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SEQUENCES AND Series Sol

1) Put $n=1,2,3$ in options

Option B $\Rightarrow 1 + (-1)^1 \Rightarrow 1 - 1 = 0$

$2 + (-1)^2 \Rightarrow 3$

$3 + (-1)^3 \Rightarrow 2$

2) C

3) Check fibonacci Sequence } - theory

4) Check triangular Sequence

$$\frac{n(n+1)}{2} \Rightarrow \frac{6(7)}{2}$$

5) $a_{n+1} = a_n - n$ and $a_1 = 1$

Put $n=1$

$a_2 = a_1 - 1$

$a_3 = a_2 - 2$

and so on

$a_2 \Rightarrow 1 - 1 = 0$

$a_3 \Rightarrow 0 - 2 \Rightarrow -2$

1, 0, -2 ...

6) D

7) C

8) $a_5 - a_3 = 2d \rightarrow 5 - 3 = 2 \rightarrow$ So two times d

9) $a_5 - a_2 = 3d$ and $a_7 - a_4 = 3d$, $a_5 - a_2 = 3d$
So All and $a_{11} - a_8 = 3d$

10) $\frac{1}{b} - \frac{1}{a} = \frac{1}{c} - \frac{1}{b}$

$$\frac{a-b}{ab} = \frac{b-c}{bc} = d \rightarrow \text{Common } d$$

11) $x - (-x^2) = x^2 + 1 - x$

$$x + x^2 = x^2 + 1 - x$$

$$\Rightarrow 2x = 1 \rightarrow x = \frac{1}{2}$$

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12) $a_4 - a_1 = 3d \rightarrow \frac{a_4 - a_1}{3} = d$

13) C

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

$$a_n = 2 + (n-1)(3)$$

$$a_{11} = 2 + (11-1)(3) =$$

15) $a_5 = a_1 + 4d \rightarrow 13 = a_1 + 4d$
 $49 = a_1 + 16d$

find a_1 and d

$$\text{then } a_{13} = a_1 + 12d$$

16) put $n=1, 2, 3$ in options

$$-- \frac{(3(1)+1)^2}{3^2}, \frac{(3(2)+1)^2}{3^2}, \frac{(3(3)+1)^2}{3^2}$$

$$\Rightarrow \frac{16}{9}, \frac{7^2}{3^2}, \frac{(10)^2}{(3)^3}$$

$$\downarrow$$
$$\frac{(4)^2}{(3)^3}$$

option A

17) <

18) A.M. $\frac{3\sqrt{2} + \sqrt{2}}{2} \Rightarrow \frac{4\sqrt{2}}{2} \Rightarrow 2\sqrt{2}$

three A.M and two terms are $\sqrt{2}$ and $3\sqrt{2}$ total 5 terms

so $3\sqrt{2} = \sqrt{2} + (5-1)(d)$

$$d = \frac{3\sqrt{2} - \sqrt{2}}{4} \Rightarrow \frac{\sqrt{2}}{2} \Rightarrow \frac{1}{\sqrt{2}}$$

$$A_1 = a_1 + d$$

$$A_2 = a_1 + 2d \Rightarrow \sqrt{2} + 2\left(\frac{1}{\sqrt{2}}\right) \Rightarrow \frac{2+2}{\sqrt{2}} \Rightarrow \frac{4}{\sqrt{2}}$$

19) Put options for n

$$n=1$$

$$\frac{a^1 + b^1}{a^{1-1} + b^{1-1}} \Rightarrow \frac{a+b}{1+1} \Rightarrow \frac{a+1}{2} \checkmark$$

20) Find one A.M then multiply by 7

$$\Rightarrow \frac{2+12}{2} \Rightarrow 7 \rightarrow 7(7) = 49$$

$$21) S_n = \frac{n}{2} [a_1 + a_n] \Rightarrow \frac{50}{2} [2 + 100] \Rightarrow 25(102)$$

$$\text{or } S_n = \frac{n}{2} [2a_1 + (n-1)d]$$

$$100 = 2 + (n-1)(2) \rightarrow \text{to find } n$$

$$22) 1+3+5 \Rightarrow 9$$

put $n=3$ in option

$$(3)^2 = 9 \checkmark$$

$$(3+1)^2 = 16 \times$$

$$\text{or } (3+3)^2 = 36 \times$$

$$23) 1^2 + 2^2 \Rightarrow 5$$

put $n=2$ in options

$$\frac{2(3)}{2} \Rightarrow 3 \times$$

$$2^2 + 2 \Rightarrow 6 \times$$

$$\frac{2(3)(5)}{6} \Rightarrow 5 \checkmark \text{ so } C$$

$$24) C$$

$$25) d = -6 - (-9) \Rightarrow 3$$

$$66 = \frac{n}{2} [2(-9) + (n-1)(3)] \text{ find } n$$

$$27) a_n = S_n - S_{n-1}$$

$$a_5 = S_5 - S_4$$

$$a_5 = (5)^2 - (4)^2 = 9$$

28) B

28) A

$$29) (1+2) + (1+2+2^2)$$

$\Rightarrow 3 + 7 = 10$ we added 2 terms to get 10
put $n=2$ in options check which one gives 10

$$30) \frac{2a+2}{2}, \frac{2b+2}{2}, \frac{2c+2}{2}$$

$$\Rightarrow \frac{2(a+1)}{2}, \frac{2(b+1)}{2}, \frac{2(c+1)}{2}$$

$$\Rightarrow a+1, b+1, c+1$$

if a, b, c in A.P

~~the~~

then $a+k, b+k, c+k$ also in A.P So Also A.P

$$31) S_{3n} = 3(S_{2n} - S_n) \rightarrow \text{Book me has}$$

$$S_{2n} = 3S_n$$

$$S_{3n} = 3(3S_n - S_n) \Rightarrow 3(2S_n) = 6S_n$$

$$32) 2+4+6 \dots 100$$

$$S_n = \frac{50}{2} [a_1 + a_n] \Rightarrow 25(2+100)$$

$$5+10+15 \dots 100$$

$$\Rightarrow 25(102) + 10(105)$$

$$\Rightarrow S_n = \frac{20}{2} [5+100] \Rightarrow 10(105)$$

but LCM of 2 and 5 is 10

so sum of numbers divisible by 10 is counted twice

Eg 2, 4, 6, 8, 10, 12

and 5, 10, 15

10 Dono ana arha

So sub sum of 10 up till 100

$$\Phi S_n = \frac{10}{2} [10+100] \Rightarrow 5(110)$$

$$\text{So Ans } 25(102) + 10(105) - 5(110)$$

$$33) a-d, a, a+d = 9 \Rightarrow a-d+a+a+d=9 \Rightarrow 3a=9 \Rightarrow a=3$$

$$(a-d)^2, a^2, (a+d)^2 = 30$$

$$(3-d)^2 + (3)^2 + (3+d)^2 = 30 \Rightarrow \text{Solve find } \frac{a}{d}$$

$$34) 13$$

$$35) 13$$

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36) $\rightarrow B$

37) $\rightarrow \frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ C.P will be $\frac{1}{a^n} \Rightarrow a^{-n}$

38) B

39) $\frac{x}{x-7} = \frac{x+8}{x} \rightarrow \text{Solve}$

40) $\frac{8}{27} = a_1 (r)^3, \frac{-64}{729} = a_1 (r)^6$

Divide both
Eqn

41) B

42) ~~$a = a_1 r^6$~~
 ~~$b = a_1 r^8$~~
 ~~$c = a_1 r^9$~~

$$42) a = 9i v^6$$

$$b = 9i v^8$$

$$c = 9i v^9$$

$$b^3 = a c^2$$

$$(9i v^8)^3 = 9i v^6 (9i v^9)^2$$

$$9i^3 v^{24} = 9i^3 v^{24} \checkmark$$

$$43) A \rightarrow 4, 16 \text{ both true}$$

$$44) B$$

$$45) \sqrt{4(-16)} \Rightarrow \sqrt{-64} \Rightarrow 8i$$

$$46) \text{ Back solve } n$$

whichever gives $\sqrt{96}$ is Ans

$$47) |r| > 1 \text{ so } A \text{ Check book}$$

$$48) S_n = \frac{a(2^n - 1)}{2 - 1} \rightarrow 64 = \frac{2(2^n - 1)}{2 - 1}$$

$$32 = 2^n - 1$$

$$33 = 2^n$$

$$2^5 = 2^n \Rightarrow n - 1 = 5 \Rightarrow n = 6$$

$$\Rightarrow 2^7 - 1 \Rightarrow 128 - 1$$

$$49) C$$

$$50) |r| = \frac{1}{2} \Rightarrow \frac{1}{1 - \frac{1}{2}} \Rightarrow 2$$

$$51) \frac{-\frac{1}{2}}{2} \Rightarrow -\frac{1}{4} \Rightarrow r \Rightarrow |r| = \frac{1}{4} \quad |r| < 1$$

$$\text{So } S_n = \frac{a}{1-r} \Rightarrow \frac{2}{1 - (-\frac{1}{4})} \Rightarrow \frac{2}{1 + \frac{1}{4}} \Rightarrow \frac{8}{5}$$

52) $\rightarrow$ Short Cut Google or Q Series

$$0.1 + 0.01 \text{ —}$$

$$r = \frac{0.01}{0.1} \Rightarrow 0.1$$

$$S_n = \frac{a_1}{1-r} \Rightarrow \frac{0.1}{1-0.1} \Rightarrow \frac{0.1}{0.9} \Rightarrow \frac{1}{9}$$

52) $\frac{x}{y} = 0.\overline{3} \Rightarrow 0.3333 \text{ —}$

$$0.\overline{3} = 0.3 + 0.03 + 0.003 \text{ —}$$

$$a_1 = 0.3$$

$$r = \frac{0.03}{0.3} \Rightarrow \frac{0.3}{3} \Rightarrow \frac{1}{10} \Rightarrow 0.1$$

$$S_n = \frac{a_1}{1-r} \Rightarrow \frac{0.3}{1-0.1} \Rightarrow \frac{0.3}{0.9} \Rightarrow \frac{3}{9} \Rightarrow \frac{1}{3} \Rightarrow x \quad \frac{1+3}{2} \Rightarrow 2$$

54) $y = \frac{a_1}{1-r} \Rightarrow y(1-r) = x$
 $y - yr = x$
 $yr = y - x$

$$S_n = \frac{a_1}{1-r} \Rightarrow r = \frac{x}{1-x} \quad \Rightarrow \quad 4 - 4r = 21$$

$$r = 1 - \frac{x}{4}$$

$$|x| < 1$$

$$\text{so } \left| 1 - \frac{x}{4} \right| < 1 \Rightarrow |x| < 4 \rightarrow -4 < x < 4$$

$$\text{so } -1 < 1 - \frac{x}{4} < 1$$

$$-4 < 4 - x < 4$$

$$-8 < -x < 0$$

$$8 > x > 0 \rightarrow 0 < x < 8$$

$$55) 2^{\frac{1}{2}} \cdot (2^2)^{\frac{1}{8}} \cdot (2^3)^{\frac{1}{4}} =$$

$$2^{\frac{1}{2}} \cdot 2^{\frac{1}{4}} \cdot 2^{\frac{3}{4}}$$

$$2^{\left(\frac{1}{2} + \frac{1}{4} + \frac{3}{4}\right)} \rightarrow \text{G.P. Lagao}$$

$$S_n = \frac{1}{1 - \frac{1}{2}} \Rightarrow 1 \quad \text{so } 2 \Rightarrow 2$$

$$56) S_n = \frac{a_1(r^n - 1)}{r - 1} \Rightarrow 2 \frac{(r^{n/2} - 1)}{2 - 1} \Rightarrow 2 \frac{(2^{n/2} - 1)}{n/2 + 1}$$

$$\Rightarrow 2 - 2$$

$$\Rightarrow 2^{\frac{n+2}{2}} - 2 \checkmark$$

57) $B \rightarrow$ Oscillating $1/r$ r is $-1, 1, -1, 1$ —

58) Any Series Not Convergent is Divergent

59) $2 \cdot 23$

$$\Rightarrow 2 + 0.23$$

$$\Rightarrow 2 + 0.23 + 0.0023 + 0.000023 \text{ —}$$

$$2 + \frac{23}{99} \text{ — solve}$$

60) Check shortcut on google or G Series

61) a_1, a_2, a_3 —

$$a_1 = 2(a_2 + a_3 \text{ —})$$

Now

$$a, ar, ar^2 \text{ —}$$

a is a_1

and ar is a_1 for Second Series

$$a_1 = 2 \left(\frac{a_1}{1-r} \right) \Rightarrow a_1 = \frac{2(ar)}{1-r}$$

$$\Rightarrow 1-r=2r$$

Since a_1 is twice Sum of Series after it so

$$a = 2(ar + ar^2 \text{ —})$$

$$a = 2 \left(\frac{ar}{1-r} \right)$$

$$\Rightarrow 1-r=2r$$

$$r = \frac{1}{3} \checkmark$$

62) Product of n G.M b/w a and $\frac{1}{a}$ is 1 $\rightarrow$ A

63) Find one G.M then raise to power 4

$$\left(\sqrt[4]{729(3)} \right)^4$$

64) $2+2+2 \dots n$ or use short cut

$$\Rightarrow 2n$$

$$2+2+2 \Rightarrow 6$$

Put $n=3$ in option

$$\text{option A} = 2n \Rightarrow 2(3) = 6$$

$$65) y = \frac{a_1}{1-r}$$

$$y = \frac{1}{1-2x}$$

$$\Rightarrow y - 2xy = 1$$

$$2xy = y - 1$$

$$x = \frac{y-1}{2y}$$

66) 1, 3, 5 if you take reciprocal its A.P
so original H.P

67) H.P should be asked not G.P

Ans D

~~Since~~ since Aik term 0 is and $\frac{1}{0}$ ~~is~~ undefined

68) Find ~~the~~ 7th term in A.P then reciprocal

69) <

70) A

71) A

$$72) G = \sqrt{AH} \Rightarrow \sqrt{\frac{32}{5}(10)} \Rightarrow \sqrt{32 \cdot 2} \Rightarrow \sqrt{64} = 8$$

73) Back solve

$$74) \frac{1}{2} + \frac{1}{3} + \frac{1}{4} - \left[\frac{1}{3} + \frac{1}{4} + \frac{1}{5} - \frac{1}{10} \right]$$

$$\frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} - \frac{1}{10} - \left[\frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} - \frac{1}{10} \right]$$

$\Rightarrow$ Sab cancel hojaya $\frac{1}{2}$ rah jaye

$$75) \frac{n(n+1)(2n+1)}{6} \text{ put } n=10$$

76) repeated -> Google or Ignore

$$S_n = \frac{n!}{1-x} \Rightarrow \frac{1}{1-(x-1)} \Rightarrow \frac{1}{1-x+1} \Rightarrow \frac{1}{2-x}$$

$$x = x-1 \Rightarrow |x| < 1$$

$$|x-1| < 1$$

$$-1 < x-1 < 1$$

$$0 < x < 2$$

76) C

77) put $n=1, 2, 3$ in options check which Series is oscillating or which series ~~is~~ is not converging wahi Ans

78) C

79) $a_n = a_{n-1} + 2$

put $n=2$

$$a_2 = a_1 + 2 \Rightarrow 3 + 2 = 5$$

$$a_3 = a_2 + 2 \Rightarrow 7$$

so $3, 5, 7, 9$ —

$$a_{50} = 3 + (n-1)(2)$$

$$3 + (49)(2)$$

$$\Rightarrow 101$$

80) ~~check~~ khud krlo

81) $a_{13} = a_1 r^{12}$

$$1 = a_1 r^{12}$$

$$\text{and } \frac{243}{32} = a_1 r^{17}$$

Divide both Eqn

82) $2\left(\frac{1}{x}\right)\left(\frac{1}{y}\right)$

→ solve

$$\frac{1}{x} + \frac{1}{y}$$

83) Check shortcut on Google $0.\overline{318}$

$$84) \frac{a+b + \sqrt{ab}}{2}$$

$$\Rightarrow \frac{a+b+2\sqrt{ab}}{2} \Rightarrow \frac{(\sqrt{a}+\sqrt{b})^2}{2}$$

$$85) < \text{ since } |r| < 1$$

$$86) \frac{k(k+1)}{2} = 36 \text{ or } \frac{n(n+1)}{2} = 36$$

$$87) S(-1) = 1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} -$$

$$1 + 2 + 3 + 4 -$$

$$\Rightarrow \frac{n(n+1)}{2}$$

88)

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