| ASIA ENGLISH SCHOOL | | 1st Term Exam<br>September 2009-10 |
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| Secondary /Higher Secondary Section | | Date :14-09-09 |
| Asia Campus, Drive-in Road, Ahmedabad-380054 | | Time : 3 Hours |
| Std : XII Sci | **Sub : Maths** | Total Marks : 100 |

**Roll No. _____**

## SECTION – A

**Each question is carrying one mark. (M.C.Q.)** **[15]**

(1) If A(0, 0), B (4,0), C(0, 3) then length of perpendicular line segment from A to $\overline{BC}$ is

[a] 1.2 [b] 5 [c] 3 [d] 2.4

(2) The equation of a line having congruent intercepts on the axes and passing though (a, b) = _____

[a] $x + y = ab$ [b] $x + y = a + b$

[c] $x + y = a - b$ [d] $x - y = a - b$

(3) The equation of line passing through the point of intersection of the lines $x = 0$ any $y = 3$ and perpendicular to $x + y + 1 = 0$ is _____

[a] $x + y + 3 = 0$ [b] $x + y - 3 = 0$

[c] $x - y + 3 = 0$ [d] $x - y = 0$

(4) Radius of circle passing through points (0,0), (2,0) and (0,2) is _____

[a] $\sqrt{2}$ [b] $\frac{1}{\sqrt{2}}$ [c] $2\sqrt{2}$ [d] $\frac{1}{2}$

(5) If tangents of circles are $3x - 4y - 4$ and $6x - 8y - 7 = 0$, then radius of circle is _____

[a] $\frac{3}{2}$ [b] 3 [c] $\frac{3}{8}$ [d] $\frac{3}{4}$

(6) If $\bar{x} = (\cos\theta, \sin\theta)$, $\bar{y} = (\cos\phi, \sin\phi)$, then $\left|\bar{x} \times \bar{y}\right|$ = _____

[a] $\sin^2\left(\frac{\theta - \phi}{2}\right)$ [b] $\left|\sin\left(\frac{\theta - \phi}{2}\right)\right|$

[c] $\left|\sin\theta - \sin\phi\right|$ [d] None of these

(7) $\hat{i} \times \left(\hat{i} \times \hat{j}\right) =$ _____

[a] $\hat{k}$ [b] $\hat{j}$ [c] $\hat{i}$ [d] $-\hat{j}$

(8) If $\lim_{x \to \infty}\left|\frac{7x + 1}{5}\right| = \frac{7}{5}$, $x \in R$ and $N(a,\alpha)$ then $(a,\alpha)$ = _____

[a] $\left(\frac{7}{5}, \frac{7}{5}\right)$ [b] $\left(\frac{1}{5}, \frac{7}{5}\right)$

[c] $\left(\frac{1}{7}, 1\right)$ [d] $\left(1, \frac{1}{7}\right)$

(9) $\lim_{x \to a}\frac{f(x) - f(a)}{x - a} =$ _____ where $f(x) = \sin^{-1} x$

[a] $\frac{1}{\sqrt{1 - a^2}}$, [b] $\frac{1}{1 - a^2}$

[c] $\cos^{-1} x$ [d] None of these

(10) $\lim_{n \to \infty}\frac{1 + n^3}{(2n + 1)(1 + n^2)} =$ _____

[a] $\frac{3}{16}$ [b] $\frac{1}{6}$ [c] $\frac{3}{4}$ [d] $\frac{3}{8}$

**(P.T.O.)**

(11) $\frac{d}{dx}\left(\sin\left(\cos^{-1}x\right)\right)$ = _____

(a) $\frac{-x}{\sqrt{1-x^2}}$ [b] $\frac{x}{\sqrt{1-x^2}}$ [c] $\frac{-x}{\sqrt{x^2-1}}$ [d] None of these

(12) $\frac{d}{dx}\log|\cos x|$ = _____

[a] $\tan x$ [b] $|\tan x|$ [c] $-\tan x$ [d] None of these

(13) $\int a\sin x\,da$ = _____

[a] $\frac{a^2}{2}\sin x + c$ [b] $a\cos x + c$ [c] $-a\cos x + c$ [d] None of these.

(14) $\int e^t\cos t(1-\tan t)dt$ = _____ $+ c$

[a] $e^t\sec t$ [b] $e^t\sin t$ [c] $e^t\cos t$ [d] $e^t\tan t$

(15) $\int\sqrt{x^2-7}\,dx$ = _____ $+ c$

[a] $\frac{x}{2}\sqrt{x^2-7} - \frac{7}{2}\log\left|x+\sqrt{x^2-7}\right|$

[b] $\frac{x}{2}\sqrt{x^2-7} - \frac{7}{2}\sin^{-1}\left(x/\sqrt{7}\right)$

[c] $\frac{x}{2}\sqrt{x^2-7} - \frac{7}{2}\sin^{-1}\left(x/\sqrt{7}\right)$

[d] $\frac{x}{2}\sqrt{x^2-7} - \frac{7}{2}\log\left|x+\sqrt{x^2-7}\right|$

## SECTION – B

**Each question is carrying one mark. (Show calculation)** **[15]**

(16) In which ratio X-axis divides $\overline{AB}$ from B, where A(3,2), B (2,-4)

(17) $A(x_1,y_1), B(x_2,y_2)$ and $p(tx_2+(1-t)x_1, ty_2+(1-t)y_1), t\in[0,1]$ then P divides $\overline{AB}$ from A in the ratio $\lambda$. Find $\lambda$

(18) Prove that $(\lambda+1)x+(2\lambda+1)y+12=0, \lambda\in R$ passes through a fixed point, Find the fixed point.

(19) Find the length of chord of circle $x^2+y^2+4x+6y+12=0$ cut off by X-axis

(20) If $\left|\overline{x}\right|=7$, $\left|\overline{y}\right|=11$, $\left|\overline{x}+\overline{y}\right|=10\sqrt{3}$, then find $\left|\overline{x}-\overline{y}\right|$

(21) If $\overline{x}+\overline{y}+\overline{z}=\overline{0}$ and $\left|\overline{x}\right|=\left|\overline{y}\right|=\left|\overline{z}\right|=1$ then find $\overline{x}\cdot\overline{y}+\overline{y}\cdot\overline{z}+\overline{z}\cdot\overline{x}$

(22) Find $\lim_{x\to 7}\frac{\partial}{\partial x}\left(\frac{\partial}{\partial x}\right)$

(23) Find $\lim_{x\to 0}\frac{1-\cos 7x}{1-\cos 500x}$

(24) Find $\lim_{x\to\infty}\frac{1}{n(n+1)}$

(25) Find $\lim_{x\to 0}\frac{2^{x+4}-16}{x}$

(26) Find $\lim_{x\to\infty}\left(\frac{1}{n^2}+\frac{2}{n^2}+\frac{3}{n^2}+\ldots\ldots\ldots\ldots+\frac{n}{n^2}\right)$

**Contd…**

(27) If $f(2) = 5, f'(2) = 3$, then find $\lim_{x \to 2} \frac{xf(2) - 2f(x)}{x - 2}$

(28) Evaluate $\int \cos^3 x \, e^{\log \sin x} \, dx$

(29) Evaluate $\int e^x \sin 2x \, dx$

(30) Evaluate $\int \left( \frac{1}{\log x} - \frac{1}{(\log x)^2} \right) dx$

## SECTION –C

**Short questions, each carrying two marks.** **[20]**

(31) Find the fourth vertex of a parallelogram if the other three vertices are (1,2), (-2,3) and (3,-1)

(32) Find the equation of line that is perpendicular to $\sqrt{3}x - y - 5 = 0$ given that to x-intercept is 2.

(33) If a, c, b are in G.P. then find the area of the triangle formed by the axes and the line $ax + by + c = 0$

(34) Find 'g' and 'k' if the circle $x^2 + y^2 + gx + 2y + k = 0$ troches both the axes.

(35) Find the limit of $\lim_{x \to 0} x^3 \sin 1/x$

(36) Find $\lim_{x \to 0} (\sec^2 x)^{\operatorname{cosec}^2 x}$

(37) If $\sin y = x \sin(a + y)$, then find $\frac{dy}{dx}$.

(38) Evaluate $\int \frac{dx}{(\sin x)^{2/5} (\cos x)^{8/5}}$

(39) Evaluate $\int \frac{dx}{\sqrt{x} + x\sqrt{x}}$

(40) Evaluate $\int \frac{x^2 - 1}{\sqrt{x^2 + 4}} dx$

## SECTION –D

**Following questions carry three marks each.** **[30]**

(41) For $A(x_1, x_1 \cos\theta_1), B(x_2, x_2 \cos\theta_2), C(x_3, x_3 \cos\theta_3)$ are vertices of $\Delta$ ABC where $0 < \theta_1, \theta_2, \theta_3 < \pi/2$, origin is the circumcentre and centroid is $(x, y)$. Prove that $x \sum_{i=1}^{3} \cos\theta_i + y \sum_{i=1}^{3} \sin\theta = i$, where $x_i, y_i > 0, i = 1,2,3$

(42) If '$\square$' intersects the lines $5x + y + 4 = 0$ and $3x + 4y + 4 = 0$ in A and B respectively. If (1,5) is mid point of $\overline{AB}$, then find the equation of '$\square$'

(43) Find the points on the line $3x + 4y + 8 = 0$ at a distance 3 units from $3x + 2y + 2 = 0$.

(44) If circles $x^2 + y^2 + 2gx + c = 0$ and $x^2 + y^2 + 2fy + c = 0$ touch each other, than prove that $g^{-2} + f^{-2} = c^{-1}$ $(g > 0, f > 0, c > 0)$

(45) If $\bar{x} = \left(\frac{1}{2}, 0, \frac{1}{2}\right), \bar{y} = \left(\frac{1}{2}, -1, \frac{1}{2}\right)$ then find unit vectors perpendicular to both $\bar{x} + \bar{y}$ and $\bar{x} - \bar{y}$

**Contd…**

(46) Find $\lim_{x \to 0} \frac{x(1+\sqrt{1+x^2})}{\sqrt{1+x^2}\cdot(\sin^{-1}x)^3}$

(47) Find $\lim_{x \to 0} \frac{x(3^x-1)}{1-\cos x}$

(48) If $y = e^{ax}\sin bx$, then $y_2 - 2ay_1 + (a^2+b^2) = 0$

(49) Evaluate $\int \frac{1}{1+\cos\alpha\cdot\cos x}\,dx, \quad \alpha \in (0, \pi/2)$

(50) Evaluate $\int \frac{\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x}-\cos^{-1}\sqrt{x}}\,dx$

## SECTION – E

**Answer the following questions. Each carrying 5 marks.** **[20]**

(51) In $\Delta$ ABC, C is (1,4). The line containing the altitude from A is $3x - y + 11 = 0$, the line containing the median $\overline{AD}$ through A is $x + 2y + 7 = 0$. Find the equations of the lines containing three sides of triangle.

(52) Find the length of the common chord of the circles $(x-a)^2 + (y+b)^2 = c^2$ and $(x+b)^2 + (y-a)^2 = c^2$ where $a \neq b$

(53) If $y = \left(\frac{1}{x}\right)^x$, then find the value of $y_2(1)$

(54) Evaluate $\int \frac{x^2}{x^4-1}\,dx$

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