PATHFINDERS CLASSES
YOUR WAY TO SUCCESS...
1st Floor, Near Adarsh Jain School, Opp. Vikas Hospital, Thana Road, Najafgarh, Delhi.

Code No. 16/1/5

PLEASURE TEST SERIES XI – 05

A Compilation By : O. P. Gupta [Call or WhatsApp @ +91-9650 350 480]

Time Allowed : 180 Minutes **Max. Marks : 100**

SECTION – A

Q01. Find a + 2b, if (a + b, 2b – 3) = (4, –5).

Q02. Express $\frac{i}{i+1}$ in the form of x + iy.

Q03. Write the negation of the statement "$\sqrt{3}$ is a rational number".

Q04. Determine the distance between the points (2, –1, 3) and (1, 3, 5).

Q05. Describe the set {–1, 1} in set builder form.

Q06. Find the principal solution of $\tan x = -\frac{1}{\sqrt{3}}$.

SECTION – B

Q07. Prove that : $\cos x \cos(60^\circ - x)\cos(60^\circ + x) = \frac{1}{4}\cos 3x$.

Q08. If $|z_1| = |z_2| = |z_3| = ... = |z_n| = 1$, then prove that $\left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} + ... + \frac{1}{z_n}\right| = |z_1 + z_2 + z_3 + ... + z_n|$.

OR Show that the locus of a complex number z satisfying $\left|\frac{z-3}{z+3}\right| = 2$ is a circle.

Q09. Solve : $2\tan\theta - \cot\theta + 1 = 0$.

Q10. Let G be a geometric mean between two positive numbers. Also let p and q be two arithmetic means between these two numbers, then show that $G^2 = (2p - q)(2q - p)$.

OR Find the sum of the series : $1.2^2 + 3.3^2 + 5.4^2 + ...$ upto n terms.

Q11. If U = {a, b, c, d, e}, A = {a, b, c} and B = {b, c, d, e}. Show that $(A \cap B)' = A' \cup B'$.

Q12. Shruti got 95, 72, 73, 83 marks in the first four papers each carrying 100 marks. If she wants an average of greater than or equal to 75 marks and less than 80 marks, find the range of marks she should score in the fifth paper. To achieve her objective she used unfair means in her fifth paper, which went undetected by the teacher. Which life value(s) will she loose by using unfair means?

Q13. Find the square roots of – 15 – 8i.

Q14. Find the ratio in which the line segment joining the points (6, 10, –8) and (4, 8, 10) is divided by the YZ-plane. Also, find the point of intersection.

OR Show that the points A(1, 2, 3), B(–1, –2, –1), C(2, 3, 2) and D(4, 7, 6) are the vertices of a parallelogram ABCD but, itis not a rectangle.

Q15. Obtain the equation of ellipse whose vertices are $(\pm 6, 0)$ and foci $(\pm 4, 0)$.

Q16. In a single throw of two dice, find the probability that neither a doublet nor a total of 10 will appear.

OR Two students Radha and Anuradha appeared in a test. The probability that Radha will qualify the test is 0.10 and that Anuradha will qualify is 0.05. The probability that both will qualify the test is 0.02. Find the probability that (a) both won't qualify the test (b) at least one of them won't qualify the test and (c) only one of them will qualify the test.

Q17. If the m^{th} term of an AP is a and its n^{th} term is b, then show that the sum of (m + n) terms is $\frac{m+n}{2}\left[\frac{a-b}{m-n}+a+b\right]$.

Q18. The function $F(x)=\frac{9x}{5}+32$ is a formula to convert x ^{o}C to the Fahrenheit units. Find the followings :

(a) F(0) (b) F(–10) (c) value of x when F(x) = 212.

Q19. Find the equation of the line through the point (0, 2) making an angle $\frac{2\pi}{3}$ with the positive x-axis. Also find the equation of line which is parallel to it and crossing the y-axis at a distance of 2 units below the origin.

SECTION – C

Q20. The angles of a triangle are in AP and b : c $=\sqrt{3}:\sqrt{2}$, find the angles.

OR **(i)** Prove that $\cos 52^{o}+\cos 68^{o}+\cos 172^{o}=0$.

(ii) In a ΔABC prove that $\tan\frac{B-C}{2}=\frac{b-c}{b+c}\cot\frac{A}{2}$.

Q21. Find the equation of circle whose centre lies on x – 4y = 1 and which passes through the points (3, 7) and (5, 5).

Q22. **(i)** How many seven digit numbers can be formed by using the digits 1, 2, 0, 2, 4, 2 and 4?
(ii) A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of : a. exactly 3 girls? b. at least 3 girls?

Q23. Using PMI, prove that $3.2^2+3^2.2^3+3^3.2^4+...+3^n.2^{n+1}=\frac{12}{5}(6^n-1)$ for all $n\in N$.

OR Show that $1^2+2^2+3^2+...+(2n-1)^2=\frac{1}{3}n(4n^2-1)=\frac{1}{3}n(2n-1)(2n+1)$ for all natural nos. n.

Q24. **(i)** Find $(m+n)^4-(m-n)^4$. Hence using this, evaluate $\left(\sqrt{2}+\sqrt{3}\right)^4-\left(\sqrt{2}-\sqrt{3}\right)^4$.

(ii) Find the coefficient of a^4 in the product $(1+2a)^4(2-a)^5$ using binomial theorem.

Q25. **(a)** Evaluate : $\lim_{x\to 0}\frac{e^x-e^2}{x-2}$. **(b)** Differentiate $\frac{\sec x-\tan x}{\sec x+\tan x}$ w.r.t. x.

Q26. **(i)** The mean and variance of marks obtained by 50 students of a class in three subjects Mathematics, Physics and Chemistry are given below :

Subject	Mathematics	Physics	Chemistry
Mean	42	32	40.9
Variance	144	225	400

Which of the three subjects shows the highest variability in marks and which shows the lowest?
(ii) Find the standard deviation of first n natural numbers.

Q01. By equality of ordered pairs, we get a + b = 4, 2b – 3 = –5 $\Rightarrow a+2b=5+2(-1)=3$.

Q02. $\frac{1}{2}+\frac{1}{2}i$

Q03. It is not true that $\sqrt{3}$ is a rational number.

Q04. $\sqrt{21}$ units

Q05. $\{x : x \text{ is a root of } x^2-1=0\}$

Q06. $\frac{5\pi}{6}, \frac{11\pi}{6}$

Q07. We have $\cos x\cos(60^o-x)\cos(60^o+x)=\frac{1}{4}\cos 3x \quad \Rightarrow 4\cos x\cos(60^o-x)\cos(60^o+x)=\cos 3x$

LHS : $4\cos x\cos(60^o-x)\cos(60^o+x)=2\cos x\left[2\cos(60^o-x)\cos(60^o+x)\right]$

$\Rightarrow \quad =2\cos x\left[\cos(60^o-x+60^o+x)+\cos(60^o-x-60^o-x)\right]$

$\Rightarrow \quad =2\cos x\left[-\frac{1}{2}+\cos 2x\right] \quad \Rightarrow \quad =-\cos x+\left[2\cos x\cos 2x\right]$

$\Rightarrow \quad =-\cos x+\left[\cos 3x+\cos x\right] \quad \Rightarrow \quad =\cos 3x=\text{RHS}$.

Q08. We know that if $|z|=1 \Rightarrow |z|^2=1 \Rightarrow z\bar{z}=1 \Rightarrow \bar{z}=\frac{1}{z}$ ...(i)

Now in LHS we have : $\left|\frac{1}{z_1}+\frac{1}{z_2}+\frac{1}{z_3}+...+\frac{1}{z_n}\right|=|\bar{z}_1+\bar{z}_2+\bar{z}_3+...+\bar{z}_n|$ [Using (i)

$\Rightarrow \quad =|\overline{z_1+z_2+z_3+...+z_n}|$

$\Rightarrow \quad =|z_1+z_2+z_3+...+z_n|$ $[\because |z|=|\bar{z}|$

= RHS.

OR Let $z=x+iy$. $\therefore \left|\frac{z-3}{z+3}\right|=2 \quad \Rightarrow \left|\frac{x-3+iy}{x+3+iy}\right|=2$

$\Rightarrow \frac{|x-3+iy|}{|x+3+iy|}=2 \quad \Rightarrow \frac{\sqrt{(x-3)^2+y^2}}{\sqrt{(x+3)^2+y^2}}=2 \quad \Rightarrow x^2-6x+9+y^2=4\left(x^2+6x+9+y^2\right)$

$\Rightarrow 3x^2+3y^2+30x+27=0$, which represents equation of a circle.

Q09. $n\pi+\frac{3\pi}{4},\ n\pi+\tan^{-1}\left(\frac{1}{2}\right)$, where $n\in Z$

Q10. Let the two numbers be a and b. We have $G=\sqrt{ab} \Rightarrow G^2=ab$ ...(i)

Also $p=a+d,\ q=a+2d$ where $d=\frac{b-a}{3}$ ...(ii)

Consider RHS : $(2p-q)(2q-p)=(2a+2d-a-2d)(2a+4d-a-d)$

$\Rightarrow \quad =a(a+3d) \quad \Rightarrow \quad =ab=G^2=\text{RHS}$ [By (i) & (ii)

OR We have $a_n=(2n-1)(n+1)^2=2n^3+3n^2-1$.

$\therefore S_n=\sum a_n=\sum\left(2n^3+3n^2-1\right)=\frac{n}{2}(n^3+4n^2+4n-1)$.

Q12. More than or equal to 52 but less than 77

Q13. $\pm(1-4i)$

Q14. Ratio 3 : 2 externally. Point of intersection : (0, 4, 46)

OR Show that the opposite sides are equal (i.e., AB = CD, BC = DA) but diagonals are not equal (i.e., $AC\neq BD$).

Q15. $\frac{x^2}{36}+\frac{y^2}{20}=1$

Q16. P(neither total of 10 nor a doublet will appear) = 1 – P(either total of 10 or a doublet will appear) i.e., $= 1 - P(A \cup B) = \frac{28}{36}$

OR Let A : Anuradha qualifies, B : Radha qualifies,

We have P(A) = 0.05, P(B) = 0.10, $P(A \cap B) = 0.02$

(a) $P(\bar{A} \cap \bar{B}) = P(\overline{A \cup B}) = 1 - P(A \cup B)$ $\Rightarrow P(\bar{A} \cap \bar{B}) = 1 - [P(A) + P(B) - P(A \cap B)] = 0.87$

(b) P(at least one won't qualify) = 1 – P(both will qualify) = 1 – 0.02 = 0.98

(c) P(only one of them will qualify) = $[P(A) - P(A \cap B)] + [P(B) - P(A \cap B)] = 0.11$

Q18. (a) 32°F (b) 14°F (c) 100°C

Q19. $\sqrt{3}x + y - 2 = 0,\ \sqrt{3}x + y + 2 = 0$

Q20. $\angle A = 75^\circ, \angle B = 60^\circ, \angle C = 45^\circ$

Q21. $x^2 + y^2 + 6x + 2y - 90 = 0$

Q22. (i) $\frac{7!}{3!2!} - \frac{6!}{3!2!} = 360$ (ii) a. 504 b. 588

Q24. (i) $8mn(m^2 + n^2),\ 40\sqrt{6}$ (ii) –438

Q25. (a) $\frac{e^2 - 1}{2}$ (b) $\frac{2\sec x(\tan x - \sec x)}{\sec x + \tan x}$

Q26. (i) Highest variability is in marks of Chemistry and Lowest variability is in marks of Maths

(ii) $\sqrt{\frac{n^2 - 1}{12}}$.