Instructions for Solving the DPP (Daily Practice Problems)

1. Purpose of the DPP

- This DPP is designed to strengthen concept clarity for both **JEE Main** and **JEE Advanced**.
- Problems are arranged in increasing order of difficulty:
  - **Level–1**: JEE Main oriented
  - **Level–2**: Mixed Main + Advanced
  - **Level–3**: JEE Advanced oriented

2. How to Attempt the DPP

1. Read the theory from your notes before attempting the problems.
2. Do not jump between questions; solve sequentially unless instructed otherwise.
3. For each question, write:
   - Key concept involved
   - Formula used
   - Corrected approach if you made an error
4. Maintain a separate **DPP Mistake Notebook**.

3. Recommended Time Allocation

- Total time per DPP: **45–60 minutes**
- Per-question timing:
  - Single Correct / Objective: **1–2 minutes**
  - Numerical Value: **2–3 minutes**
  - Integer Type: **3–4 minutes**
  - Advanced Multi-Correct: **4–6 minutes**
  - Paragraph Type: **6–8 minutes**
- Mark questions exceeding time with a star (*) and revisit after finishing the DPP.

4. Best Practices for Scoring Higher

- Focus on accuracy first, then speed.
- Re-check algebraic and calculation steps.
- Solve Advanced-level problems only after mastering Main-level basics.
- Revise solved DPPs weekly and track repeating mistakes.
- Maintain short notes for formulas and special results.
- Compare your solution approach with teacher/official solutions.
- Build exam temperament by solving at least one DPP daily.

5. Evaluation Guidelines

- Use JEE Main scoring: **+4 / −1**.
- Apply partial marking for JEE Advanced multi-correct patterns.
- Maintain a cumulative performance record.

6. Weekly Review Checklist

- Reattempt unsolved/incorrect questions from last 5–7 DPPs.
- Update formula sheet and mistake notebook.
- Solve one mixed-chapter DPP to test long-term retention.

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Sequence and Series – Set 2

MCQ Type Questions

1. If positive numbers a^{-1}, b^{-1}, c^{-1} are in A.P., then the product of roots of
$$x^2 - \alpha x + 2b^{101} - a^{101} - c^{101} = 0$$
is
   (a) Less than 0
   (b) Greater than 0
   (c) Equal to 0
   (d) Cannot be determined

2. If $x^a = y^b = z^c$ and x, y, z are in G.P. with unequal positive a, b, c, then $a^3 + c^3$ is
   (a) $> 2b^3$
   (b) $< 2b^3$
   (c) $= 2b^3$
   (d) None of these

3. The 1025th term in the sequence $1, 22, 4444, 88888888, \ldots$ is
   (a) 2^{10}
   (b) 2^8
   (c) 2^{12}
   (d) 2^5

4. If a, b, c are non-real numbers such that
$$3(\sum a^2 + 1) = 2(\sum a + \sum ab),$$
then a, b, c are in
   (a) A.P and G.P both
   (b) A.P only
   (c) G.P only
   (d) H.P

5. If a_1, a_2, a_3, a_4 are in H.P., then
$$\frac{1}{a_1 a_2} \sum_{r=1}^{3} a_r a_{r+1}$$
is a root of
   (a) $x^2 + 2x - 15 = 0$
   (b) $x^2 - 2x - 15 = 0$
   (c) $x^2 + 15x - 2 = 0$
   (d) $x^2 - 15x + 2 = 0$

6. If $a_1, a_2, \ldots, a_n$ are in H.P., then
$$\frac{a_1}{a_2 + \cdots + a_n}, \frac{a_2}{a_1 + a_3 + \cdots + a_n}, \ldots$$
are in
   (a) A.P
   (b) G.P
   (c) H.P
   (d) A.G.P

7. For non-zero $a_1, \dots, a_n$, if

$$(a_1^2 + \cdots + a_{n-1}^2)(a_2^2 + \cdots + a_n^2) \leq (a_1 a_2 + \cdots + a_{n-1} a_n)^2,$$

then $a_1, \dots, a_n$ are in

(a) A.P
(b) G.P
(c) H.P
(d) None

8. For a G.P. of positive terms, if

$$\sum_{n=1}^{100} a_{2n} = \alpha, \qquad \sum_{n=1}^{100} a_{2n-1} = \beta,\ \alpha \neq \beta,$$

then the common ratio is

(a) $\dfrac{\alpha}{\beta}$
(b) $\dfrac{\beta}{\alpha}$
(c) $\sqrt{\dfrac{\alpha}{\beta}}$
(d) $\dfrac{\alpha+\beta}{\alpha}$

9. The coefficient of x^{203} in

$$(x-1)(x^2-2)(x^3-3)\cdots(x^{20}-20)$$

is

(a) 13
(b) 12
(c) 14
(d) 15

10. If $a_1, a_2, \dots$ form an A.P. with common difference not a multiple of 3, the maximum number of consecutive prime terms is

(a) Infinity
(b) 0
(c) 1
(d) 3

11. The sum of pairwise products of

$$1, 2, 2^2, \dots, 2^{n-1}$$

is

(a) $\dfrac{1}{3}2^{2n} - 2^n + \dfrac{2}{3}$
(b) $2^{2n} - 1$
(c) 2^{2n+1}
(d) $2^n - 1$

12. Number of sequences a, b, c, d, e satisfying both:

- A.P and G.P
- $c \in \{3, 7\}$

is

(a) 1
(b) 2
(c) 5
(d) 10

13. If

$$3(a^2+b^2+c^2+1)=2(a+b+c+ab+bc+ca),$$

then a, b, c are in

(a) A.P & G.P both
(b) A.P only
(c) G.P only
(d) H.P

14. If a, b, c, d are distinct integers in A.P and $d=a^2+b^2+c^2$, then $a+b+c+d$ equals

(a) 0
(b) 1
(c) 2
(d) none

15. If a, b, c, d are in A.P., then products abc, abd, acd, bcd are

(a) Not in AP/GP/HP
(b) A.P
(c) G.P
(d) H.P

16. $\displaystyle\sum_{r=1}^{n} \frac{r}{(r+1)!}$ equals

(a) $1-\dfrac{1}{(n+1)!}$
(b) $2-\dfrac{1}{(n+1)!}$
(c) $1-\dfrac{1}{(2n+1)!}$
(d) $1-\dfrac{1}{(n+2)!}$

17. If $I(n)=\displaystyle\sum_{r=1}^{n} r^4$, then

$$\sum_{r=1}^{n}(2r-1)^4=$$

(a) $I(2n)-2I(n)$
(b) $I(3n)-2I(n)$
(c) $I(2n)-I(n)$
(d) $I(2n)+I(n)$

18. If a, b, c are in H.P. and are sides of triangle ABC, then

(a) Triangle is equilateral
(b) Triangle is isosceles
(c) $\cos B<0$
(d) None