CHAPTER 05 ARITHMETIC PROGRESSION

SUBJECT: MATHEMATICS	**MAX. MARKS : 40**
CLASS : X	**DURATION : 1½ hrs**

General Instructions:
(i).   **All** questions are compulsory.
(ii).   This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii).   **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv).   There is no overall choice.
(v).   Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. In an AP, if a = 3.5, d = 0, n = 101, then a_n will be
    (a) 0   (b) 3.5   (c) 103.5   (d) 104.5

2. If p – 1, p + 3, 3p – 1 are in AP, then p is equal to _____.
    (a) 3   (b) 4   (c) 2   (d) none of these

3. In an AP, if d = –2, n = 5 and a_n = 0, the value of a is
    (a) 10   (b) 5   (c) –8   (d) 8

4. If the common difference of an AP is 3, then $a_{20} - a_{15}$ is
    (a) 5   (b) 3   (c) 15   (d) 20

5. The next term of the AP $\sqrt{18}, \sqrt{50}, \sqrt{98},.....$ is
    (a) $\sqrt{146}$ (b) $\sqrt{128}$ (c) $\sqrt{162}$ (d) $\sqrt{200}$

6. The common difference of the AP $\dfrac{1}{p}, \dfrac{1-p}{p}, \dfrac{1-2p}{p},.... ....$ is
    (a) p   (b) – p   (c) –1   (d) 1

7. An AP consists of 31 terms. If its 16th term is m, then sum of all the terms of this AP is
    (a) 16 m   (b) 47 m   (c) 31 m   (d) 52 m

8. If the sum of first n terms of an AP is $An + Bn^2$ where A and B are constants, the common difference of AP will be
    (a) A + B   (b) A – B   (c) 2A   (d) 2B

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** The sum of series with the nth term a_n = (9 – 5n) is 220 when no. of terms n = 6

    Reason (R): Sum of first n terms in an A.P. is given by the formula: $S_n = \dfrac{n}{2}[2a + (n-1)d]$

10. Assertion (A): The value of n, if $a = 10$, $d = 5$, $a_n = 95$ is 20

Reason (R): The formula of general term a_n is $a_n = a + (n - 1)d$.

SECTION – B
Questions 11 to 14 carry 2 marks each.

11. Determine k so that $4k + 8$, $2k^2 + 3k + 6$ and $3k^2 + 4k + 4$ are three consecutive terms of an AP.

12. In an AP, the 24th term is twice the 10th term. Prove that the 36th term is twice the 16th term.

13. Find 10th term from end of the AP 4, 9, 14, ... , 254.

14. If the sum of first n terms of an AP is given by $S_n = 3n^2 + 2n$, find the nth term of the AP.

SECTION – C
Questions 15 to 17 carry 3 marks each.

15. Find the value of the middle term of the following AP: –6, –2, 2, ..., 58.

16. Which term of the progression $19, 18\frac{1}{5}, 17\frac{2}{5}, \ldots\ldots$ is the first negative term.

17. If the pth, qth, rth terms of an AP be x, y, z respectively, show that $x(q – r) + y(r – p) + z(p – q) = 0$.

SECTION – D
Questions 18 carry 5 marks.

18. If S_1, S_2, S_3 are the sum of n terms of three APs, the first term of each being unity and the respective common difference being 1, 2, 3; prove that $S_1 + S_3 = 2S_2$.

SECTION – E (Case Study Based Questions)
Questions 19 to 20 carry 4 marks each.

19. Aditya is a fitness freak and great athlete. He always wants to make his nation proud by winning medals and prizes in the athletic activities.

An upcoming activity for athletes was going to be organised by Railways. Aditya wants to participate in 200 m race. He can currently run that distance in 51 seconds. But he wants to increase his speed, so to do it in 31 seconds. With each day of practice, it takes him 2 seconds less.

(i) He wants to makes his best time as 31 sec. In how many days will be able to achieve his target? (2)

(ii) What will be the difference between the time taken on 5th day and 7th day. (2)

OR

(ii) Which term of the arithmetic progression 3, 15, 27, 39 .... will be 120 more than its 21st term? (2)

20. In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year.

Based on the above information answer the following questions.

(i) Find the production in the 1st year. (1)

(ii) Find the production in the 12th year. (1)

(iii) Find the total production in first 10 years. (2)

OR

(iii) In how many years will the total production reach 31200 cars? (2)

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