## HOME WORK –1

**1.** The first term of an A.P. of consecutive integer is $p^2 + 1$. The sum of $(2p + 1)$ terms of this series can be expressed as

(A) $(p + 1)^2$ (B) $(2p + 1)(p + 1)^2$ (C) $(p + 1)^3$ (D) $p^3 + (p + 1)^3$

**2.** If $a_1, a_2, a_3, \ldots \ldots$ are in A.P. such that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$, then $a_1 + a_2 + a_3 + \cdots .. + a_{23} + a_{24}$ is equal to

(A) 909 (B) 75 (C) 750 (D) 900

**3.** The sum of the series $\frac{1}{\log_2 4} + \frac{1}{\log_4 4} + \frac{1}{\log_8 4} + \cdots \ldots . + \frac{1}{\log_{2^n} 4}$ is

(A) $\frac{1}{2}n(n + 1)$ (B) $\frac{1}{12}n(n + 1)(2n + 1)$

(C) $\frac{1}{n(n+1)}$ (D) $\frac{1}{4}n(n + 1)$

**4.** If a and b are $p^{th}$ and $q^{th}$ terms of an AP, then the sum of its $(p + q)$ terms is

(A) $\frac{p+q}{2}\left[a - b + \frac{a+b}{p-q}\right]$ (B) $\frac{p+q}{2}\left[a + b + \frac{a-b}{p-q}\right]$

(C) $\frac{p-q}{2}\left[a + b + \frac{a+b}{p+q}\right]$ (D) $\frac{p-q}{2}[a + b]$

**5.** The sum of integers from 1 to 100 that are divisible by 2 or 5 but not by both is

(A) 2550 (B) 1050 (C) 3050 (D) 2050

**6.** Consider an A.P. with first term 'a' and the common difference 'd'. Let $S_k$ denote the sum of its first K terms. If $\frac{S_{kx}}{S_x}$ is independent of x, then

(A) $a = d/2$ (B) $a = d$ (C) $a = 2\,d$ (D) $a = d/4$

**7.** The common difference d of the A.P. in which $T_7 = 9$ and $T_1 T_2 T_7$ is least is

(A) $\frac{33}{2}$ (B) $\frac{5}{4}$ (C) $\frac{33}{20}$ (D) $\frac{33}{10}$

**8.** If 1,2,3 ... are first terms; 1,3,5 .... are common differences and $S_1, S_2, S_3$ ... are sums of n terms of given p AP 's; then $S_1 + S_2 + S_3 + \cdots + S_p$ is equal to

(A) $\frac{np(np+1)}{2}$ (B) $\frac{n(np+1)}{2}$ (C) $\frac{np(p+1)}{2}$ (D) $\frac{np(np-1)}{2}$

**9.** If $a_1, a_2 \ldots a_n$ are in A.P. with common difference $d \neq 0$, then the sum of the series

(sind) $[\text{coseca}_1\text{coseca}_2 + \text{coseca}_2\text{coseca}_3 + \cdots .. + \text{coseca}_{n-1}\text{coseca}_n]$

(A) sec $a_1$ − sec $a_n$ (B) cosec $a_1$ − cosec $a_n$

(C) cot $a_1$ − cot $a_n$ (D) tan $a_1$ − tan $a_n$

**10.** The third term of an A.P. is 18 , and the seventh term is 30 ; find the sum of 17 terms.

**11.** Find the number of integers between 100 & 1000 that are

(i) divisible by 7

(ii) not divisible by 7

**12.** Find the sum of all those integers between 100 and 800 each of which on division by 16 leaves the remainder 7 .

**13.** The sum of three numbers in A.P. is 27, and their product is 504 , find them.

**14.** If a, b, c are in A.P., then show that

(i) $a^2(b+c), b^2(c+a), c^2(a+b)$ are also in A.P.

(ii) $b+c-a, c+a-b, a+b-c$ are in A.P.

**15.** In an A.P. of which ' a ' is the $1^{st}$ term, if the sum of the $1^{st}$ ' p ' terms is equal to zero, show that the sum of the next ' q ' terms is $\frac{-(a)(p+q)q}{p-1}$.

**16.** If the $p^{th}$ , $q^{th}$ and $r^{th}$ terms of an A.P. are a, b, c respectively, show that $(q-r)a+(r-p)b+(p-q)c=0$.

**17.** A person is to count 4500 currency notes. Let $a_n$ denote the number of notes he counts in the $n^{th}$ minute. If $a_1=a_2=\cdots=a_{10}=150$ and $a_{10}, a_{11}$ ... are in an AP with common diference -2 , then the time taken by him to count all notes is - **[AIEEE 2010]**

(A) 24 minutes (B) 34 minutes

(C) 125 minutes (D) 135 minutes

**18.** If 100 times the $100^{th}$ term of an AP with non zero common difference equals the 50 times its $50^{th}$ term, then the $150^{th}$ term of this AP is: **[AIEEE 2012]**

(A) 150 (B) zero (C) -150 (D) 150 times its $50^{th}$ term

**19.** Let α and β be the roots of equation $px^2+qx+r=0, p\neq 0$. If p, q, r are in A.P. and $\frac{1}{\alpha}+\frac{1}{\beta}=4$, then the value of $|\alpha-\beta|$ is: **[JEE Main 2014]**

(A) $\frac{\sqrt{61}}{9}$ (B) $\frac{2\sqrt{17}}{9}$ (C) $\frac{\sqrt{34}}{9}$ (D) $\frac{2\sqrt{13}}{9}$

**20.** Let $a_1, a_2, a_3, \ldots, a_{49}$ be in A.P. such that $\sum_{k=0}^{12} a_{4k+1}=416$ and $a_9+a_{43}=66$. If $a_1^2+a_2^2+\cdots\ldots a_{17}^2=140m$, then m equal to : **[JEE Main2018]**

(A) 33 (B) 66 (C) 68 (D) 34

**21.** If the sum of first n terms of an A.P. is $cn^2$, then the sum of squares of these n terms is **[JEE 2009, 3]**

(A) $\frac{n(4n^2-1)c^2}{6}$ (B) $\frac{n(4n^2+1)c^2}{3}$ (C) $\frac{n(4n^2-1)c^2}{3}$ (D) $\frac{n(4n^2+1)c^2}{6}$

**22.** Let $a_1, a_2, a_3, \ldots, a_{11}$ be real numbers satisfying $a_1=15$ , $27-2a_2>0$ and $a_k=2a_{k-1}-a_{k-2}$ for $k=3,4,\ldots,11$. If $\frac{a_1^2+a_2^2+\cdots+a_{11}^2}{11}=90$, then the value of $\frac{a_1+a_2+\cdots+a_{11}}{11}$ is equal to **[JEE 2010]**

**23.** Let $a_1, a_2, a_3, \ldots, a_{100}$ be an arithmetic progression with $a_1 = 3$ and $S_p = \sum_{i=1}^{p} a_i, 1 \leq p \leq 100$. For any integer n with $1 \leq n \leq 20$, let $m = 5n$. If $\frac{S_m}{S_n}$ does not depend on n, then $a_2$ is **[JEE 2011]**

**24.** Suppose that all the terms of an arithmetic progression (A.P.) are natural numbers. If the ratio of the sum of the first seven terms to the sum of first eleven terms is 6: 11 and the seventh term lies in between 130 and 140 , then the common difference of this A.P. is. **[JEE Adv. 2015]**

**25.** Let X be the set consisting of the first 2018 terms of the arithmetic progression 1,6,11, ... and Y be the set consisting of the first 2018 terms of the arithmetic progression 9,16,23, Then, the number of elements in the set X U Y is_____.

**26.** Let $l_1, l_2, \ldots, l_{100}$ be consecutive terms of an arithmetic progression with common difference $d_1$ and let $w_1, w_2 \ldots, w_{100}$ be consecutive terms of another arithmetic progression with common difference $d_2$, where $d_1\, d_2 = 10$. For each $i = 1, 2, \ldots, 100$, let $R_i$ be a rectangle with length $l_i$ width $w_i$ and area $A_i$. If $A_{51} - A_{50} = 1000$, then the value of $A_{100} - A_{90}$ is **[JEE Adv. 2022]**

**27.** Let $a_1, a_2, a_3, \ldots$ be an arithmetic progression with $a_1 = 7$ and common difference 8 . Let $T_1, T_2, T_3, \cdots$ be such that $T_1 = 3$ and $T_{n+1} - T_n = a_n$ for $n \geq 1$. Then, which of the following is/are TRUE ? **[JEE Adv. 2022]**

(A) $T_{20} = 1604$

(B) $\sum_{k=1}^{20} T_k = 10510$

(C) $T_{30} = 3454$

(D) $\sum_{k=1}^{3a} T_k = 35610$

## ANSWER KEY

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1.** | (D) | **2.** | (D) | **3.** | (D) | **4.** | (B) | **5.** | (C) | **6.** | (A) | **7.** | (C) |
| **8.** | (A) | **9.** | (C) | **10.** | 612 | **11.** | **(i)** 128 | | **(ii)** 771 | | | | |
| **12.** | 19668 | | | **13.** | 4 , 9, 14 OR 14, 9, 4 | | | | | **17.** | (B) | **18.** | (B) |
| **19.** | (D) | **20.** | (D) | **21.** | (C) | **22.** | 0 | **23.** | 9 | **24.** | 9 | **25.** | 3748 |
| **26.** | 18900 | | | **27.** | (BC) | | | | | | | | |