Reg: FA21-BSE-133

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Course Title: Discrete Structures (CSC102)

Section: A

Assignment: 03

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::|——————[CLO-4]|::

Q No:-01

a) $\sum_{k=1}^{5} \sum_{m=6}^{9} 3(2k+7)$

$= \sum_{k=1}^{5} 3 \times 4 (2k+7)$

$= \sum_{k=1}^{5} 12(2k+7)$

$= 12\left[\sum_{k=1}^{5} 2k+7\right]$

$= 12\left((2(1)+7)+(2(2)+7)+(2(3)+7)+(2(4)+7)+(2(5)+7)\right)$

$= 12(9+11+13+15+17)$

$= 12 \times 65$

$= 780$

=)

$$\sum_{i=20}^{110} (2i + i^3)$$

$$= 2 \sum_{i=20}^{110} i + \sum_{i=20}^{110} i^3$$

$$\sum_{i=1}^{110} i = \sum_{i=1}^{19} i + \sum_{i=20}^{110} i$$

$$\sum_{i=20}^{110} i = \sum_{i=1}^{110} i - \sum_{i=1}^{19} i$$

$$\because \sum_{i=1}^{n} i \Rightarrow \frac{n(n+1)}{2}$$

putting above formula to given values:

$$= \frac{110(110+1)}{2} - \frac{19(19+1)}{2}$$

$$= \frac{110 \times 111}{2} - \frac{19 \times 20}{2}$$

$$= \frac{12,210}{2} - \frac{380}{2}$$

$$\not{2} \sum_{i=20}^{110} = \frac{11830}{\not{2}}$$

$$\sum_{i=20}^{110} = 11830$$

$$\sum_{i=20}^{110} i^3 = ?$$

$$\sum_{i=1}^{110} i^3 = \sum_{i=1}^{19} i^3 + \sum_{i=20}^{110} i^3$$

$$\because \sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4}$$

$$= \frac{(110)^2(110+1)^2}{4} - \frac{(19)^2(19+1)^2}{4}$$

$$= \frac{(110)^2(111)^2}{4} - \frac{(19)^2(20)^2}{4}$$

$$= \frac{12100 \times 12,321}{4} - \frac{361 \times 400}{4}$$

$$= \frac{149,084,100}{4} - \frac{144,400}{4}$$

$$= 37,234,925$$

$$\sum_{i=20}^{110} (2i+i^3) \Rightarrow 11830 + 37234925$$

$$= 37,246,755$$

QNo:-02

a) Consider Sequence:

$$-2, 1, -1/2, 1/4, \ldots$$

30^{th} term = ?

$$a_1 = -2$$

$$r = -\frac{1}{2}$$

Geometric (Arithmetic sequence)

$$a_n = a_1 r^{n-1}$$

$$a_{30} = (-2)\left(-\frac{1}{2}\right)^{30-1}$$

$$= (-2)\left(-\frac{1}{2}\right)^{29}$$

$$= (+2)\left(+\frac{1}{536,870,912}\right) \Rightarrow \frac{2}{536,870,912}$$

$$\boxed{a_{30} = \frac{1}{536,870,912}}$$

$-\frac{1}{34359738368}$ is which term of sequence?

Given that

$a_1 = -2$, $r = -\frac{1}{2}$

$a_{37} = (-2)(-\frac{1}{2})^{37-1}$

$= (-2)(-\frac{1}{2})^{36}$

$$\boxed{a_{37} = -\frac{1}{34359738368}}$$

Its 37th term of sequence.

Q No:-03: Find explicit & recursive formula:

a) $-31, -14, 3, 20, 37, 54, \ldots$

$a_1 = -31$ (explicit formula)

$d = 17$

$a_n = a_1 + (n-1)d$

$= -31 + (n-1)17$

$= -31 + 17n - 17$

$$\boxed{a_n = 17n - 48}$$ (Recursive formula)

Basic step:

$a_1 = -31$

Recursive step:

$$\boxed{a_{n+1} = a_n + 17}$$

$a_{2+1} = a_2 + 17$

$a_3 = -14 + 17 = 3$

$\boxed{a_3 = 3}$

(5)

3) b) $\frac{1}{5}, \frac{1}{25}, \frac{1}{125}, \frac{1}{625}, \ldots\ldots$

– (Explicit formula) –

$a_1 = 1/5$

$r = \frac{1}{5}$

$a_n = a_1 r^{n-1}$

$a_n = \left(\frac{1}{5}\right)\left(\frac{1}{5}\right)^{n-1}$

$a_n = \left(\frac{1}{5}\right)^{n-r+r}$

$\boxed{a_n = \left(\frac{1}{5}\right)^n}$ ← explicit formula

– (Recursive formula) –

Basic step:

$a_1 = 1/5$

Recursive step:

$\boxed{a_{n+1} = \frac{1}{5} \times a_n}$

$a_{n+1} = a_1 \times \frac{1}{5}$

$a_2 = \frac{1}{5} \times \frac{1}{5}$

$\boxed{a_2 = \frac{1}{25}}$

hence proved!

The End ∴