ANSWER KEY- XII(ASEEM)-G0-G1- (FT-01) DATE :17-05-2015

CODE-1

PHYSICS															
QUS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ANS.	2	1	1	4	1	2	4	2	3	1	2	3	1	2	1
QUS.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
ANS.	2	1	4	1	2	4	3	3	2	4	4	3	2	2	3
CHEMISTRY															
QUS.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
ANS.	2	3	2	1	4	2	2	3	4	2	2	2	3	1	3
QUS.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
ANS.	2	4	2	1	4	3	4	1	4	2	3	4	1	2	1
MATHEMATICS															
QUS.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
ANS.	3	1	1	1	3	2	1	4	4	2	3	2	2	4	3
QUS.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
ANS.	3	1	1	4	2	4	2	2	1	4	4	2	2	4	1

Note :-
Solutions can be *downloaded* from the website or will be displayed on the notice board !

ANSWER KEY- XII(ASEEM)-G0-G1- (FT-01) DATE :17-05-2015

CODE-2

PHYSICS															
QUS.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ANS.	2	2	3	3	1	4	1	2	4	2	3	2	1	1	1
QUS.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
ANS.	2	1	2	1	4	1	2	4	3	3	2	4	4	3	2
CHEMISTRY															
QUS.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
ANS.	2	4	2	1	4	3	4	1	4	2	3	4	1	2	1
QUS.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
ANS.	2	3	2	1	4	2	2	3	4	2	2	2	3	1	3
MATHEMATICS															
QUS.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
ANS.	3	1	1	4	2	4	2	2	1	4	4	2	2	4	1
QUS.	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
ANS.	3	1	1	1	3	2	1	4	4	2	3	2	2	4	3

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Hints & Solution

PART- I (PHYSICS)

1. Potential in the x-y plane is given ....

Sol. $E_x = -\dfrac{\partial V}{\partial x} = -(10x + 5y) = -10 + 10 = 0$

$E_y = -\dfrac{\partial V}{\partial x} = -5x = -5$

$\therefore \quad \vec{E} = -5\hat{j}\,V/m.$

$\therefore$ (B)

6. A point charge q moves from point P ......

Sol. The work done is independent of the path followed and is equal to $(q\vec{E}).\vec{r}$,

where $\vec{r}$ = displacement from P to S

Here, $\vec{r} = a\hat{i} - b\hat{j}$, while $\vec{E} = E\hat{i}$

$\therefore \quad \text{Work} = -(qE\hat{i}).(a\hat{i} + b\hat{j}) = -qaE$

Hence, B is correct choice.

7. A particle A of mass m and charge Q ......

Sol. From Conservation of energy $(KE+EPE)_{\text{minimum separation}} = (KE+EPE)_{\text{far away}}$

$\Rightarrow \quad 0 + \dfrac{1}{4\pi\varepsilon_o}\dfrac{Q^2}{r_{min}} = \dfrac{1}{2}mv^2 + 0$

$\Rightarrow \quad r_{min} \propto \dfrac{1}{v^2}$

Hence, (D) is correct choice.

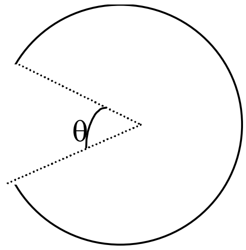
8. A circular wire of radius R carries ....

Sol. Electric field due to an arc at its centre is

$\dfrac{k\lambda}{R}2\sin\left(\dfrac{\theta}{2}\right)$, Where $k = \dfrac{1}{4\pi\varepsilon_0}$,

θ = angle subtended by the wire at the centre,

λ = Linear density of charge.



Let E be the electric field due to remaining portion.

Since intensity at the centre due to the circular wire is zero.

Applying principle of superposition.

$$\frac{k\lambda}{R}2\sin\left(\frac{\theta}{2}\right)\hat{n} + \vec{E} = 0$$

$$\left|\vec{E}\right| = \frac{1}{4\pi\varepsilon_0 R}.\frac{Q}{2\pi R}.2\sin\left(\frac{\theta}{2}\right)$$

$$= \frac{Q}{4\pi^2\varepsilon_0 R^2}\sin\left(\frac{\theta}{2}\right)$$

9. Two concentric conducting thin shells ....

Sol Let q' be the charge on inner shell when it is earthed.

$V_{inner} = 0$

$\therefore \quad \dfrac{1}{4\pi\epsilon_o}\left[\dfrac{q'}{r} + \dfrac{q}{3r}\right] = 0$

$\therefore \quad q' = -q/3$

i.e. $\dfrac{4q}{3}$ charge will flow from inner shell to earth .

10. A charge Q is distributed over two ....

Sol. $q_1 + q_2 = Q$ . . (i)

$\sigma = \dfrac{q_1}{4\pi r^2} = \dfrac{q_2}{4\pi R^2}$ . . (ii) from (i) and (ii) $q_1 = \dfrac{Qr^2}{(r^2 + R^2)}$

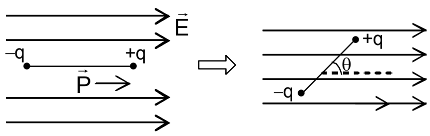
$q_2 = \dfrac{QR^2}{(r^2 + R^2)}$

$V_{centre} = V_1 + V_2 = \dfrac{1}{4\pi\varepsilon_0}\left(\dfrac{q_1}{r} + \dfrac{q_2}{R}\right)$

$= \dfrac{1}{4\pi\varepsilon_0} \dfrac{Q(R+r)}{R^2 + r^2}$

11. An electric dipole of dipole moment P ....

Sol. When displaced at an angle θ, from its mean position the mean position the magnitude of restoring torque is $\tau = -PE\theta$



For small angular displacement $\sin\theta \approx \theta$

$$\tau = -PE\theta$$

The angular acceleration is,

$\alpha = \dfrac{\tau\theta}{I} = -\left(\dfrac{pE}{I}\right)\theta = -\cos^2\theta$

Where $\omega^2 = \dfrac{PE}{I}$

$\therefore \quad T = 2\pi\sqrt{\dfrac{I}{PE}}$

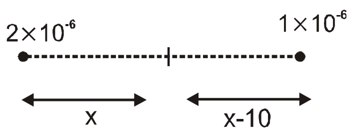
12. The dimension of $\left(\dfrac{1}{2}\right)\varepsilon_0 E^2$ (ε_0: permittivity ......

Sol. Energy density

$= \dfrac{1}{2}\varepsilon_0 .E^2 = \dfrac{\text{Energy}}{\text{Volume}} = \dfrac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$.

13. Two charges 2.0×10^{-6}C and ....

Sol. (A) $\dfrac{K \times 2 \times 10^{-6}}{x^2} = \dfrac{K \times 1 \times 10^{-6}}{(10-x)^2}$



$\sqrt{2}(10 - x) = x$

$\Rightarrow \quad 10\sqrt{2} = (\sqrt{2}+1).x$

$\Rightarrow \quad x = 10\dfrac{\sqrt{2}}{\sqrt{2}+1}$.

$10 - x = 10 - \dfrac{10\sqrt{2}}{(\sqrt{2}+1)} = \dfrac{10}{\sqrt{2}+1}$ from charge 1×10^{-6}.

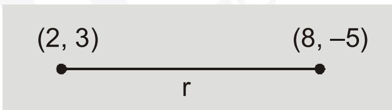
14. A charge +q and a charge –q are ....

Sol. In region I and II electric field along opposite direction.

$E \neq 0$ in region II

16. A point charge +50 μC is placed ....

Sol. (B)
+q = + 50 μC



$\vec{r} = 6\hat{i} - 8\hat{j}$

$\vec{E} = \dfrac{Kq}{r^3}\vec{r} = \dfrac{9 \times 10^9 \times 50 \times 10^{-6}}{10^3}(6\hat{i} - 8\hat{j})$

$\vec{E} = 900(3\hat{i} - 4\hat{j})$

17. In the figure two concentric ....

Sol. $V_i = \dfrac{KQ^2}{2R}$ $V_f = \dfrac{KQ^2}{2(2R)}$ (whole charge will get transferred to outer sphere)

so heat $= \dfrac{KQ^2}{2(2R)} = \dfrac{KQ^2}{4R}$

18. Two concentric rings, one of radius R ......

Sol. Electric field at a point on z-axis distant r from origin is

$E = \dfrac{1}{4\pi Eo}\left(\dfrac{Qr}{(r^2+R^2)^{3/2}} - \dfrac{\sqrt{8}\,Qr}{(r^2+4R^2)^{3/2}}\right) = 0$

Solving we get $r = \sqrt{2}R$ Ans

21. A bus is moving with a velocity 10 ms^{-1} ....

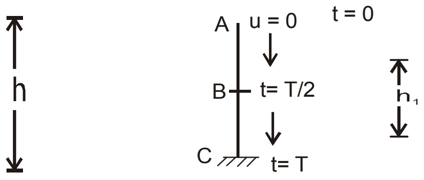
Sol. $V_{rel} = \frac{S_{rel}}{t} = \frac{1000}{100} = 10$ m/s.

$\therefore V_S - V_B = 10$

$\Rightarrow V_S = 10 + V_B = 10 + 10 = 20$ m/s. **Ans.**

22. A body is released from the top of ....

Sol.



Let at $t = \frac{T}{2}$ body is at point B.

For AC

$s = ut + \frac{1}{2}at^2$

$-h = -\frac{1}{2}gT^2$

$h = g\frac{T^2}{2}$ ...(1)

For AB

$s = ut + \frac{1}{2}at^2$

$-(h - h_1) = -\frac{1}{2}g\left(\frac{T}{2}\right)^2$

$h - h_1 = g\frac{T^2}{2\times4}$ ...(2)

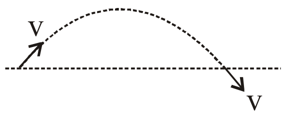
From (1) and (2), we have $h - h_1 = \frac{h}{4}$

$\Rightarrow \quad h - \frac{h}{4} = h_1$

or $\quad h_1 = \frac{3h}{4}$ from the ground

23. A gun is mounted in a stationary ....

Sol. $H_{max} = \frac{1}{8}gT^2$



24. The distance travelled by the car ....

Sol. Distance travelled by the car in 10 second is equal to displacement in 10 second and it is same as area under the v-t curve.

$\therefore$ Distance $= \frac{1}{2} \times 2 \times 10 + 10 \times 5 + \frac{1}{2} \times 3 \times 10 = 10 + 50 + 15 = 75$ m

25. Correct acceleration-time ....

Sol. From v-t graph we can analyze in t = 0 to t = 2 sec slope is positive and constant. Hence acceleration is positive and constant and it is $\frac{10}{2} = 5\ ms^{-2}$.

Between t = 2 to t = 7. Slope is zero so the acceleration is zero. Between t = 7 to t3 = 10 slope is negative and constant. Hence acceleration is negative and constant and its value is $-\frac{10}{3}ms^{-2}$.

Hence the required at graph is (D).

27. Two persons of equal height are ....

Sol. $$\frac{N_A}{N_B} = \frac{\dfrac{Mg\left(\frac{\ell}{2}-\frac{\ell}{6}\right)}{\left(\ell-\frac{\ell}{4}-\frac{\ell}{6}\right)}}{\dfrac{Mg\left(\frac{\ell}{2}-\frac{\ell}{4}\right)}{\left(\ell-\frac{\ell}{4}-\frac{\ell}{6}\right)}} = \frac{4}{12} \times \frac{8}{2} = \frac{4}{3}$$

30. A thin hollow sphere of mass m is ....

Sol. (C) $KE = \frac{1}{2}mv^2 + \frac{1}{2}\frac{2}{3}mR^2\left(\frac{V}{R}\right)^2 + \frac{1}{2}mv^2$

$= \frac{mv^2}{2}\left(1+\frac{2}{3}+1\right) = \frac{4mv^2}{3}$

PART- II (CHEMISTRY)

32. The heat capacity of a..........

Sol. For 2.0ºC :

Heat change = 2 x 500 J
= 1000 J

$\therefore$ For the combustion of 0.1 gm methane = 1000 J

$\therefore$ For the combustion of 16 gm methane

$= \frac{1000}{0.1}$ x 16 = 160000 J = 160 kJ / mole

(Heat of combustion is negative)

34. The vapour pressures ....

Sol. $P_T = P^o_{A} \times A + P^o_{B} \times B$

$= 108 \times \frac{1}{2} + 36 \times \frac{1}{2}$

= 72

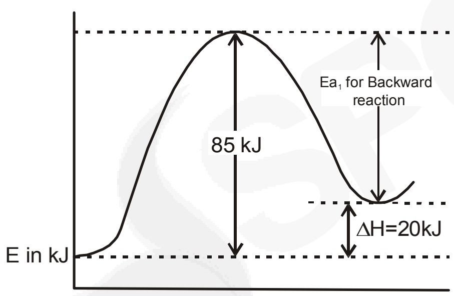
$Y_B = \frac{P^o_{B} \times B}{P_T}$

$= \frac{36 \times \frac{1}{2}}{72}$

= 0.25

36. For A + B $\rightarrow$ C + D; ΔH = ...

Sol.



ΔH of forward reaction = 20 kJ mol^{-1}.

Energy of activation for forward reaction (E_a) = 85 kJ mol^{-1}

$\therefore$ Energy of activation for backward reaction = $E_a - \Delta H$

= 85 – 20 **= 65 kJ mol^{-1}**

38. What is the simplest formula ....

Sol. An atom at the corner of a cube is shared among 8 unit cells. As there are 8 corners in a cube, number of corner atom [1] per unit cell = 8 x $\frac{1}{8}$ = 1.

A face-centred atom in a cube is shared by two unit cellls. As there are 6 faces in a cube, number of face-centred atoms [2] per unit cell = 6 x $\frac{1}{2}$ = 3.

An atom in the body of the cube is not shared by other cells.

\ Number of atoms [3] at the body centre per unit cell = 1

Hence, the formula of the solid is AB_3C.

48. A first order reaction takes..........

Sol. $\because$ K = $\frac{0.693}{t_{1/2}} = \frac{0.693}{69.3}$ minute^{-1}

($\because t_{1/2}$ = 69.3 min)

Now K = $\frac{2.303}{t} \log_{10} \frac{100}{20}$; K = $\frac{2.303}{t} \log \frac{100}{100-x}$ [if a = 100, x = 80 and a – x = 20]

$\frac{0.693}{69.3} = \frac{2.303}{t} \log_{10} 5$;

t = 160.97 minute

51. Which curve represents ....

Sol. See various plot given in important formulae.

Hence the answer is [3].

54. Fraction of total............

Sol. In a simple cubic system, number of atoms

a = 2r

$\therefore$ Packing fraction =

$\frac{\text{Volume occupied by one atom}}{\text{Volume of unit cell}}$

$= \frac{\frac{4}{3}\pi r^3}{a^3} = \frac{\frac{4}{3}\pi r^3}{(2r)^3} = \frac{\pi}{6}$

PART- III (MATHS)

61. For a given matrix...........

[Hint: Obv. A is orthogonal as $a_{11}^2 + a_{12}^2 = 1 = a_{21}^2 + a_{22}^2 = a_{11}^2 + a_{22}^2$

for skew symmetric matrix $a_{ii} = 0 \Rightarrow \theta = (2n+1)\frac{\pi}{2}$

for symmetric matrix , $A = A^T \Rightarrow \sin\theta = 0 \Rightarrow \theta = n\pi$

Also $\text{adj}A = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$ and $|A| = 1$

hence $A = A^{-1}$ is possible if $\sin\theta = 0$]

63. If $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & a & 1 \end{bmatrix}$, ...

[Sol. $|A| = 2(a-2) \Rightarrow a \neq 2$

cofactor of 0 in $|A|$ is $2 - 3a$. According to value of A^{-1},

$$\frac{2-3a}{|A|} = \frac{1}{2} \Rightarrow \frac{2-3a}{2(a-2)} = \frac{1}{2}$$

$\Rightarrow 2 - 3a = a - 2 \Rightarrow a = 1$

Again $c = \dfrac{\text{cofactor of } a \text{ in } |A|}{|A|}$

$$= \frac{\begin{vmatrix} 0 & 2 \\ 1 & 3 \end{vmatrix}}{2(a-2)} = \frac{2}{2(1-2)} = -1$$

Alternative : $AA^{-1} = I$]

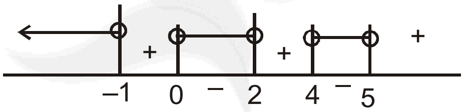
64. Values of x whic...............

Sol. $\dfrac{(x+1)(x-3)^2(x-5)(x-4)^3(x-2)}{x} < 0$

x

$x \neq 0$

$\dfrac{(x+1)(x-5)(x-4)(x-2)}{x} < 0$



$x \in (-\infty, -1) \cup (0, 2) \cup (4, 5)$

65. Matrix $A = \begin{bmatrix} x & 3 & 2 \\ 1 & y & 4 \\ 2 & 2 & z \end{bmatrix}$, ...

[Sol. $A.\,\text{adj}\,A = |A|\,I$

$|A| = xyz - 8x - 3(z-8) + 2(2-2y)$

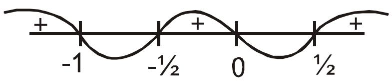
$|A| = xyz - (8x + 3z + 4y) + 28 \Rightarrow 60 - 20 + 28 = 68 \Rightarrow$ [3]]

67. If S is the set of all real ....

Sol. $\dfrac{2x-1}{2x^3+3x^2+x} > 0$

$\Rightarrow \dfrac{2x-1}{x(2x^2+3x+1)} > 0$

$\Rightarrow \dfrac{2x-1}{x(2x+1)(x+1)} > 0$



$\Rightarrow$ $S = \left\{x / x \in (-\infty,-1) \cup \left(-\dfrac{1}{2}, 0\right) \cup \left(\dfrac{1}{2}, \infty\right)\right\}$

$\therefore$ S contains $\left(-\infty, -\dfrac{3}{2}\right)$

69. α, β are roots of the equation ......

Sol. $\because$ α, β are roots of

$\lambda x^2 - (\lambda - 1)x + 5 = 0$

$\therefore$ $\alpha + \beta = \dfrac{\lambda - 1}{\lambda}$ and $\alpha\beta = \dfrac{5}{\lambda}$

$\because$ $\dfrac{\alpha}{\beta} + \dfrac{\beta}{\alpha} = 4 \Rightarrow \dfrac{\alpha^2+\beta^2}{\alpha\beta} = 4$

$\Rightarrow$ $(\alpha + \beta)^2 = 6\alpha\beta$

$\Rightarrow$ $\dfrac{(\lambda-1)^2}{\lambda^2} = \dfrac{30}{\lambda}$

$\lambda^2 - 32\lambda + 1 = 0$

............(1)

$\because$ λ_1, λ_2 are roots of (1)

$\therefore$ $\lambda_1 + \lambda_2 = 32$ and $\lambda_1\lambda_2 = 1$

$\therefore$ $\dfrac{\lambda_1}{\lambda_2} + \dfrac{\lambda_2}{\lambda_1} = \dfrac{(\lambda_1+\lambda_2)^2 - 2\lambda_1\lambda_2}{\lambda_1\lambda_2} =$

$\dfrac{(32)^2 - 2}{1} = 1022$

70. The minimum value of...................

Sol. $f(x) = |x-1| + |x-2| + |x-3|$

let $x \geq 3$ $f(x) = x - 1 + x - 2 + x - 3$

$= 3x - 6$

f(x) min = 3

$2 \leq x < 3$

$f(x) = x - 1 + x - 2 + 3 - x$

$f(x) = x$

f(x)min = 2

Case-III

$1 \leq x < 2$

$f(x) = x - 1 + 2 - x + 3 - x$

$= 4 - x$

$f(x)_{min} = 2$

Case-IV

$x < 1$

$f(x) = 1 - x + 2 - x + 3 - x$

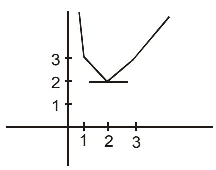
$= 6 - 3x$

$f(x)_{min} = 3$

minimum value of f(x) = 2

graphically

$f(x)_{min} = 2$



71. Let $A + 2B = \begin{bmatrix} 1 & 2 & 0 \\ 6 & -3 & 3 \\ -5 & 3 & 1 \end{bmatrix}$..........

[Hint: $t_r[1] + 2\,t_r[2] = -1$ (from the given matrix)

and $2\,t_r[1] - t_r[2] = 3$ (from the given matrix)

Let $t_r[1] = x$ and $t_r[2] = y$

$x + 2y = -1$

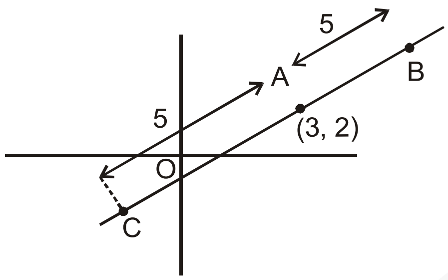
$2x - y = 3$

solving $x = 1$ and $y = -1$

Hence $t_r[1] - t_r[2] = x - y = 2$]

72. If the slope of a line ....

Sol.



For B and C apply Parametric form

$\frac{x-3}{\cos\theta} = \frac{y-2}{\sin\theta} = \pm 5$

Points are (7, 5) & (–1, 1)

73. The equation of line.............

Sol. Required line $\equiv (4x + 3y - 7) + \lambda\,(8x + 5y - 1) = 0$

slope $= -\frac{3}{2} \Rightarrow -\frac{(4+8\lambda)}{3+5\lambda} = -\frac{3}{2}$

$\Rightarrow \lambda = 1$

equation of required line $3x + 2y = 2$

74. The set of all the solutions of........

Sol. $\log_{1-x}(x-2) \geq -1$

$x > 2$ ....(1)

(i) When $0 < 1 - x < 1 \Rightarrow 0 < x < 1$

So no common range comes out.

(ii) When $1 - x > 1 \Rightarrow x < 0$ but $x > 2$

here, also no common range comes out. , hence no solution.

Finally, no solution

75. Let $A = \begin{bmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{bmatrix}$,.............

[Sol. $|A| = \begin{vmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{vmatrix} = 1(1 + \sin^2\theta)$

$-\sin\theta\,(-\sin\theta + \sin\theta) + (1 + \sin^2\theta) = 2\,(1 + \sin^2\theta)$

$|\sin\theta| \leq 1 \Rightarrow -1 \leq \sin\theta \leq 1$

$\Rightarrow 0 \leq \sin^2\theta \leq 1$

$\Rightarrow 1 \leq 1 + \sin^2\theta \leq 2 \Rightarrow 2 \leq 2(1 + \sin^2\theta) \leq 4$

76. If the system of equations........

Sol. $x + \lambda y + 2 = 0,\ \lambda x + y - 2 = 0,\ \lambda x + \lambda y + 3 = 0$

$\Delta = \begin{vmatrix} 1 & \lambda & 2 \\ \lambda & 1 & -2 \\ \lambda & \lambda & 3 \end{vmatrix} = 0$ For consist system

$\Rightarrow 3 + 2\lambda - \lambda(3\lambda + 2\lambda) + 2(\lambda^2 - \lambda) = 0$

$-3\lambda^2 = -3,\ \lambda^2 = 1,\ \lambda = \underline{+}1$

at $\lambda = 1$, since at three lines are parallel,

so $\lambda = -1$, is only solution

77. If the lines $px^2 - qxy - y^2 = 0$ ....

Sol. $px^2 - qxy - y^2 = 0$

$m_1 = \tan\alpha$, $m_2 = \tan\beta$

$m_1 + m_2 = -q$, $m_1 m_2 = -p$

$\Rightarrow \tan(\alpha + \beta) = -\frac{q}{1+p}$

79. The set of real value(s) of ....

Sol. $|2x + 3| + |2x - 3| = px + 6$

Case-I

$x \geq \frac{3}{2}$

$2x + 3 + 2x - 3 = px + 6$

$4x = px + 6$

$x(4 - p) = 6$

$x = \frac{6}{4-p}$

$\frac{6}{4-p} - \frac{3}{2} \geq 0$

$\frac{12 - 12 + 3p}{2(4-p)} \geq 0$

$3p(4 - p) \geq 0$

Case-II

$-\frac{3}{2} \le x \le \frac{3}{2}$

$2x + 3 + 3 - 2x = px + 6$

$px = 0$

$p = 0$

Case-III

$x \le -\frac{3}{2}$

$-(2x + 3) + 3 - 2x = px + 6$

$-4x = px + 6$

$x(4 + p) + 6 = 0$

$x = -\frac{6}{4+p}$

$-\frac{6}{4+p} \le -\frac{3}{2}$

$\frac{12-12-3p}{2(4+p)} \ge 0$

$3p(4 + p) \le 0$

$p \in (-4, 0]$

intersection of all three cases is p = 0

80. If A, B and C are $n \times n$ ....

[Hint: $|A| = 2$; $|B| = 3$; $|C| = 5$

$\det(A^2BC^{-1}) = |A^2BC^{-1}| = \frac{|A|^2|B|}{|C|} = \frac{4 \cdot 3}{5} = \frac{12}{5}$ Ans.]

81. Exhaustive set of values ....

Sol. $\log_{|x|}(x^2 + x + 1) \ge 0$

I for $(x^2 + x + 1) \ge 0$

$b^2 - 4ac < 0$

$a > 0$ it is always true for $x \in R$

$|x| > 0$ & $x \ne 0, 1, -1$

now $\log_{|x|}(x^2 + x + 1) \ge 0$

$0 < |x| < 1$

$\log|x| < 0$

so $\frac{\log(x^2x+1)}{\log|x|} \ge 0$

when $x^2 + x + 1 \ge 1$

when $0 < x < 1$

so $\log|x| < 0$

so it is failed in taks interval for other perion

$-1 < x < 0$

$x^2 + x + 1 < 1$

$\log(x^2 + x + 1) < 0$

so $\log|x| < 0$

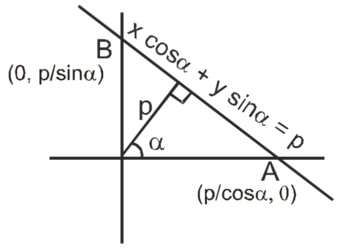
so it is true

so the correct domain

$(-\infty, -1) \cup (-1, 0) \cup (1, \infty)$

82. The locus of the mid-point............

Sol. P is (η, κ) mid point of AB



$\eta = \frac{p}{2\cos\alpha}$

$\kappa = \frac{p}{2\sin\alpha}$

$\sin^2\alpha + \cos^2\alpha = 1$

$\frac{1}{\eta^2} + \frac{1}{\kappa^2} = \frac{4}{p^2}$, locus is $\frac{1}{x^2} + \frac{1}{y^2} = \frac{4}{p^2}$

83. The value of the ....

[Hint: Use $R_2 \to R_2 - R_1$ and $R_3 \to R_3 - R_1$ and expand]

84. If $f(x) = \begin{vmatrix} a & -1 & 0 \\ ax & a & -1 \\ ax^2 & ax & a \end{vmatrix}$ then f ....

Sol. $f(x) = a\begin{vmatrix} 1 & -1 & 1 \\ x & a & -1 \\ x^2 & ax & a \end{vmatrix} = a(a^2 + ax + ax + ax^2 + ax^2 - ax^2)$

$f(x) = a^2(a + 2x + x^2)$

$f(-x) = a^2(a - 2x + x^2)$

$f(x) - f(-x) = a^2 . 4x = 4a^2x$ (one degree)

85. If $[x + [2x]] < 3$, where [.]denotes........

Sol. $[x + [2x]] < 3$

if $x > 1$

$2x > 2$

$[2x] > 2$

$x + [2x] > 3$

$[x + (2x)] > 3$ so failed

so when

$0 < x < 1$

$2x < 2$

$[2x] < 2$

$0 < x + [2x] < 3$

so it is pass.

now $x < 0$

$-1 \le x < 0$

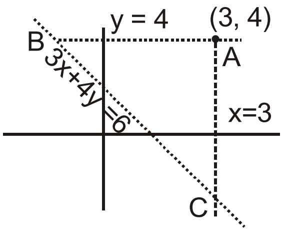
$[x] = -1$

$x + [x] < -1$ it will be true for all –vex

domain of x $[-\infty, 1)$

86. Coordinates of the ....

Sol.



From figure it is clear that A is orthocentre of ΔABC

87. Let $f(\theta)$ =.............

Sol. $f\left(\frac{\pi}{6}\right) = \begin{vmatrix} \frac{3}{4} & \frac{\sqrt{3}}{4} & -\frac{1}{2} \\ \frac{\sqrt{3}}{4} & \frac{1}{4} & \frac{\sqrt{3}}{2} \\ \frac{1}{2} & -\frac{\sqrt{3}}{2} & 0 \end{vmatrix}$

$= \frac{1}{2}\left(\frac{3}{8}+\frac{1}{8}\right) + \frac{\sqrt{3}}{2}\left(\frac{3\sqrt{3}}{8}+\frac{\sqrt{3}}{8}\right) = \frac{1}{4} + \frac{\sqrt{3}}{2} \times \frac{4\sqrt{3}}{8} = \frac{1}{4} + \frac{3}{4} = 1$

89. The roots of the quadratic ....

Sol. Clearly $x = 1$ is one root of the given equation

$\therefore$ 2nd root will be $\frac{a-2b+c}{a+b-2c}$

$\therefore$ D is correct option

90. Solution of the.............

Sol. $x - 3 < \sqrt{x^2+4x-5}$

Domain

$x^2 + 4x - 5 \ge 0$

$(x + 5)(x - 1) \ge 0$

$x \in (-\infty, -5] \cup [1, \infty)$

Case – 1 L.H.S. is $\ominus$ or zero $x \le 3$

then it is true for domain

$x \in (-\infty, -5] \cup [1, 3]$

Case – 2 $x > 3$

requaring fothrider

$x^2 - 6x + y < x^2 + 4x - 5$

$14 < 10x$, $x > 7/5$

As $x \in (7/5, \infty$