# JEE(Main + Advanced) : NURTURE TEST SERIES / JOINT PACKAGE COURSE

## Test Type : Mock Test

ANSWER KEY PAPER-1

### PART-1 : PHYSICS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SECTION-I (i) | Q. | 1 | 2 | 3 | 4 | | |
| | A. | D | D | C | B | | |
| SECTION-I (ii) | Q. | 5 | 6 | 7 | | | |
| | A. | B,D | A,C | B,C | | | |
| SECTION-I (iii) | Q. | 8 | 9 | 10 | | | |
| | A. | A | B | A | | | |
| SECTION-II | Q. | 1 | 2 | 3 | 4 | 5 | 6 |
| | A. | 20.00 | 18.00 | 21.00 | 6.00 | 4.00 | 2.00 |

### PART-2 : CHEMISTRY

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SECTION-I (i) | Q. | 1 | 2 | 3 | 4 | | |
| | A. | B | C | B | D | | |
| SECTION-I (ii) | Q. | 5 | 6 | 7 | | | |
| | A. | B,C,D | A,B,C,D | C,D | | | |
| SECTION-I (iii) | Q. | 8 | 9 | 10 | | | |
| | A. | B | B | A | | | |
| SECTION-II | Q. | 1 | 2 | 3 | 4 | 5 | 6 |
| | A. | 3.00 | 7.00 | 3.00 | 18.00 | 12.00 | 5.00 |

### PART-3 : MATHEMATICS

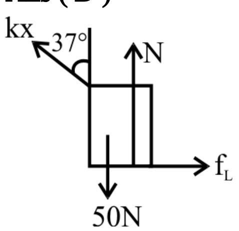
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| SECTION-I (i) | Q. | 1 | 2 | 3 | 4 | | |
| | A. | A | B | A | C | | |
| SECTION-I (ii) | Q. | 5 | 6 | 7 | | | |
| | A. | A,B,D | B,C | A,D | | | |
| SECTION-I (iii) | Q. | 8 | 9 | 10 | | | |
| | A. | C | A | B | | | |
| SECTION-II | Q. | 1 | 2 | 3 | 4 | 5 | 6 |
| | A. | 101.00 | 147.00 | 0.00 | 29.00 | 726.00 | 5.00 |

# HINT – SHEET

## PART-1 : PHYSICS

### SECTION-I (i)

1. **Ans ( D )**




$x = 0.25$ m

$$100 \times .25 \times \frac{3}{5} = \mu \times (50 - 100 \times .25 \times \frac{4}{5})$$

$$\mu = \frac{15}{30} = \frac{1}{2} = 0.5$$

2. **Ans ( D )**

$a = 2 m/s^2 (\downarrow)$

$60 - T = 12$

$T = 48$ N

3. **Ans ( C )**

$\vec{F}_{s_1} + \vec{F}_{s_2} + \vec{w} = -10\vec{j}$

then, after string is bouned,

$\vec{a} = \dfrac{-10\hat{i}}{5} = -2\hat{j}$

4. **Ans ( B )**

$\theta = \dfrac{1}{2} \times 4 \times 3^2 = 18$

$n = \dfrac{18}{2\pi} = \dfrac{9}{3.14} = 2.9$

## PART-1 : PHYSICS

### SECTION-I (ii)

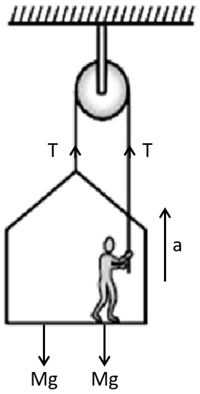
5. **Ans ( B,D )**

Initial velocity of stone w.r.t. air observer on ground $\vec{u} = 4\hat{i} + 3\hat{j} + 3\sqrt{3}\hat{k}$

$\Rightarrow \ |\vec{u}| = \text{speed} = 2\sqrt{13}$ and at highest point

$\vec{u} = 4\hat{i} + 3\hat{j} \ \Rightarrow \ |\vec{v}| = 5$

6. **Ans ( A,C )**



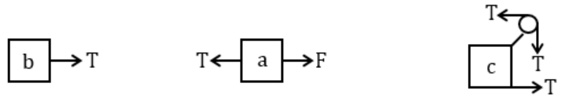

$2T - (M+m)g = (M+m)a$

$2T - 1500 = 150(5)$

$2T = 750 + 1500$

$T = 1125N$

7. **Ans ( B,C )**




$F - 10 = 10 \times a$.......(i)

$T = 10 \times a$ .............(ii)

$F = 20a \Rightarrow a = 1$

$a_a = a_b = 1, \ \ a_c = o$

$T = 10N$

## PART-1 : PHYSICS

### SECTION-I (iii)

8. **Ans ( A )**

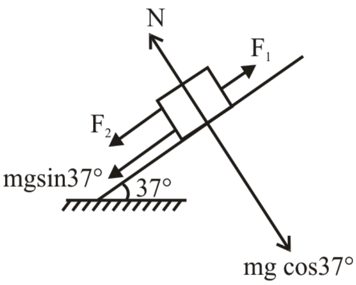
$\omega = 3t^2 - 2t$

$\alpha = \dfrac{d\omega}{dt} = 6t - 2$

$a_t = R\alpha = 6t - 2$

Rate of change of angular velocity = $\alpha$

9. **Ans ( B )**



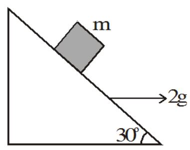

fmax = $\mu N = 0.5 \times 80 = 40N$

$\Rightarrow 0 \le f \le 40$

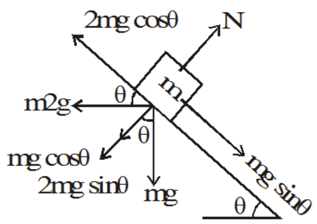
Net force on the block = $F_1 - F_2 - mg\sin 37° \pm f$

(Friction force 'f' always try to stop the relative motion between block & wedge.)

10. **Ans ( A )**




$\mu = \tan 30^o = \dfrac{1}{\sqrt{3}} = 0.577$

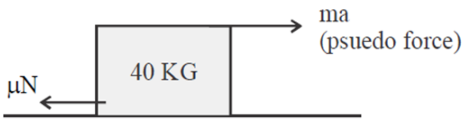


## PART-1 : PHYSICS

### SECTION-II

1. **Ans ( 20.00 )**

In the reference frame of the truck FBD of 40 kg block




Net force $\Rightarrow ma - \mu N$

$\Rightarrow 40 \times 2 - \frac{15}{100} \times 40 \times 10$

$ma_{block} \Rightarrow 80 - 60 \Rightarrow a_{block} = \frac{20}{40} = \frac{1}{2} m/s^2$

This acceleration of the block in reference frame of truck so time taken by box to fall down from truck

$S_{rel} = u_{rel}t - \frac{1}{2}a_{rel}t^2$

$\Rightarrow 5 = 0 + \frac{1}{2} \times \frac{1}{2} \times t^2 \Rightarrow t^2 = 20$

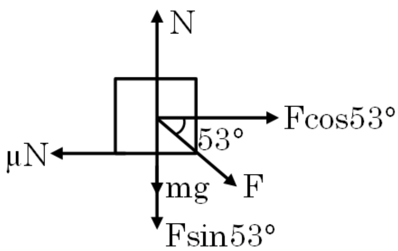
So distance moved by the truck

$\Rightarrow \frac{1}{2} \times a_{truck} \times t^2$

$\Rightarrow \frac{1}{2} \times 2 \times (20) = 20\,\text{meter}$

2. **Ans ( 18.00 )**

Max. frictional force




$f_{max} = \mu N$

$= \mu(mg + F\sin 53°)$

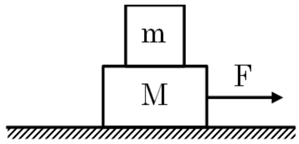
$= 0.2(20 \times 10 + 30 \times \frac{4}{5}$

$= 44.8$ N

As applied horizontal force is

Fcos53° = 18N < fmax, friction force will also be 18 N.

3. **Ans ( 21.00 )**




$a = \frac{F}{M + m}$

$ma < \mu mg$

4. **Ans ( 6.00 )**

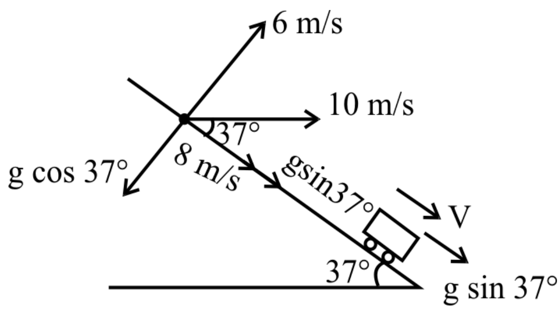
$\alpha = \frac{\omega d\omega}{d\theta}$

$\int \omega d\omega = \int \alpha d\theta$

$\frac{\omega^2}{2} = \text{Area under } \alpha \text{ vs } \theta \text{ graph} = \frac{1}{2}(9 \times 4)$

$\omega = \sqrt{36} = 6\text{rad/s}$

5. **Ans ( 4.00 )**




with respect to trolley velocity of ball along the inclined plane will be 8 − V

Time of flight $T = \frac{2 \times 6}{10\cos 37°} = \frac{3}{2}$

$6 = (8 - V)\frac{3}{2}$

$V = 4$

6. **Ans ( 2.00 )**

$\left(\sqrt{5}\right)^2 + v_r^2 = 3^2$

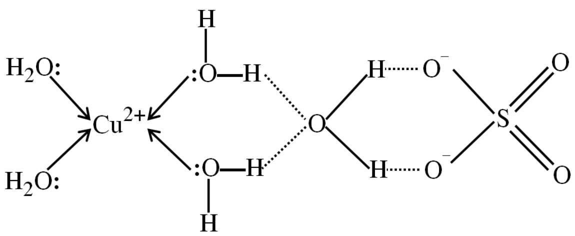
$v_r = 2$ m/s

## PART-2 : CHEMISTRY

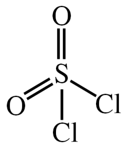
### SECTION-I (i)

1. **Ans ( B )**

(A)

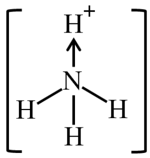


(B)



(C) H—N≡C:

(D)



$[Cl^-]$

2. **Ans ( C )**

Bond order $\propto \dfrac{1}{\text{Bond length}}$

3. **Ans ( B )**

Homologous series - Successive members differ from each other by a $-CH_2-$ unit having a characteristic functional group.

4. **Ans ( D )**

$CaCO_3(s) \longrightarrow CaO(s) + CO_2$

moles of CaO $= \dfrac{28}{56} = \dfrac{1}{2}$

moles of $CaCO_3$ $= \dfrac{x}{100}$

$\because$ moles of $CaCO_3$ = moles of CaO

$$\frac{x}{100} = \frac{1}{2}$$

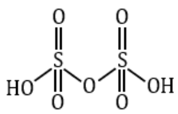
x = 50 gm

## PART-2 : CHEMISTRY

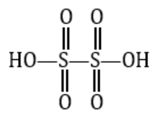
### SECTION-I (ii)

5. **Ans ( B,C,D )**

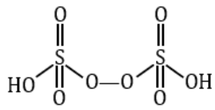
(A) $H_2S_2O_7$



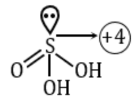
(B) $H_2S_2O_6$



(C) $H_2S_2O_8$

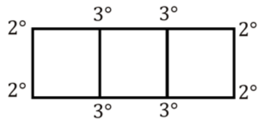


(D) $H_2SO_3$



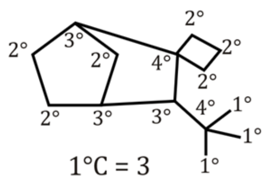
6. **Ans ( A,B,C,D )**

**(I)**



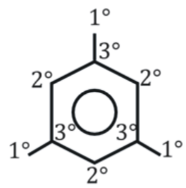
2°C = 4
3°C = 4

**(II)**



1°C = 3
2°C = 6
3°C = 3
4°C = 2

(III)



1°C = 3
2°C = 3
3°C = 3

**7.** **Ans ( C,D )**

1 g atom of nitrogen means 1 mole of nitrogen atom or $N_A$ atoms of N.

(A) $6.02 \times 10^{23}$ $N_2$ molecule = $2 \times 6.02 \times 10^{23}$ atoms of nitrogen

(B) Moles = $\frac{22.4}{22.4}$ =1 mole $N_2$ = $6.02 \times 10^{23}$ $N_2$ molecule = $2 \times 6.02 \times 10^{23}$ atoms of nitrogen

(C) Moles = $\frac{11.2}{22.4}$ = 0.5 moles $N_2$ = $3.01 \times 10^{23}$ $N_2$ molecule = $2 \times 3.01 \times 10^{23}$ atoms of nitrogen

= $6.02 \times 10^{23}$ atoms of nitrogen

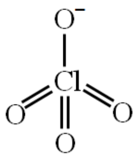
(D) Moles of $N_2$ = $\frac{14}{28}$ = 0.5 moles

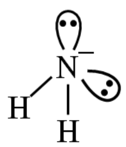
$N_2$ = $3.01 \times 10^{23}$ $N_2$ molecule = $2 \times 3.01 \times 10^{23}$ atoms of nitrogen = $6.02 \times 10^{23}$ atoms of nitrogen

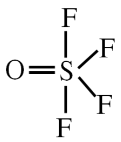
## PART-2 : CHEMISTRY

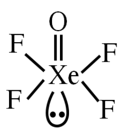
### SECTION-I (iii)

**8.** **Ans ( B )**

(P) 
Non planar
Non – Polar
$sp^3$
$p\pi - d\pi$ bonds

(Q) 
Planar
Polar
$sp^3$

(R) 
Non planar
Polar
$sp^3d$
$p\pi–d\pi$ bond

(S) 
Non planar
Polar
$sp^3d^2$
$p\pi–d\pi$ bond

**9.** **Ans ( B )**

(P) $SO_3 \Rightarrow$ V.D. = $\frac{MW}{2} = \frac{80}{2} = 40$

No. of electrons in one mole = $40N_A$

(Q) CO $\Rightarrow$ % by mass of C = $\frac{12}{28} \times 100 = \frac{300}{7}\%$

% carbon by moles = $\frac{1}{2} \times 100 = 50\%$

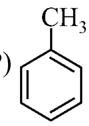
(R) $C_6H_6 \Rightarrow$ Hydrocarbon

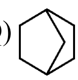
% by mole of C = $\frac{6}{12} \times 100 = 50\%$

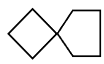
(S) $C_2H_2 \Rightarrow$ Hydrocarbon

% by mole of C = $\frac{2}{4} \times 100 = 50\%$

**10.** **Ans ( A )**

(P)  $\Rightarrow$ Have $sp^2$ & $sp^3$ carbon (2)

(Q)  $\Rightarrow$ By cyclo compound (3)

(R)  $\Rightarrow$ Spiro compound (4)

(S) $CH_3-CH=CH-C\equiv CH \Rightarrow$ Double bond equivalent = 3 (Odd) (I)

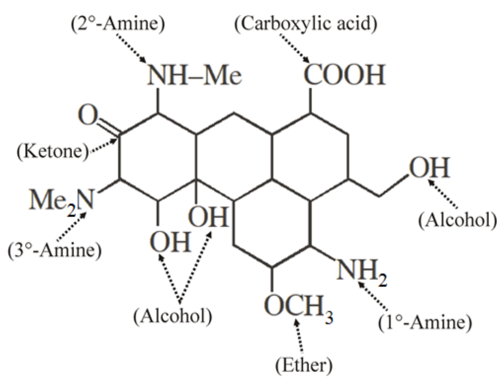
## PART-2 : CHEMISTRY

### SECTION-II

**1.** **Ans ( 3.00 )**

$O_3$ $sp^2$
$O_2F_2$ $sp^3$
$I_3^-$ $sp^3d$
$I(CN)_2^-$ $sp^3d$
$PCl_2F_3$ $sp^3d$
$XeF_6$ $sp^3d^3$
$IOF_5$ $sp^3d^2$
$XeF_5^+$ $sp^3d^2$

**2.** **Ans ( 7.00 )**



3. **Ans ( 3.00 )**

% of $H_2O = \dfrac{n \times 18 \times 100}{230 + 18n} = 19$

n = 3

4. **Ans ( 18.00 )**

$C_2H_6 + \frac{7}{2}O_2 \rightarrow 2CO_2 + 3H_2O$

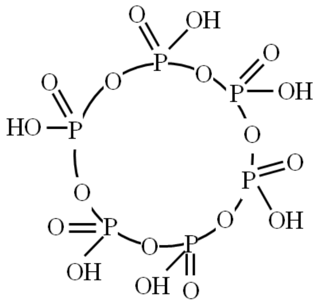
$\frac{3}{30}$ 0.3 mol

= 0.1 mol molecule = $0.3 \times 6.023 \times 10^{23}$

$= 18.069 \times 10^{22}$

$x \approx 18$

5. **Ans ( 12.00 )**



6. **Ans ( 5.00 )**

$CaCO_3(s) \longrightarrow CaO(s) + CO_2\ (g)$

No. of mole of $CO_2 = 2 \times 10^{-2}$

$0.8n = 2 \times 10^{-2}$

$\Rightarrow n = \dfrac{2 \times 10^{-2}}{0.8} = 0.025$

$m_{CaCO_3} = 2.5$ gm (pure)

Mass of $CaCO_3$ sample = 5 gm.

## PART-3 : MATHEMATICS

### SECTION-I (i)

1. **Ans ( A )**

Let d be the common difference between each term of the progression. The we have

$5(a_1 - 12d) = 6(a_1 - 18d)$

$5a_1 - 60d = 6a_1 - 108d$

$48d = a_1$

Thus, $a_{49} = a_1 - 48d = 0$ and $a_{50} = -d$ and thus n = 50

2. **Ans ( B )**

Let $a = x^2 - 2x$. Then,

$\dfrac{a}{a-24} + \dfrac{a+24}{a} = \dfrac{2a^2 - 576}{a^2 - 24a} = 2$

Solving for a, we find

$2a^2 - 576 = 2a^2 - 48a$

$48a = 576$

$a = 12$

Thus, we would like the find the product of all real x such that $x^2 - 20x = 12$, or $x^2 - 20x - 12 = 0$

We can verify that this has two distinct real roots because $b^2 - 4ac = (-20)^2 - 4(-12) > 0$.

By Vieta's formulas, the product of all possible real x is therefore $-12$

3. **Ans ( A )**

Let a, ar, $ar^2$ are the three terms in G.P.

We have, $ar = 8 \Rightarrow r = \dfrac{8}{a}$.

Also, $ar^2 = a^2 \Rightarrow a\left(\dfrac{8}{a}\right)^2 = a^2$

$\Rightarrow a^3 = 64 \Rightarrow a = 4 \Rightarrow r = \dfrac{8}{a} = \dfrac{8}{4} = 2$

Now, $a_6 = ar^5 = 4 \times 2^5 = 128$

4. **Ans ( C )**

Note that for any real number u > 0,

$2^{\log_4 u} = \sqrt{4}^{\log_4 4} = \sqrt{4^{\log_4 u}} = \sqrt{u}$

Using this, the given equation simplifies to $8\sqrt{ab} = 3(a - b)$.

Dividing by b and letting $x = \sqrt{\dfrac{a}{b}}$ results in the equation $0 = 3x^2 - 8x - 3 = (3x + 1)(x - 3)$.

Thus, x = 3 and the requested ratio is $\dfrac{a}{b} = x^2 = 9$

## PART-3 : MATHEMATICS

### SECTION-I (ii)

5. **Ans ( A,B,D )**

Because $(\sin x + \cos x)^2 + (\sin x - \cos x)^2 = 2$ and x is in the interval $\left(0, \frac{\pi}{2}\right)$, it follows that

$\sin x + \cos x = \frac{\sqrt{7}}{2}$.

Squaring this last relation gives

$1 + 2\sin x \cos x = \frac{7}{4}$,

implying that

$\sin x \cos x = \frac{3}{8}$

Hence

$\sin^3 x + \cos^3 x = (\sin x + \cos x)(\sin^2 x - \sin x\cos x + \cos^2 x)$

$= \frac{\sqrt{7}}{2}.\left(1 - \frac{3}{8}\right) = \frac{5\sqrt{7}}{16}$

6. **Ans ( B,C )**

By Vieta's formulas, the sum of the 3 roots of the polynomial is 30 and their product is 840. Because the roots form an arithmetic progression, one of the 3 roots must be the mean of the roots, $\frac{30}{3} = 10$. If the common difference in the arithmetic progression is d, then the 3 roots are $10 - d$, 10 and $10 + d$. Their product is $(10 - d)10(10 + d) = 10(100 - d^2) = 840$. It follows that $d = \pm 4$. Thus, the 3 roots are 6, 10 and 14 and the polynomial factors as $(x - 6)(x - 10)(x - 14)$. The sum of the coefficients of the polynomial is equal to the polynomial evaluated at $x = 1$, so the sum of the coefficients is

$(1 - 6)(1 - 10)(1 - 14) = -585 = 1 - 30 + k - 840$

It follows that $k = 284$.

7. **Ans ( A,D )**

By the Double Angle Formula for cosine and the product-to-sum formulas, for all n,

$2T(n) = 2\cos^2(30° - n) - 2\cos(30° - n)\cos(30° + n) + 2\cos^2(30° + n)$

$= [1 + \cos(60° - 2n)] - [\cos(60°) + \cos(2n)] + [1 + \cos(60° + 2n)]$

$= 1 + \cos(60°)\cos(2n) + \sin(60°)\sin(2n) - \cos(60°) - \cos(2n) + 1 + \cos(60°)\cos(2n) - \sin(60°)\sin(2n)$

$= 2 - \frac{1}{2} = \frac{3}{2}$

Thus, T(n) is a constant function equal to $\frac{3}{4}$ and, the original expression simplifies as

$$4\sum_{n=1}^{30} n.T(n) = 3\sum_{n=1}^{30} n = 3.\frac{30.31}{2} = 1395$$

## PART-3 : MATHEMATICS

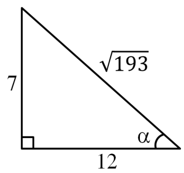
### SECTION-I (iii)

8. **Ans ( C )**

$12\cos(\alpha) = 5\left(\cos^2\left(\frac{\alpha}{2}\right) - \sin^2\left(\frac{\alpha}{2}\right)\right)\left(\cos^2\left(\frac{\alpha}{2}\right) + \sin^2\left(\frac{\alpha}{2}\right)\right) + 12\sin\alpha$

$12\cos(\alpha) = 5\cos(\alpha) + 12\sin\alpha$

$\therefore \tan\alpha = \frac{7}{12}, \alpha \in \left(0, \frac{\pi}{2}\right)$




$\sin\alpha = \frac{7}{\sqrt{193}}, \cos\alpha = \frac{12}{\sqrt{193}}$,

$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$

$\therefore \cos 2\alpha = \frac{95}{\sqrt{193}}$

**9. Ans ( A )**

$x^2 - 10x + 9 \le 0 \quad \Rightarrow x \in [1, 9]$

$A = \{1, 2, 3, ..., 9\}, |A| = 9$

$$\sum \frac{(x-1)}{2} = \frac{1+2+\ldots+8}{2} = \frac{8.9}{2.2} = \frac{36}{2} = 18$$

$x^2 - 25 \le 0 \quad \Rightarrow x \in [-5, 5]$

$B = \{-5, -4, ..., 5\}, |B| = 11$

$|2x - 1| \le 7 \ \Rightarrow -7 \le 2x - 1 \le 7 \ \Rightarrow x \in [-3, 4]$

$C = \{-3, -2, ..., 3, 4\}, |C| = 8$

**10. Ans ( B )**

$$S_1 = \sum_{r=1}^{10}\left(\frac{1}{r} - \frac{1}{r+1}\right) = 1 - \frac{1}{11} = \frac{10}{11}$$

$22S_1 = 20$

$$S_2 = \sum_{r=5}^{11} r^2 = \sum_{r=1}^{11} r^2 - \sum_{r=1}^{4} r^2 = \frac{11.12.23}{6} - \frac{4.5.9}{6}$$

$$S_2 = 476, \frac{S_2 - 14}{21} = 22$$

$$S_3 = \sum_{r=1}^{12}(r^2 + r) = \frac{12.13.25}{6} + \frac{12.13}{2} = 650 + 78$$

$$S_3 = 728, \frac{S_3 + 8}{32} = 23$$

$$S_4 = \sum_{r=1}^{21} r - \sum_{r=1}^{9} r = \frac{21.22}{2} - \frac{9.10}{2} = 231 - 45$$

$$S_4 = 186, \frac{S_4 + 3}{9} = 21$$

## PART-3 : MATHEMATICS

### SECTION-II

**1. Ans ( 101.00 )**

Because $\sec^2\alpha - \tan^2\alpha = 1$ and

$(\sec^2\alpha + \tan^2\alpha) + (\sec^2\alpha - \tan^2\alpha)^2 = 2(\sec^4\alpha + \tan^4\alpha)$

it follows that $(\sec^2\alpha + \tan^2\alpha)^2 = 2 \cdot 5101 - 1 = 10201$

$= 101^2$.

The requested quantity is 101.

**2. Ans ( 147.00 )**

Let $f(x) = x^2 - nx + 80$. We can rewrite $f(x)$ as $f(x) = (x - r_1)(x - kr_1)$, where k is some positive integer.

Expanding this out gives us

$f(x) = x^2 - (k + 1)r_1x + kr_1^2$

This yields the following two equations :

$(k + 1)r_1 = n$

$kr_1^2 = 80$

Looking at $kr_1^2 = 80$, since both k and $r_1$ must be integers, and $r_1^2$ must divide 80, we have the solutions of $(k, r_1) = \{(80, 1), (20, 2), (5, 4)\}$.

Therefore, the sum of all possible values of n is

$81 \cdot 1 + 21 \cdot 2 + 6 \cdot 4 = 147$

**3. Ans ( 0.00 )**

The three equations are equivalent to

$xyz = x^3 + 2 = y^3 - 3 = z^3 + 1$.

Adding these together gives $3xyz = x^3 + y^3 + z^3$.

But then

$0 = x^3 + y^3 + z^3 - 3xyz$

$= \frac{1}{2}.(x + y + z).((x - y)^2$

$(y - z)^2 + (z - x)^2)$

It is not possible for $x = y = z$, so this implies that $x + y + z = 0$, which is the requested sum.

To show that the system does have real valued note that $y^3 = x^3 + 5$ and $z^3 = x^3 + 1$, so that if $w = x^3$, it follows from cubing $x^3 + y^3 + z^3 = 3xyz$ that $(3w + 6)^3 = 27w(w + 5)(w + 1)$. This reduces to a linear polynomial equation with solution $w = -\frac{8}{7}$, so there are real values of x, y and z that satisfy $x^3 + y^3 + z^3 = 3xyz$. Because these values also satisfy $y^3 = x^3 + 5$ and $z^3 = x^3 + 1$, they satisfy the given system.

Alternatively, let $u = xyz$. Then

$x^3 = u - 2$, $y^3 = u + 3$ and $z^3 = u - 1$, from which $u^3 = (u - 2)(u + 3)(u - 1)$, which implies that $u = \frac{6}{7}$. Then

$$x + y + z = \sqrt[3]{-\frac{8}{7}} + \sqrt[3]{\frac{27}{7}} - \sqrt[3]{-\frac{1}{7}} = 0$$

**4.** **Ans ( 29.00 )**

Let n be Aditya's favorite number. The first sum is equal to $\frac{n(n+1)}{2} - \frac{4.5}{2} = \frac{1}{2}n^2 + \frac{1}{2}n - 10$ and the second sum is equal to $12n + \frac{12.13}{2} = 12n + 78$.

The first sum is exactly one less than the second sum, so $\frac{1}{2}n^2 + \frac{1}{2}n - 10 = (12n + 78) - 1$.

Rearranging the terms to form a quadratic gives

$\frac{1}{2}n^2 - \frac{23}{2}n - 87 = 0$.

Solving this equation via the quadratic formula, we get that n is either 29 or −6. Discarding the negative root, we conclude that Aditya's favorite number is 29

**5.** **Ans ( 726.00 )**

Because the mean of a, b and c is 22, it follows that $a + b + c = 3.22 = 66$. Then the requested mean is

$$\frac{ab + \frac{c^2}{2} + bc + \frac{a^2}{2} + ca + \frac{b^2}{2}}{3}$$

$$= \frac{a^2 + b^2 + c^2 + 2ab + 2bc + 2ca}{6}$$

$$= \frac{1}{6}(a + b + c)^2$$

$$= \frac{1}{6}.66^2$$

$$= 6 \cdot 121$$

$$= 726$$

**6.** **Ans ( 5.00 )**

$$\tan 36^\circ \tan 72^\circ = \frac{\sin 36^\circ}{\cos 36^\circ} . \frac{\sin 72^\circ}{\cos 72^\circ} = \frac{2\sin^2 36^\circ}{\cos 72^\circ}$$

$$= \frac{2 - 2\cos^2 36^\circ}{2\cos^2 36^\circ - 1} = \sqrt{5}$$

because, as we have seen, $\cos 36° = \frac{\sqrt{5} + 1}{4}$