Chapter: - Sequence and Series

Q1. Find the sum to n- terms of the following series: - (i) 3+15+35+63+99+-------- **Ans**. $\frac{n}{3}\left(4n^2+6n-1\right)$

(ii)1+(1+2)+(1+2+3) +-------- **Ans.** $\frac{n(n+1)(n+2)}{6}$ (iii)(2X5)+(5X8) + (8X11) +-----------**Ans**. $n\left(3n^2+6n+1\right)$

(iv) 0.3+0.33+0.333 +---------- . **Ans.** $\frac{1}{3}\left[n-\frac{1}{9}\left\{1-(0.1)^n\right\}\right]$ (v) $1^2+3^2+5^2+7^2+9^2$ +-------- **Ans.** $\frac{n}{3}\left(4n^2-1\right)$

(vi) $\frac{1}{2x5}+\frac{1}{5x8}+\frac{1}{8x11}+---=\frac{n}{2(3n+2)}$ (vii) $1+\left(1+\frac{1}{3}\right)+\left(1+\frac{1}{3}+\frac{1}{3^2}\right)+---=\frac{n}{4}\left(6n-3+\frac{1}{3^{n-1}}\right)$

(viii) $1^2-2^2+3^2-4^2+5^2-6^2$+-------- **Ans.** $\pm\frac{n(n+1)}{2}$ (Answer is –when n is even and + when n is odd)

Q2. Find the sum to infinity in each of the following geometric progressions (GP): -

(i).$1+\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+----$ **Ans.** $\frac{3}{2}$

(ii).$1-\frac{1}{3}+\frac{1}{3^2}-\frac{1}{3^3}+----$ **Ans.** $\frac{3}{4}$

(iii) .$1+\frac{2}{3}+\frac{4}{9}+----$ **Ans.** 3

(iv).10-9+8.1-7.29+------- **Ans.** 5.263

(v).$\frac{1}{3}+\frac{1}{5^2}+\frac{1}{3^3}+\frac{1}{5^4}+\frac{1}{3^5}+\frac{1}{3^6}+----$ **Ans.** $\frac{5}{12}$

(vi).$5+\frac{20}{7}+\frac{80}{49}+----$ **Ans.** $\frac{35}{3}$

(vii).6+1.2+0.24+------- **Ans.** 7.5

(viii).$\frac{-5}{4}+\frac{5}{16}-\frac{5}{64}+----$ **Ans.** -1

(ix).$\frac{-3}{4}+\frac{3}{16}+\frac{-3}{64}+----$ **Ans.** $\frac{-3}{5}$

(x).0.3+0.18+0.108+------- **Ans** .0.75

(xi).$\left(\sqrt{2}+1\right)+1+\left(\sqrt{2}-1\right)+\left(\sqrt{2}-1\right)^2+----$ **Ans.** $\frac{4+3\sqrt{2}}{2}$

Q3. Solve the equation for x:-2+5+8+11+-------+x=345. **Ans.** 44

Q4 nth term of a sequence $\{a_n\}$ is given by $a_n=n^2(n-1)(n-2)$. Show that first two terms are zero and all other terms are positive.

Q5. A sequence is given by $a_n=(2-3n)$ prove that it is an AP, find its 5th term **Ans.** -13

Q6. If the 9th term of an AP is zero prove that 29th term is double the 19th term.

Q7. How many three digit number divisible by 7 .**Ans.** 128

Q8. In an AP $a_n=\frac{1}{m}$ and $a_m=\frac{1}{n}$ then show that $a_{mn}=1$

Q9.Show that the linear function in n i.e. f (n) = an +b where a and b are constant is an AP. Find AP **Ans.** (a+b), (2a+b), (3a+b), ---------------.

Q10.Find the sum of all natural nos. between 250 and 1000 which are exactly divisible by3 **Ans.** 136375

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Q11. If $a_1, a_2, - - - - - a_n$, are in an AP where $a_i > 0 \forall i$ Show that:-

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

Q12. The ratio of the sum of n terms of 2 AP's is (3n+4):(5n+6),find the ratio of their 5^{th} term
Ans. 31:51

Q13. Divide 22 into four parts forming of an AP such that product of the extremes is to the product of the means is 5:14 **Ans**. 1, 4,7,10 or 10,7,4,1

Q14. The digits of a positive integer, having three digits are in an AP and their sum is 15. The number obtained by reversing the digits is 594 less than the original number, find the number. **Ans**. 852

Q15. Find five nos. in an AP whose sum is 25 and ratio of the first to the last is 2:3 **Ans**. 4, $\frac{9}{2}$, 5, $\frac{11}{2}$,6,

Q16. Show that the product of n GM between two given numbers is equal to the n th power of the single GM between them

Q17. The sum of three number in GP is 56 If 1,7 and 21 are subtracted from the numbers respectively the resulting number form an AP , find numbers. **Ans**. 32, 16, 8, or 8, 16, 32

Q18. Prove that: - (i) $\left(3^{\frac{1}{2}}\right)\left(3^{\frac{1}{4}}\right)\left(3^{\frac{1}{8}}\right)------=3$ (ii) $\left(6^{\frac{1}{2}}\right)\left(6^{\frac{1}{4}}\right)\left(6^{\frac{1}{8}}\right)------=6$

Q19. Find the rational number having the following decimal expansion:- (i) $0.6\bar{8}$ (ii) $0.1\bar{5}$ (iii) $0.\overline{712}$ (iv) $3.5\bar{2}$ (v) $0.\overline{231}$ (vi) $0.3\overline{56}$ (vii) $0.\bar{3}$ **Ans**. (i) $\frac{31}{45}$ (ii) $\frac{114}{99}$ (iii) $\frac{712}{999}$ (iv) $\frac{317}{90}$ (v) $\frac{231}{999}$ (vi) $\frac{353}{990}$ (vii) $\frac{1}{3}$

Q20. The first term of a GP is 2 and the sum to infinity is 6. Find common ratio **Ans**. $\frac{2}{3}$.

Q21. The common ratio of a GP is $\frac{-4}{5}$ and the sum to infinity is $\frac{80}{9}$.Find the first term. **Ans**. 16

Q22. Find an infinite GP whose first term is 1 and each term is the sum of all the terms which follow it
Ans.1, $\frac{1}{2}, \frac{1}{4}$ ---------

Q23. The sum of first two terms of an infinite GP is 5 and each term is three times the sum of the succeeding terms .Find GP **Ans**.4,1, $\frac{1}{4}, \frac{1}{16}$ ---------

Q24. Let x=1+a+ a^2 + -------- and y=1+b+ b^2 + -------- where |a|<1 and |b|<1 prove that 1+ab+ a^2b^2 + --------= $\frac{xy}{x+y-1}$

Q25. If the sum of an infinite geometric series is 15 and the sum of the squares of three terms is 45. Find the series. **Ans** $5+\frac{10}{3}+\frac{20}{9}+----$

Q26. If the sum of an infinite GP is 57 and the sum of their cubes is9747. Find the GP.
Ans $19+\frac{38}{3}+\frac{76}{9}+----$

---**Best of Luck**--