brain which helps in maintaining the balance of the animal.
• Hooks and suckers are present in tapeworm while only suckers are present in liver fluke.
• The body of ctenophores bear eight external rows of ciliated comb plates, which help in locomotion.

(152) Answer : (1)
Solution:
In hermaphrodites or monoecious animals, both male and female gametes are produced in the same individual.

(153) Answer : (3)
Hint:
Body symmetry
Solution:
Canis is a mammal.
Fasciola is a platyhelminth.
Sepia is a mollusc.
All the above mentioned organisms exhibit bilateral symmetry (body can be divided into identical left and right halves in only one plane).
• *Canis* gives birth to young ones among them.
• Radial symmetry is seen in the members of phylum Coelenterata and Ctenophora.
• Digestive system is incomplete (has a single opening) in platyhelminths.

(154) Answer : (2)
Hint:
Jawless vertebrates
Solution:
Under the division Agnatha, all the living members of the class Cyclostomata are ectoparasites on some fishes. They have an elongated body bearing 6 – 15 pairs of gill slits for respiration. Cyclostomes have a sucking and circular mouth without jaws. Cyclostomes are marine but migrate for spawning to fresh water. After spawning, within a few days, they die. Their larvae, after metamorphosis, return to the ocean.

(155) Answer : (2)

Hint:
It is a reptile.
Solution:
Generally reptiles have a three-chambered heart and show incomplete double circulation.
Crocodilus is an exception. It has a 4-chambered heart.

(156) Answer : (4)
Hint:
Petromyzon is a cyclostome
Solution:
The mouth of cyclostomes is suctorial, circular and without jaws. Mouth of the members belonging to the class Chondrichthyes is located ventrally. Terminal mouth is a feature of bony fishes.

(157) Answer : (3)
Solution:
Locusta is an economically harmful insect (arthropod) and attacks the crops in the group [gregarious pest].

(158) Answer : (3)
Solution:
Planaria possesses high regeneration capacity. Metamorphosis is the process of transformation from an immature form to an adult form in two or more distinct stages.
Parthenogenesis is a form of asexual reproduction in which new individual develops from an unfertilised egg.

(159) Answer : (2)
Solution:
Aschelminths are bilaterally symmetrical, triploblastic, pseudocoelomates and they have a complete digestive tract.
Platyhelminths are acoelomates while annelids and arthropods are coelomates.

(160) Answer : (3)
Solution:
Gnathostomes (*e.g.*, fishes) have both endoskeleton (bony/cartilaginous) and exoskeleton (scales). Some molluscs have exoskeleton in the form of a shell. Arthropods have an exoskeleton.
Annelids have neither an endoskeleton nor an exoskeleton.

(161) Answer : (4)
Solution:
Hirudinaria lacks parapodia.
Pheretima exhibits sexual reproduction.
Ancylostoma is an aschelminth.

(162) Answer : (1)
Solution:
Arthropods have a dorsal tubular heart but no capillary network. Haemolymph directly bathes tissues, hence, we say that they have an open circulation.

(163) Answer : (2)
Solution:
Adult echinoderms have radial symmetry.
The water vascular system consists of tube feet.

(164) Answer : (3)
Solution:
Molluscs are found in variety of habitats. They perform extracellular digestion. They are usually dioecious. Some monoecious forms also exist.

(165) Answer : (2)
Solution:
Ascaris – Separate sexes present, internal fertilisation occurs
Pheretima – Closed circulation; hermaphrodite

(166) Answer : (4)
Solution:
Taenia (platyhelminth), *Echinus* (echinoderm), *Rana* (amphibian) show indirect development. *Naja* (reptile) and *Pheretima* (annelid) show direct development. *Pristis* is viviparous.

(167) Answer : (3)
Solution:
Presence of jointed appendages is the feature of arthropods. Cockroach and locust are arthropods. Arthropods are coelomates as well. Earthworm is an annelid. Annelids and molluscs have true coelom but they lack jointed appendages.

(168) Answer : (3)
Solution:
Apis (honey bee) is dioecious and has an open circulatory system.

(169) Answer : (3)
Solution:
Complete digestive system first appeared in aschelminths. True segmentation and closed circulation first appeared in annelids.

(170) Answer : (4)
Solution:
Some amphibians and reptiles do not possess limbs.
Chordates are fundamentally characterised by the presence of a notochord, a dorsal hollow nerve cord and paired pharyngeal gill slits.

(171) Answer : (4)
Solution:
In *Macropus* (Kangaroo), the notochord appears in the embryo but is later replaced by the vertebral column. *Branchiostoma*, *Pristis* and *Petromyzon* retain the notochord throughout their life.

(172) Answer : (4)
Solution:
Non-chordates have a ventral nerve cord and dorsal heart, while chordates have the reverse arrangement showing dorso-ventral inversion.

(173) Answer : (4)
Solution:
Balanoglossus belongs to the phylum Hemichordata.

(174) Answer : (3)
Solution:
In cephalochordates, notochord persists throughout their life.

(175) Answer : (2)
Solution:
Whales, dolphins, *etc.*, have abdominal testes and they lack ear pinnae as well. All the male mammals lack functional mammary glands.

(176) Answer : (2)
Solution:
Cyclostomes –Parasitic, migratory animals
Chondrichthyes –Marine predators
Osteichthyes –Unisexual, cold-blooded and exclusively aquatic animals
Amphibians –Unisexual, poikilothermic and scaleless animals

(177) Answer : (3)
Solution:
Reptiles are poikilothermic while birds are homeothermic, *i.e.*, birds are able to maintain a constant body temperature. Both reptiles and birds show internal fertilisation and oviparity. Both reptiles and birds are uricotelic.
Scales are present on the hindlimbs of birds.

(178) Answer : (2)
Solution:
Gill cover is absent in members of the class Chondrichthyes, while it is present in the members of the class Osteichthyes.

(179) Answer : (2)
Solution:
Presence of hair on skin is the unique feature of mammals. *Ornithorhynchus* is a mammal and shows oviparity. *Pteropus* is a viviparous mammal. *Corvus* is a bird while *Hippocampus* is a bony fish.

(180) Answer : (2)
Solution:
Both reptiles and fishes have a muscular and chambered heart. Tympanum and paired limbs are absent in fishes. Fishes respire through gills, while reptiles respire through lungs.