Sequence and Series – Set 3

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

4. Best Practices for Scoring Higher

- Focus on accuracy first, then speed.
- Review every calculation step—most mistakes arise from small algebraic slips.
- Solve advanced problems only after finishing Main-level questions for the chapter.
- Revise solved DPPs weekly and note repeating mistake patterns.
- Use short notes for formulas, special results, and commonly used approximations.
- After solving, compare your approach with the official solution or teacher's method.
- Build endurance by solving at least one DPP in exam-like conditions daily.

5. Evaluation Guidelines

- Award yourself:
  - **+4 / -1** for JEE Main pattern questions.
  - **Partial marking** for JEE Advanced style multi-correct.
- Maintain a cumulative score record for every DPP set.
- Track:
  - Chapters with highest accuracy
  - Chapters needing revision
  - Time taken per DPP
  - Common error types

6. Weekly Review Checklist

- Reattempt the unsolved or incorrect problems from the past 5–7 DPPs.
- Update your formula sheet and mistake notebook.
- Solve at least one mixed-topic DPP to test retention.

By: www.udgamwelfarefoundation.com (helping students since 2012)

Daily Practice Problems

Multiple Choice Questions

1. If a, b, c, d are positive real numbers such that $a+b+c+d=2$, then $m=(a+b)(c+d)$ satisfies:
   (a) $0 < m \leq 1$
   (b) $0 < m < 2$
   (c) $m \geq 1$
   (d) none of these

2. Suppose a, b, c are in A.P. and a^2, b^2, c^2 in G.P. If $a > b > c$ and $a+b+c=\frac{3}{2}$, then a equals:
   (a) $\frac{1}{2}+\frac{1}{\sqrt{2}}$
   (b) $\frac{3}{4}$
   (c) $\frac{5}{4}$
   (d) none of these

3. 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) 2
   (b) 4
   (c) 6
   (d) 8

4. If $\sum_{i=1}^{21} a_i = 693$, where $a_1, a_2, \ldots, a_{21}$ are in A.P., then $\sum_{r=0}^{10} a_{2r+1}$ equals:
   (a) 363
   (b) 396
   (c) 420
   (d) none of these

5. The sum of the infinite series
   $$\frac{5}{3^2 \cdot 7^2}+\frac{9}{7^2 \cdot 11^2}+\frac{13}{11^2 \cdot 15^2}+\cdots$$
   is:
   (a) $\frac{1}{72}$
   (b) $\frac{1}{36}$
   (c) $\frac{1}{18}$
   (d) none of these

6. Let a, b, c be positive real numbers such that
   $$bx^2+\sqrt{(a+c)^2+4b^2}\,x+(a+c) \geq 0,\ \forall x \in \mathbb{R}$$
   Then a, b, c are in:
   (a) G.P.
   (b) A.P.
   (c) H.P.
   (d) none of these

7. If $\sum n, \frac{\sqrt{10}}{3}\sum n^2, \sum n^3$ are in G.P., then n equals:
   (a) 4
   (b) 5
   (c) 6
   (d) none of these

Integer Type Questions

8. If $\sum_{r=1}^{n} t_r = \frac{n(n+1)(n+2)(n+3)}{8}$, then

$$\lim_{n\to\infty} \sum_{r=1}^{n} \frac{1}{t_r}$$

9. If $a_7 = 9$ in an A.P. and $a_1 a_2 a_7$ is least, then the common difference is:

Multiple Choice Questions (continued)

10. If $x, y, z > 0$ and $x + y + z = 1$, then $\frac{xyz}{(1-x)(1-y)(1-z)}$ is necessarily:

    (a) ≥ 8

    (b) $\leq \frac{1}{8}$

    (c) $< \frac{1}{8}$

    (d) none of these

11. If a, b, c are positive real numbers in H.P., then $\frac{1}{b-a} + \frac{1}{b-c}$ equals:

    (a) $\frac{2}{b}$

    (b) $2b$

    (c) $5b^2 - 1$

    (d) $4b + 1$

12. If A_1 is the A.M. and G_1, G_2 are two G.M.s between a and b, then $\frac{G_1^2 + G_2^2}{G_1 G_2 A_1}$ equals:

    (a) 2

    (b) 4

    (c) 5

    (d) 10

13. $\{a_i\} = 1, 2, \ldots, n$ is an A.P. If $a_7 = 9$, the value of the common difference such that $a_1 a_2 a_7$ is minimum:

    (a) $\frac{331}{10}$

    (b) $\frac{133}{20}$

    (c) $\frac{30}{17}$

    (d) $\frac{33}{20}$

14. The third term of a geometric progression is 4. The product of the first five terms is:

    (a) 4^3

    (b) 4^5

    (c) 4^4

    (d) none of these

15. If a, b, c are in G.P., then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have a common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in:

    (a) A.P.

    (b) G.P.

    (c) H.P.

(d) none of these

16. If $x > 1, y > 1, z > 1$ are in G.P., then $\frac{1}{1+\ln x}, \frac{1}{1+\ln y}, \frac{1}{1+\ln z}$ are in:

(a) A.P.

(b) H.P.

(c) G.P.

(d) none of these

17. The harmonic mean of roots of $(5+\sqrt{2})x^2 - (4+\sqrt{5})x + 8 + 2\sqrt{5} = 0$ is:

(a) 2

(b) 4

(c) 6

(d) 8

18. Let $a_1, a_2, \ldots, a_{10}$ be in A.P. and $h_1, h_2, \ldots, h_{10}$ be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ equals:

(a) 2

(b) 3

(c) 5

(d) 6