Guess Question Paper

Class XI

TRIGONOMETERY, AP, GP, Special Series, Complex Number

Q(1). The expression $\frac{\cos 6x + 6\ \cos 4x + 15\ \cos 2x + 10}{\cos 5x + 5\ \cos 3x + 10\ \cos x}$ is equal to

Q(2). The value of $\left(1+\cos\frac{\pi}{8}\right)\left(1+\cos\frac{3\pi}{8}\right)\left(1+\cos\frac{5\pi}{8}\right)\left(1+\cos\frac{7\pi}{8}\right)$ is (3)

Q(3). The value of $\cos\frac{\pi}{15}\cos\frac{2\pi}{15}\cos\frac{3\pi}{15}\cos\frac{4\pi}{15}\cos\frac{5\pi}{15}\cos\frac{6\pi}{15}\cos\frac{7\pi}{15}$ is

Q(4). $\frac{\tan^2 2\theta - \tan^2\theta}{1-\tan^2 2\theta\tan^2\theta}$

Q(5). Prove that: $\frac{1}{\sin(x-a)\sin(x-b)} = \frac{\cot(x-a)-\cot(x-b)}{\sin(a-b)}$

Q(6). Prove that: $(\cos\alpha + \cos\beta)^2 + (\sin\alpha + \sin\beta)^2 = 4cos^2(\frac{\alpha-\beta}{2})$

Q(7). Prove that: $\cos A\ \cos 2A\ cos2^2A\ cos2^3A \ldots cos2^{n-1}A = \frac{sin2^nA}{2^n\sin A}$

Q(8). Prove that: $\sin\frac{\pi}{14}\sin\frac{3\pi}{14}\sin\frac{5\pi}{14}\sin\frac{7\pi}{14}\sin\frac{9\pi}{14}\sin\frac{11\pi}{14}\sin\frac{13\pi}{14} = \frac{1}{64}$

Q(9). Prove that: $\cot\frac{\pi}{24} = \sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$

Q(10). Prove that: $\sin 10°\sin 30°\sin 50°\sin 70° = \frac{1}{16}$

Q(11). Prove that: $\tan 20°\tan 40°\tan 80° = \tan 60°$

Q(12). If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$.

Q(13). If $\sin x + sin^2x = 1$, then write the value of $cos^{12}x + 3cos^{10}x + 3cos^8x + cos^6x$.

AP, GP & SPECIAL SERIES

Q(14). If the sum of n terms of an A.P. is $pn + qn^2$, where p and q are constants, find the common difference.

Q(15). Find the sum to n terms of the sequence given by $a_n = 5 - 6n$,

Q(16). If a, b, c, are in A.P., prove that $\frac{1}{\sqrt{b}+\sqrt{c}}, \frac{1}{\sqrt{c}+\sqrt{a}}, \frac{1}{\sqrt{a}+\sqrt{b}}$ are also in A.P.

Q(17). Find the sum to n term of the sequence $\left(x+\frac{1}{x}\right)^2, \left(x^2+\frac{1}{x^2}\right)^2, \left(x^3+\frac{1}{x^3}\right)^2, \ldots$

Q(18). Find the sum of the $0.7 + 0.77 + 0.777 + \cdots$ *to n terms*

Q(19). If S be the sum, P the product and R the sum of the reciprocals of n terms of G.P., prove that $\left(\frac{S}{R}\right)^n = P^2$

Q(20). n^{th} term of the series $2+4+7+11+\ldots\ldots$ will be

Q(21). Sum of n terms of series $\frac{1}{1.2}+\frac{1}{2.3}+\frac{1}{3.4}+\ldots\ldots+\frac{1}{n.(n+1)}$

Q(22). Prove that 1.2.3 + 2.3.4 + ___________ + n. (n+1).(n+2) = $\frac{n(n+1)(n+2)(n+3)}{4}$ for all n $\in N$.

Q(23). if the sum of two extreme numbers of an A.P. with four terms is 8 and product of remaining *two middle term is* 15, *then greatest number of the series will be*

Q(24). The sum of three numbers in G.P. is 56. If we subtract 1, 7, 21 from these numbers in that order, we obtain an arithmetic progression. Find the numbers.

Q(25). The sum of two numbers is 6 times their geometric mean, show that the numbers are in the ratio of $(3+2\sqrt{2}):(3-2\sqrt{2})$.

Q(26). Let a_n be the nth term of the G.P. of positive numbers. Let $\sum_{n=1}^{100} a_{2n} = a$ and $\sum_{n=1}^{100} a_{2n-1} = \beta$, such that $\alpha \neq \beta$. Prove that the common ratio of the G.P. is α/β. If $x = a + \frac{a}{r} + \frac{a}{r^2} + \cdots\infty, y = b - \frac{b}{r} + \frac{b}{r^2} - \cdots\infty$ and $z = c + \frac{c}{r} + \frac{c}{r^2} + \cdots\infty$, prove that $\frac{xy}{z} = \frac{ab}{c}$.

Q(27). If $x = \sum_{n=0}^{\infty} cos^{2n}\theta,\ y = \sum_{n=0}^{\infty} sin^{2n}\phi, z = \sum_{n=0}^{\infty} cos^{2n}\theta sin^{2n}\phi$, where $0 < \theta, \phi < \frac{\pi}{2}$ then prove that $xz + yz - z = xy$.

Q(28). If $a_1, a_2, a_3, \ldots, a_n$ are in A.P., where $a_i > 0$ for all i, show that

a. $\frac{1}{\sqrt{a_1}+\sqrt{a_2}} + \frac{1}{\sqrt{a_2}+\sqrt{a_3}} + \cdots + \frac{1}{\sqrt{a_{n-1}}+\sqrt{a_n}} = \frac{n-1}{\sqrt{a_1}+\sqrt{a_n}}$

Q(29). The ratio of the sum of n terms of two A.P.'s is (7n + 1): (4n + 27), Find the ratio of their mth terms.

Q(30). The ratio of the sums of m and n terms of an A.P. is $m^2:n^2$. show that the ratio of the mth and nth terms is (2m – 1):(2n – 1). (3)

Q(31). The interior angles of a polygon are in A.P. the smallest angle is 120° and the common difference is 5°. Find the number of sides of the polygon. (3)

Q(32). Find three numbers in G.P. whose sum is 13 and the sum of whose squares is 91. (3)

Q(33). Sum the series 3.8 + 6.11 + 9.14 + ……… to n terms. (3)

Q(34). If S_1, S_2, S_3 are the sums of first n natural numbers, their squares, their cubes respectively, show that $9S_2^2 = S_3(1 + 8S_1)$. (3)

Q(35). Find the sum to n terms of the series: 1 + 5 + 12 + 22 + 35 + …….. (3)

Q(36). Sum the following series to n terms: 5 + 7 + 13 + 31 + 85 …….. (3)

Q(37). .Find the sum to n terms of the series:

Q(38). $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots \ldots \ldots . + \frac{1}{n.(n+1)}$ (3)

COMPLEX NUMBER

Q(39). Find the square root of i.

Q(40). Prove that $\frac{(1+i)^n}{(1-i)^{n-2}} = 2\, i^{n-1}$.

Q(41). Convert $Z = \frac{1+7i}{(2-i)^2}$ *in the polar form.*

Q(42). If a = cos θ + i sin θ , Find value of $\frac{1+a}{1-a}$

Q(43). If (1+i) z = (1-i) z^{-}, then show that z= - i z^{-}

Q(44). Write the complex no. Z = $\frac{1-i}{\cos 60°+i\sin 60°}$ in polar form

Q(45). Find principal Argument of $\frac{(a^2+1)^2}{2a-i} = x + i\,y$, what is value of $x^2 + y^2$

Q(46). Show that $|z_1 + z_2 + z_3 + \cdots \ldots \ldots \ldots . z_n|$ = $\left|\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3} + \cdots \ldots \ldots \ldots \frac{1}{Z_n}\right|$ if $z_1 + z_2 + z_3 + \cdots \ldots \ldots \ldots . z_n$ are complex no.

Q(47). If α and β are different complex number with $|\beta|$ =1, Find $\left|\frac{\beta-\alpha}{1-\alpha\beta^{-}}\right|$