SRIGAYATRI EDUCATIONAL INSTITUTIONS

INDIA

SR MPC (EAMCET) | **DPP-1** | **Date: 06-04-2020**

Time: 3 Hours

MATHS-A

SYLLABUS:

1. **If $\tan^2A + \tan^2B + \tan^2C - \tan A \tan B - \tan B \tan C - \tan C \tan A = 0$, then ΔABC is**

1) isosceles 2) equilateral 3) rightangled 4) right angled isosceles.

2. **If** $\sin\alpha\sin\beta - \cos\alpha\cos\beta + 1 = 0$ **then** $1 + \cot\alpha\tan\beta =$ _____

1) –1 2) 0 3) 1 4) 2

3. **If** $x^2 - 4x + 5 - \sin y = 0; y \in [0, 2\pi]$, **then**

1) x = 1, y = 0 2) x =1, y = $\frac{\pi}{2}$ 3) x = 2, y = 0 4) x = 2, y = $\frac{\pi}{2}$

4. **If Pn =** $\cos^n x + \sin^n x$ **then $2P_6 - 3P_4 + 1$ =** _____

1) 2 2) 3 3) 0 4) 1

5. **The value of the expression** $1 - \frac{\sin^2 y}{1+\cos y} + \frac{1+\cos y}{\sin^2 y} - \frac{\sin^2 y}{1-\cos y} =$ _____

1) 0 2) 1 3) sin y 4) cos y

6. **If** $\tan\theta = -\frac{4}{3}$ **then** $\sin\theta =$ _____

1) $-\frac{4}{5}$ *but not* $\frac{4}{5}$ 2) $-\frac{4}{5}$ *or* $\frac{4}{5}$ 3) $\frac{4}{5}$ *but not* $-\frac{4}{5}$ 4) none

7. **If** $\sin\theta, \cos\theta, \tan\theta$ **are in G.P then** $\cos^9\theta + \cos^6\theta + 3\cos^5\theta =$ _____

1) -1 2) 0 3) 1 4) 2

8. **If** $x\sin^3 x + y\cos^3\theta = \cos\theta\sin\theta$ **and** $x\sin\theta = y\cos\theta$ **then by eliminating 'θ'**

1) $x^2 + y^2 = 2$ 2) $x^2 + y^2 = 4$ 3) $x^2 + y^2 = 3$ 4) $x^2 + y^2 = 1$

9. $\pi < \alpha < \frac{3\pi}{2}$, *then* $\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}} + \sqrt{\frac{1+\cos\alpha}{1-\cos\alpha}}$ **is equal to**

1) $\frac{2}{\sin\alpha}$ 2) $\frac{-2}{\sin\alpha}$ 3) $\frac{1}{\sin\alpha}$ 4) $\frac{-1}{\sin\alpha}$

10. **If** $\frac{1-\tan 2^\bullet \cot 62^\bullet}{\tan 152^\bullet - \cot 88^\bullet} = k\sqrt{3}$. the value of k is

1) 1 2) -1 3) $\frac{1}{2}$ 4) $-\frac{1}{2}$

11. **If tan A =** $\frac{x - \sin B}{1 - x\cos B}$ *and* $\tan B = \frac{y\sin A}{1 - y\sin A}$ *then* $\frac{\sin A}{\sin B}$

1) $\frac{x}{y}$ 2) $\frac{y}{x}$ 3) $x + y$ 4) $x - y$

12. $1 + \tan A\tan\frac{A}{2} =$ _____

1) sin A 2) cos A 3) tan A 4) sec A

13. **cosec 15^0 + sec15^0 =** _____

1) $2\sqrt{2}$ 2) $\sqrt{6}$ 3) $2\sqrt{6}$ 4) $\sqrt{6} + \sqrt{2}$

14. **If tan** $\left(\frac{\pi}{4} e\theta\right) + \tan\left(\frac{\pi}{4} - \theta\right) = a$ *then* $\tan^3\left(\frac{\pi}{4} + \theta\right) + \tan^3\left(\frac{\pi}{4} + \theta\right) =$ _____

1) 0 2) a 3) 3a 4) $a^3 - 3a$.

15. $\sin^2\alpha+\cos^2(\alpha+\beta)+2\sin\alpha\sin\beta\cos(\alpha+\beta)$ **is independent of**

1) α 2) β 3) both α and β 4) none

16. **If A+B+C = 180^0 then the value of (cot B + cot C) (cot C + cot A) (cot A + cot B) will be**

1) sec A sec B sec C 2) cosec A cosec B cosec C

3) tanA tanB tanC 4) 1

17. **If 'n' is a positive integer such that** $\sin\left(\frac{\pi}{2^n}\right)+\cos\left(\frac{\pi}{2^n}\right)=\frac{\sqrt{n}}{2}$ then

1) $6\le n\le 8$ 2) $4<n\le 8$ 3) $4\le n\le 8$ 4) $4<n<8$

18. **If f(x) = $\cos^2x + \sec^2x$, then**

1) f(x) < 1 2) f(x) = 1 3) 2 < f(x) <1 4) f(x) ≥ 2

19. **If** $\cot(\alpha+\beta)=0$ **.then** $\sin(\alpha+2\beta)$ **is equal to**

1) $\sin\alpha$ 2) $\cos 2\beta$ 3) $\cos\alpha$ 4) $\sin\beta$

20. **If** $\sin\theta+\cos\theta=a$ *and* $\tan\theta+\cot\theta=b$ *then* $b(a^2-1)=$ _____

1) 0 2) 1 3) 2 4) 3

MATHS – B

SYLLABUS: ***Coordinate system, Locus***

01. **If (2, 1), (2, 5) are opposite corners of a square then the length of its side is**

1) 4 2) $2\sqrt{2}$ 3) 3 4) $\sqrt{2}$

02. **The harmonic conjugate of (4, 1) with respect to the point (3, 2) and (–1, 6) is**

1) (–4, 1) 2) (1, 4) 3) $\left[\frac{7}{3},\frac{8}{3}\right]$ 4) $\left[\frac{7}{6},\frac{8}{6}\right]$

03. **The points (5, –3), (–3, –2), (9, 12), (17, 11) taken in order from a**

1) Parallelogram 2) Rhombus 3) Rectangle 4) Square

04. **The points (k, 2k), (3k, 3k) and (3, 1) are collinear, then k =**

1) $\frac{1}{3}$ 2) $-\frac{1}{3}$ 3) 3 4) –3

05. **If (2, 4), (2, 6) are two vertices of an equilateral triangle then the third vertex is**

1) $(2+\sqrt{3},5)$ 2) $(\sqrt{3}-2,5)$ 3) $(5,2+\sqrt{3})$ 4) $(5,2-\sqrt{3})$

06. **The coordinates of the point which divides the line segment joining (*a* + *b*, *a* – *b*) and (*a* – *b*, *a* + *b*) in the ratio of *a* : *b* externally is**

1) $\left[\frac{a^2-2ab-b^2}{a-b},\frac{a^2+b^2}{a-b}\right]$ 2) $\left[\frac{a^2-2ab-b^2}{a+b},\frac{a^2+b^2}{a+b}\right]$

3) $\left[\frac{a^2+2ab-b^2}{a+b},\frac{a^2-b^2}{ab}\right]$ 4) $\left[\frac{a^2-2ab-2b^2}{a+2b},\frac{a^2-ab-2b^2}{2a+b}\right]$

07. **The centroid of a triangle is (2, 3) and two of its vertices are (5, 6) and (–1, 4) then the third vertex of the triangle is**

1) (3, 1) 2) (2, –1) 3) (4, –1) 4) (3, 0)

08. **The distance between the orthcenter and circumcentre of the triangle with vertices (0, 0), (4, 0), (0, 6) is**

1) $\sqrt{15}$ 2) $2\sqrt{3}$ 3) $\sqrt{13}$ 4) 5

09. **A (1, 3), B(4, –1), C(–8, 4) are the vertices of a triangle ABC. If D, E, F divides BC, CA, AB in the same ratio 2 : 1 the centroid of the triangle DEF is**

1) (–1, 2) 2) (1, –2) 3) (–1, –2) 4) (1, 2)

10. **The distance between the points (*a* cos 48^0, 0) and (0, *a* cos 12^0) is *d* then $d^2 - a^2$ =**

1) $\frac{a^2(\sqrt{5}-1)}{4}$ 2) $\frac{a^2(\sqrt{5}+1)}{4}$ 3) $\frac{a^2(\sqrt{5}-1)}{8}$ 4) $\frac{a^2(\sqrt{5}+1)}{8}$

11. The locus of all points in a plane that are equidistant from a given point in the same plane.
1) Circle 2) A line parallel to the given lines midway between them
3) Ellipse 4) Hyperbola

12. If the coordinates of a variable point *p* is (*a* cos θ, *b* sin θ), where θ is a variable quantity, then the locus of *p* is
1) $x^2 + y^2 = a^2$ 2) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ 3) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ 4) $x^2 - y^2 = a^2$

13. A(0, *ae*), B(0, –*ae*) are two points. The equation to the locus of *p* such that PA + PB = 2*a* is
1) $\frac{x^2}{a^2(1-e^2)} + \frac{y^2}{a^2} = 1$ 2) $\frac{x^2}{a^2} - \frac{y^2}{a^2(1-e^2)} = 1$ 3) $\frac{x^2}{a^2} + \frac{y^2}{a^2(1+e^2)} = 1$ 4) $\frac{x^2}{a^2} - \frac{y^2}{a^2(1+e^2)} = 1$

14. A and B are fixed points if PA + PB = *k* and AB < *k* the locus of *p* is
1) Ellipse 2) Hyperbola 3) Parabola 4) Straight line

15. The equation to the locus of a parabola *p* for which the distance from *p* to (0, 5) is double the distance from *p* to *y*–axis is
1) $3x^2 + y^2 + 10y - 25 = 0$ 2) $3x^2 - y^2 + 10y + 25 = 0$
3) $3x^2 - y^2 + 10y - 25 = 0$ 4) $3x^2 + y^2 - 10y - 25 = 0$

16. A(2, 3), B(–3, 4) are two points. If a point *p* moves such that the area of ΔPAB is 8.5sq units then the locus of *p* is
1) $x^2 + 10xy + 25y^2 - 34x - 170y = 0$ 2) $x^2 + 10xy - 25y^2 - 34x - 170y = 0$
3) $x^2 - 10xy + 25y^2 - 34x + 170y = 0$ 4) $x^2 - 10xy - 25y^2 + 34x - 170y = 0$

17. A straight line of length 3 units slides with its ends A, B always on *x* and *y* axes respectively. Locus of centroid of ΔOAB is
1) $x^2 + y^2 = 3$ 2) $x^2 + y^2 = 9$ 3) $x^2 + y^2 = 1$ 4) $x^2 + y^2 = 8$

18. The curve represented by $x = ct$ and $y = c/t$ is
1) a circle 2) a parabola 3) an ellipse 4) a hyperbola

19. A = (2, 5), B = (4, –11) and the locus of '*c*' is $9x + 7y + 4 = 0$ then the locus of the centroid of ΔABC is
1) 27x + 21y – 8 = 0 2) 3x + 4y – 2 = 0 3) 24x + 22y – 6 = 0 4) 5x + 3y –7 = 0

20. The graph represented by $x = \sin^2 t$, $y = 2\cos t$ is
1) a parabola 2) a portion of parabola
3) a part of sine graph 4) a part of hyperbola

PHYSICS

SYLLABUS: ***Units and Measurements, Motion in a straight line***

01. The number of significant figures in 3400 is
1) 3 2) 1 3) 4 4) 2

02. The length and breadth of a metal sheet are 3.124m and 3.002m respectively. The area of the sheet upto correct significant figure is
1) 9.378m^2 2) 9.37 m^2 3) 9.4 m^2 4) None of these

03. If error in measurement of radius of a sphere is 1% what will be the errors in measurement of volume
1) 1% 2) 1/3% 3) 3% 4) None of these

04. The mass of ball is 1.76kg. The mass of 25 such balls is
1) 0.44 x 10^3 kg 2) 44.0 kg 3) 44 kg 4) 44.00 kg

05. The least count of a stop watch is 0.2 sec the time of 20 oscillations of a pendulum is measured to be 25 sec. the percentage error in the time period is
1) 1.2% 2) 0.8% 3) 1.8% 4) None of these

06. The physical quantity having the dimensions $M^{-1}L^{-3}T^3A^2$ is
1) Resistance 2) Resistivity 3) Electrical conductivity 4) Electromotive force

07. The dimensional formula for magnetic flux is
1) $ML^2T^{-2}A^{-1}$ 2) $ML^3T^{-2}A^{-2}$ 3) $ML^{-2}T^{-2}A^{-2}$ 4) $ML^2T^{-1}A^2$

08. If unit of length and time is doubled, the numerical value of *g* (acceleration due to gravity) will be
1) Doubled 2) Halved 3) Four times 4) Same

09. If force F, length L and time T are taken as fundamental units, the dimensional formula for mass will be
1) $FL^{-1}T^2$ 2) FLT^{-2} 3) $FL^{-1}T^{-1}$ 4) FL^5T^2

10. The ratio of the dimensions of Planck's constant and that of the moment of inertia is the dimension of
1) Frequency 2) Velocity 3) Angular momentum 4) Time

11. A packet is released from a rising balloon accelerating upwards with acceleration a. The acceleration of the stone just after the release is
1) a upward 2) a downward 3) (g – a) downward 4) (g + a) downward

12. A ball is thrown vertically upwards from the ground. If T_1 and T_2 are the respective time taken in going up and coming town, and the air is not ignored, then
1) $T_1 > T_2$ 2) $T_1 = T_2$ 3) $T_1 < T_2$ 4) None of these

13. The length of a seconds hand in watch is 1cm the change in velocity of its tip in 15 sec is
1) Zero 2) $\frac{\pi}{30\sqrt{2}}$ cm/sec 3) $\frac{\pi}{30}$ cm/sec 4) $\frac{\pi\sqrt{2}}{30}$

14. When a ball is thrown up vertically with velocity V_0. If reaches a maximum height of *h*. If one wishes to triple the maximum height then the ball should be thrown with velocity
1) $\sqrt{3}V_0$ 2) $3V_0$ 3) $9V_0$ 4) $3/2V_0$

15. During the first 18min of a 60min trip a car has an average speed of 11m/sec. What should be the average speed for remaining 42min so that car is having an average speed of 21 m/sec for the entire trip?
1) 25.3 m/sec 2) 29.2 m/sec 3) 31 m/sec 4) 35.6 m/sec

16. A particle moves along a straight line its position at any instant is given by $x = 32t - 8t^3/3$ where *x* is in metres and t in seconds. Find the acceleration of the particle at the instant when particle is at rest
1) –16 m/sec^2 2) –32 m/sec^2 3) 32 m/sec^2 4) 16 m/sec^2

17. The acceleration of a particle is increasing linearly with time *t* as *bt*. The particle starts from the origin with an initial velocity V_0. The distance travelled by the particle in time *t* will be
1) $v_0t + \frac{1}{6}bt^3$ 2) $v_0t + \frac{1}{3}bt^3$ 3) $v_0t + \frac{1}{3}bt^2$ 4) $v_0t + \frac{1}{2}bt^2$

18. Water drops fall at regular intervals from a tap 5m above the ground. The third drop is leaving the tap, the instant the first drop touches the ground. How far above the ground is the second drop at that instant ($g = 10m/sec^2$)
1) 1.25m 2) 2.50m 3) 3.75m 4) 4.00m

19. A stone is dropped from the top of a tower and one second later, a second stone is thrown vertically downward with a velocity 20m/sec. The second stone will overtake the first after travelling a distance of ($g = 10m/sec^2$)
1) 13m 2) 15m 3) 11.25m 4) 19.5m

20. A particle moves in the $x - y$ plane with velocity $v_x = 8t - 2$ and $v_y = 2$. If it passes through the point $x = 14$ and $y = 4$ at $t = 2$ sec. The equation of the path is
1) $x = y^2 - y + 2$ 2) $x = y^2 - 2$ 3) $x = y^2 + y - 6$ 4) None of these

CHEMISTRY

SYLLABUS:

1. The ionic radii of Li^+, Be^{2+} and B^{+3} follow the order
1) $Be^{2+} > B^{3+} > Li^+$ 2) $Li^+ > B^{3+} > Be^{2+}$ 3) $B^{3+} > Be^{2+} > Li^+$ 4) $Li^+ > Be^{2+} > B^{3+}$

2. A certain compound when burnt gave three oxides, the first one turned lime water milky, the second turned anhydrous cobalt chloride paper pink and the third formed an aqueous solution of p^H nearly three which are the elements present in that compound?
1) C, H ,S 2) C, H, Ca 3) C, H , P 4) C, S,O

3. For bromine the IE / EA ratio = 10/3. Electronegativity of bromine is 2.8 on Mulliken's scale, its EA in kJ/ mole will be
1) 81 2) 93 3) 162 4) 351

4. Which of the following conversions show minimum energy release?
1) $C \longrightarrow \overline{C}$ 2) $N \longrightarrow \overline{N}$ 3) $O \longrightarrow \overline{O}$ 4) $F \longrightarrow \overline{F}$

5. In which of the following compounds chromium shows maximum radius
1) $K_2 Cr_2 O_7$ 2) $Cr O_2 Cl_2$ 3) $Cr_2 (SO_4)_3$ 4) $CrCl_2$

6. Among the following incorrect electron gain enthalpy order is [compare magnitude only]
1) Li > H > Na > K 2) Cl > F > Br > I 3) S > Se > Te > Po > O 4) Cl > F > S > O

7. Sulphur has more similarities with which of the following elements
1) Ti 2) V 3) Cr 4) Mn

8. In which of the following pair of elements the second one has lesser ionization energy than the first one?
1) K and Br 2) S and Te 3) Ga and Se 4) Sr and Br

9. An element has successive ionization enthalpies as 940 (first), 2080, 3090, 4140, 7030, 7870, 16000 and 19,500 kJ mole^{-1}. To which group of the periodic table does this element belong?
1) 14 2) 15 3) 16 4) 17

10. Bond dissociation energies of xy, x_2 and y_2 (all diatomic molecules) are in the ratio 1 : 1 : 0.5 and ΔH_f of xy is –200 kJ mol^{-1}. The bond dissociation energy of x_2 will be:
1) 800 kJ mol^{-1} 2) 200 kJ mol^{-1} 3) 300 kJ mol^{-1} 4) 400 kJ mol^{-1}

11. Electronegativity of an element depends on
1) Oxidation state of the atom 2) nature of hybrid orbitals involved
3) Effective nuclear charge 4) All the above

12. The calculated covalent radius of fluorine from C–F bond length is least in the case of
1) CH_3F 2) CH_2F_2 3) CHF_3 4) CF_4

13. Which of the following is the most basic oxide?
1) Al_2O_3 2) Sb_2O_3 3) Bi_2O_3 4) SeO_2

14. Be^{2+} is isoelectronic with which of the following ions?
1) H^+ 2) Li^+ 3) Na^+ 4) Mg^{2+}

15. Eka aluminum in Mendeleev periodic table is
1) Si 2) Ge 3) Ga 4) Sc

16. Which of the following oxides is most acidic
1) MO 2) M_2O 3) M_2O_3 4) M_2O_5

17. Which of the following does not represent Dobereiner's triad?
1) Li, Na, K 2) Ca, Sr, Ba 3) F, Cl, Br 4) S, Se, Te

18. The sequence of ionic mobility in aqueous solution is
1) $Rb^+ > K^+ > Cs^+ > Na^+$ 2) $Na^+ > K^+ > Rb^+ > Cs^+$
3) $K^+ > Rb^+ > K^+ > Na^+$ 4) $Cs^+ > Rb^+ > K^+ > Na^+$

19. Which of the following valence shell electronic configuration is correct for d – block elements
1) $ns^2\ np^{1-6}$ 2) ns^{1-2} 3) $ns^{1-2}\ (n-1)d^{1-10}$ 4) none of these

20. Which of the following metals exist as liquid at room temperature?
1) Hg 2) Br 3) Na 4) Ca

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INDIA

SR MPC (EAMCET) | **DPP-1** | **Date: 06-04-2020**

Time: 3 Hours

KEY SHEET

Maths – IA

01) 2	02) 2	03) 4	04) 3	05) 4	06) 2	07) 3	08) 4	09) 2	10) 2
11) 1	12) 4	13) 3	14) 4	15) 1	16) 2	17) 2	18) 4	19) 1	20) 3

Maths – IB

01) 2	02) 3	03) 1	04) 2	05) 1	06) 2	07) 2	08) 3	09) 1	10) 4
11) 1	12) 2	13) 1	14) 1	15) 3	16) 1	17) 3	18) 4	19) 1	20) 1

Physics

01) 4	02) 1	03) 3	04) 2	05) 2	06) 3	07) 1	08) 2	09) 1	10) 1
11) 2	12) 3	13) 4	14) 1	15) 1	16) 2	17) 1	18) 3	19) 3	20) 1

Chemistry

01) 4	02) 1	03) 4	04) 2	05) 4	06) 1	07) 3	08) 2	09) 3	10) 4
11) 4	12) 4	13) 3	14) 2	15) 3	16) 4	17) 3	18) 4	19) 3	20) 1

HINTS & SOLUTIONS

MATHS-IIA

Maths – IA

1.

$2\tan^2 A+2\tan^2 B+2\tan^2 C-2\tan A\tan B-2\tan B\tan C-2\tan C\tan A=0$

$\Rightarrow (\tan A-\tan B)^2+(\tan B-\tan C)^2+(\tan C-\tan A)^2=0$

$\Rightarrow \tan A=\tan B=\tan C$

$\Rightarrow A=B=C$

$\therefore \Delta^{le}$ *is* equilateral.

2. $\sin\alpha\sin\beta-\cos\alpha\cos\beta+1=0$

$\Rightarrow \cos\alpha\cos\beta-\sin\alpha\sin\beta=1$

$\Rightarrow \cos(\alpha+\beta)=1$

now $1+\cot\alpha\tan\beta=1+\dfrac{\cos\alpha}{\sin\alpha}.\dfrac{\sin\beta}{\cos\beta}$

$=\dfrac{\sin\alpha\cos\beta+\cos\alpha\sin\beta}{\sin\alpha\cos\beta}$

$=\dfrac{\sin(\alpha+\beta)}{\cos(\alpha+\beta)}=\dfrac{0}{\sin\alpha\cos\beta}$

$=0$

3. $x^2-4x+5=\sin y\Rightarrow 1(x-2)^2+1=\sin y$

$(x-2)^2+1\geq 1, \sin y\leq 1\Rightarrow x=2, \sin y=1$

$\Rightarrow x=2; y=\dfrac{\pi}{2}$

4.

$2P_6-3P_4+1=2(1-3\sin^2 x\cos^2 x)-3(-12\sin^2 x\cos^2 x)+$

$=2-6\sin^2 x\cos^2 x-3+6\sin^2 x\cos^2 x+1$

$=0$

5. The given value

$=1-(1-\cos y)+\dfrac{1-\cos^2 y-\sin^2 y}{\sin y(1-\cos y)}$

$=\cos y+0=\cos y$

6. $\tan\theta=-\dfrac{4}{3}$ *then* θ *lies in* Q_2 *or* Q_4

$\therefore \sin\theta=\pm\dfrac{4}{5}$

7. $\cos^2\theta=\sin\theta\tan\theta\Rightarrow\cos^3\theta=\sin^2\theta$

$\Rightarrow \cos^3\theta=1-\cos^2\theta$

$\Rightarrow \cos^3\theta+\cos^2\theta=1$

$\Rightarrow \cos^9\theta+\cos^6\theta+3\cos^5\theta=1$

8. $\Rightarrow x\left(\dfrac{y\cos\theta}{x}\right)^3+y\cos^3\theta=\cos\theta\left(\dfrac{y\cos\theta}{x}\right)$

$$\Rightarrow \frac{y^3+x^2y}{x^2}\cos^3\theta = \frac{y\cos^2\theta}{x}$$

$$\Rightarrow \cos^2\theta+\sin^2\theta = 1$$

$$\Rightarrow \frac{x^2}{\left(x^2+y^2\right)^2}+\frac{y^2}{\left(x^2+y^2\right)^2} = 1$$

$$\Rightarrow x^2+y^2 = 1$$

9.

$$\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}+\sqrt{\frac{1+\cos\alpha}{1-\cos\alpha}} = \frac{1-\cos\alpha+1+\cos\alpha}{\sqrt{1-\cos^2\alpha}} = \frac{2}{(\sin\alpha)}$$

$$= \frac{2}{-\sin\alpha}\left(\pi<\alpha<\frac{3\pi}{2}\right)$$

10.

$$G.E \Rightarrow \frac{1-\cot 88^0\cot 62^0}{-\left(\cot 88^0+\cot 62^0\right)} = \frac{\cot 88^0\cot 62^0-1}{\cot 88^0+\cot 62^0} = \cot 150^0 = -\sqrt{3}$$

$$\therefore k = -1$$

11.

$$\frac{\sin A}{\cos A} = \frac{x\sin B}{1-x\cos B} \Rightarrow \sin A - x\sin A\cos B = x\cos A\sin B$$

$$\Rightarrow \sin A = x\sin(A+B)$$

$$similarly \Rightarrow \sin B = y\sin(A+B)$$

12. $$\tan\frac{A}{2} = \tan\left(A-\frac{A}{2}\right) = \frac{\tan A-\tan\frac{A}{2}}{1+\tan A\tan\frac{A}{2}}$$

$$\Rightarrow 1+\tan A\tan\frac{A}{2} = \frac{\tan A-\tan\frac{A}{2}}{\tan\frac{A}{2}}$$

$$= \frac{1}{\tan\frac{A}{2}}\left[\frac{\sin A}{\cos A}-\frac{\sin\frac{A}{2}}{\cos\frac{A}{2}}\right]$$

$$= \frac{1}{\tan\frac{A}{2}}\left[\frac{\sin A\cos A-\cos A\sin\frac{A}{2}}{\cos A\cos\frac{A}{2}}\right]$$

$$= \frac{\sin\left(A-\frac{A}{2}\right)}{\sin\left(\frac{A}{2}\right)\cos A} = \sec A.$$

13.

$$\operatorname{cosec}15^0+\sec 15^0 = \frac{1}{\sin 15^0}+\frac{1}{\cos 15^0} = \frac{2\sqrt{2}}{\sqrt{3}-1}+\frac{2\sqrt{2}}{\sqrt{3}+1}$$

$$\Rightarrow \cos\theta = \frac{x\left[\sqrt{3}+1+\sqrt{3}-1\right]}{\left(\sqrt{3}-1\right)\left(\sqrt{3}+1\right)} = \frac{y}{2\sqrt{6}y^2}$$

14.

$$\tan^3\left(\frac{\pi}{4}+\theta\right)+\tan^3\left(\frac{\pi}{4}-\theta\right) = \left[\tan\left(\frac{\pi}{4}+\theta\right)\tan\left(\frac{\pi}{4}-\theta\right)\right]^3 -$$

$$3\tan\left(\frac{\pi}{4}+\theta\right)\tan\left(\frac{\pi}{4}-\theta\right)\left[\tan\left(\frac{\pi}{4}+\theta\right)+\tan\left(\frac{\pi}{4}-\theta\right)\right]$$

$$\left[\because a^3+b^3 = (a+b)^3-3ab(a+b)\right]$$

$$= a^3-3a$$

15.

$$= \sin^2\alpha+\cos(\alpha+\beta)\left[\cos(\alpha+\beta)+2\sin\alpha\sin\beta\right]$$

$$= \sin^2\alpha+\cos(\alpha+\beta)(\cos\alpha\cos\beta+\sin\alpha\sin\beta)$$

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

$$= 1-\sin^2\beta = \cos^2\beta$$

16.

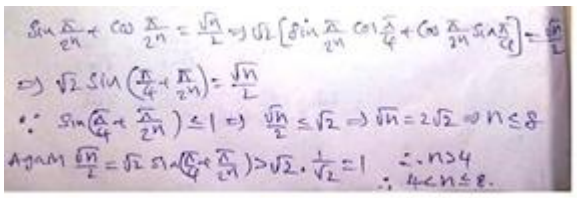
$$= \left(\frac{\cos B}{\sin B}+\frac{\cos C}{\sin C}\right)\left(\frac{\cos C}{\sin C}+\frac{\cos A}{\sin A}\right)\left(\frac{\cos A}{\sin A}+\frac{\cos B}{\sin B}\right)$$

$$= \frac{\sin(B+C)}{\sin B\sin C}\cdot\frac{\sin(C+A)}{\sin C\sin A}\cdot\frac{\sin(A+B)}{\sin A\sin B}$$

$$A+B+C = 180^0$$

$$= \frac{1}{\sin A\sin B\sin C}$$

17.



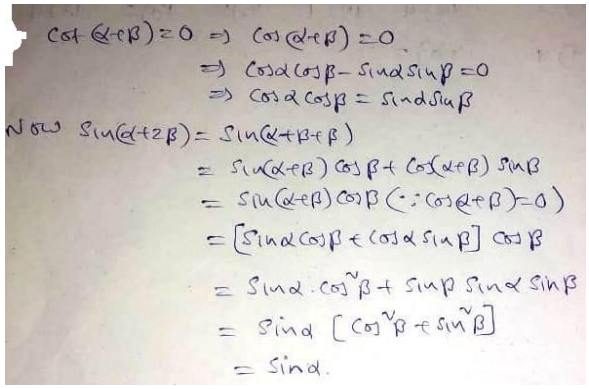
18. **we know that A.M = G.M**

$$\Rightarrow \frac{\cos^2 x+\sec^2 x}{2} = \sqrt{\cos^2 x.\sec^2 x}$$

$$\Rightarrow \cos^2 x+\sec^2 x \geq 2$$

$$\Rightarrow f(x) \geq 2$$

19.



20. $$a^2 = 1+2\sin\theta\cos\theta \Rightarrow a^2-1 = 2\sin\theta\cos\theta$$

$$\Rightarrow \sin\theta\cos\theta = \left(\frac{a^2-1}{2}\right) \_\_(1)$$

$$b = \tan\theta + \cot\theta \Rightarrow b = \frac{1}{\sin\theta\cos\theta} \Rightarrow \sin\theta\cos\theta = \frac{1}{b} \_\_\_\_(2)$$

From (1) & (2) $\quad \frac{a^2-1}{2} = \frac{1}{b}$

$$\Rightarrow b(a^2-1) = 2.$$

Maths – IB

01. $2x^2 = 16 \Rightarrow x = 2\sqrt{2}$
02. (4, 1) divides (3, 2) and (–1, 6) in the ratio –1 : 5. The point that divides joining the line segment
    (3, 2) and (–1, 6) in the ratio 1 : 5 is $\left[\frac{7}{3}, \frac{8}{3}\right]$.
03. $AB^2 = 65$, $BC^2 = 340$, $AC^2 = 241$
04. Area of triangle = 0
05. Third vertex
    $$\left[\frac{x_1 + x_2 \pm \sqrt{3}(y_1 - y_2)}{2}, \frac{y_1 + y_2 \pm \sqrt{3}(x_1 - x_2)}{2}\right]$$
    $$\left[\frac{2+2\pm\sqrt{3}(4-6)}{2}, \frac{4+6\pm\sqrt{3}(2-2)}{2}\right] = (2+\sqrt{3}, 5)$$
06. $\left[\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right]$
07. C = 3G – (A + B)
08. Give points from a right angled triangle.
    Then O(0, 0), S(2, 3) and hence OS = $\sqrt{3}$
09. Centroid of ΔDEF = centroid of ΔABC.
10. $a^2(\cos^2 48^0 + \cos^2 12^0) = d^2$
11. circle
12. Let P(x, y) be the locus of a point (a cos θ, b sin θ) x = a cos θ, y = b sin θ eliminate θ.
13. A(0, ae) B(0, –ae) p(x, y) PA + PB = 2a
    locus of p is $\frac{x^2}{a^2(1-e^2)} + \frac{y^2}{a^2} = 1$
14. PA + PB = k, k < AB then the locus of p is ellipse
15. A(0, 5); PA = 2|x|
16. use area of the triangle formula
17. $p(x, y) = \left[\frac{a}{3}, \frac{b}{3}\right]; a^2 + b^2 = 9$
18. xy = ct. c/t; $xy = c^2$ is a rectangular hyperbola
19. Let c(α, β)
    $$(x, y) = \left[\frac{6+\alpha}{3}, \frac{-6+\beta}{3}\right]$$
    (α, β) = (3x –6, 3y + 6) sub in
    9x + 7y + 4 = 0.
20. $x = 1 - \frac{y^2}{4} \Rightarrow y^2 = -4(x-1)$
    Where $0 \le x \le 1$
    $-2 \le y \le 2$.

Physics

01. Conceptual
02. A = *l* x *b* = 3.124 x 3.002
    = 9.378248 m^2
    = 9.378m^2 (rounding off to four significant digits)
03. $v = \frac{4}{3}\pi R^3$
    % error in v = 3 (% error)
    = 3(1%) = 3%
04. Number 25 has infinite numbers of significant figures. Therefore we will round off to least number of significant figures or three significant figures in the measurement 1.76kg.
05. $T = \frac{t}{n} \Rightarrow \Delta T = \frac{\Delta t}{n}$
    $$\frac{\Delta T}{T} \times 100 = \frac{\Delta t}{t} \times 100$$
    $$= \frac{0.2}{25} \times 100 = 0.8\%$$
06. $V = IR$
    $$V = I\rho\frac{l}{A}$$
    $$\frac{w}{q} = I\rho\frac{l}{A}$$
    $$\rho = \frac{wA}{qIl}$$
    $$\rho = \frac{ML^2T^{-2}L^2}{I^2TL} = ML^3I^{-2}T^{-3}$$
    $$\sigma = \frac{1}{\rho} = M^{-1}L^{-3}I^2T^3$$
07. $\phi = BA$
    $$= \frac{f}{m}A = \frac{MLT^{-2}L^2}{AL} = ML^2T^{-2}A^{-1}$$
08. If unit of length and time is double then value of g will be halved.
09. $M = F^aL^bT^c$
    $M = (MLT^{-2})^a(L)^b(T)^c$
    Equating the powers we get a = 1, b = –1, c = 2.
10. $L = I\omega = \frac{nh}{2\pi}$
    $\frac{h}{I} = \omega =$ frequency.

11. Packet comes under gravity, therefore only force is mg $a = \frac{f}{m} = \frac{mg}{m} = g$ (downwards)

12. Acceleration in upwards journey

$a_1 = \frac{F_1 + mg}{m} = g + \frac{f_1}{m}$

Acceleration in downwards journey

$a_2 = \frac{mg - f_2}{m} = g - \frac{f_2}{m}$

Since $a_1 > a_2$

$\Rightarrow T_1 < T_2$

13. $V = \frac{2\pi R}{T} = \frac{2\pi(1)}{60} = \frac{\pi}{30} cm/\sec$

In 15sec, velocity vector will rotate 90^0.

$|V| = |V_f - V_I| = \sqrt{V^2 + V_2 - 2VV\cos 90^0}$

$= \sqrt{2}V = \frac{\pi\sqrt{2}}{30} cm/\sec$

14. $h = \frac{v^2}{2g}$ (or) $h \propto v^2$

15. $V_{avg} = \frac{d}{t} = \frac{d_1 + d_2}{t_1 + t_2}$

$21 = \frac{18(11) + 42(v)}{60}$

$V = 25.3 m/\sec$

16. $V = \frac{dx}{df} = 32 - 8t^2$

$V = 0$ at $t = 2\sec$

$a = \frac{dv}{dt} = -16t$

$t = 2\sec$ $a = -32 m/\sec^2$

17. $a = bt$

$\frac{dv}{dt} = bt$

$dv = bt\ dt$

$\int_{v0}^{v} dv = \int_{0}^{t} (bt)dt$

$v = v_0 + \frac{bt^2}{2}$

$s = \int_0^t v\,dt = \int_0^t \left(v_0 + \frac{bt^2}{2}\right)dt = v_0 t + \frac{bt^3}{6}$

18. $t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2\times 5}{10}} = 1\sec$

Let t_0 is the interval between two drops, then

$2t_0 = t$

$t_0 = 0.5\sec$

2nd drop has taken to time to fall $d = \frac{1}{2} g t_0^2$

$= \frac{1}{2}(10)(0.5)^2$

$d = 1.25$m

height from ground = $h - d$

$= 5 - 1.25 = 3.75$m

19. $\frac{1}{2} gt^2 = 20(t-1) + \frac{1}{2} g(t-1)^2$

Solving this equation t = 1.5sec

Now

$d = 20(t-1) + \frac{1}{2} g(t-1)^2$

$= 11.25 cm$

20. $V_x = \frac{dx}{dt} = 8t - 2$

$\int_4^x dx = \int_2^t (8t-2)dx$

$x = 4t^2 - 2t + 2 - - - - - (1)$

$V_y = \frac{dy}{dt} = 2$

$\int_4^y dy = \int_2^t 2dt$

$y = 2t$.....(2)

Solving (1) and (2)

$x = y^2 - y + 2$.

Chemistry

1. With increase in the number of charges the size decreases
2. The first gas is CO_2, second one is H_2O and third one must be SO_2.
3. $IE = 10x; EA = 3x$

$2.8 = \frac{10x + 3x}{544}$

$x = \frac{2.8 \times 544}{13} = 117 kJ$

$EA = 3x = 3x117 = 351$

4. 'N' is having stable half-filled outer electronic configuration
5. Lesser the oxidation number more the radius.
6. Electrongain enthalpy of hydrogen is greater than Li
7. Sulphur and chromium belongs to VIA and VIB groups respectively. Both exhibits similaroxidation states +6 in SO_3 and CrO_3 form similar compounds like H_2SO_4 and H_2CrO_4; SO_4^{-2}, CrO_4^{-2}.
8. Down the group ionization energy decreases.

9. Since there is a large increase after the 6^{th} ionization enthalpy, the element belongs to 6^{th} (or) 16^{th} group of the periodic table.

10. $x_2 + y_2 \longrightarrow 2xy$

$x \quad 0.5x \quad 2x$

$2x - 1.5x = 200$

$x = 400$

11. All the factors influence the electro negativity

12. As the positive charge developed on carbon [due to more electronegativity of fluorine] the bond length goes on decreases.

13. Electro positive character is directly proportional to basic nature.

14. Number of electrons same.

15. Eka aluminium is Ga

16. Acidic nature is directly proportional to oxidation state.

17. Dobereiner's Triad law

18. Ionic mobility $\propto \frac{1}{hydrated\ radius\ of\ ion}$

19. d-block elements electronic configuration is $ns^{1-2}\ (n-1)d^{1-10}$

20. 'Hg' is a liquid at room temperature.

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