Sequence & Series

Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions :

1. The test is of **1 hour** duration and max. marks 120.

2. The test consists **30** questions, **4 marks** each.

3. Only one choice is correct **1 mark** will be deducted for incorrect response. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

4. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 3 above.

---

1. If t_n denotes the n_{th} term of the series 2 + 3 + 6 + 11 + 18 + ... then t_{50} is

(1) 2603 (2) 2601 (3) 2403 (4) 2401

2. The largest term common to the sequences 1, 11, 21, 31, ... to 100 terms and 31, 36, 41, 46, ... to 100 terms is

(1) 381 (2) 471 (3) 281 (4) 521

3. If S_r denotes the sum of the first r terms of an A.P. then $(S_{3r} - S_{r-1})/(S_{2r} - S_{2r-1})$ is equal to

(1) 2r – 1 (2) 2r + 1 (3) 4r + 1 (4) 2r + 3

4. If S_n denotes the sum of the first n terms of an A.P. such that $S_{2n} = 3\,S_n$ then $S_{3n} : S_n$ is equal to .

(1) 10 (2) 8 (3) 6 (4) 4

5. If sum of k consecutive odd natural numbers is $(2n + r)r$, $n \in N$, $r \in N$ then k is equal to

(1) r (2) r + 1 (3) n (4) n + 1

6. The sum of the products of the ten numbers ±1, ±2, ±3, ±4, ±5 taking two at a time is

(1) 165 (2) –165 (3) 55 (4) –55

7. Let $\frac{1}{1^4}+\frac{1}{2^4}+\frac{1}{3^4}+\ldots\infty=\frac{\pi^4}{90}$ then the value of $\frac{1}{1^4}+\frac{1}{3^4}+\frac{1}{5^4}+\ldots\infty$ is equal to .

(1) $\frac{\pi^4}{96}$ (2) $\frac{\pi^4}{45}$ (3) $\frac{89\pi^4}{90}$ (4) $\frac{16\pi^4}{45}$

8. If a, b, c are in AP then $a_3 + c_3 - 8b_3$ is equal to

(1) 8 abc (2) – 6 abc (3) 2 abc (4) – 4 abc

9. If $\frac{3+5+7+.....\text{upto n terms}}{5+8+11+.....\text{upto 10 terms}} = 7$ then value of n is -
(1) 35 (2) 36 (3) 37 (4) 40

10. Let f(x) = 2x + 1. IF f(x), f(2x), f(4x) are in GP then number of real values of x is
(1) 0 (2) 1 (3) 2 (4) 3

11. If $\log\left(\frac{5c}{a}\right)$, $\log\left(\frac{3b}{5c}\right)$, $\log\left(\frac{a}{3b}\right)$ are in AP, where a, b,c are in GP, then a, b, c are the lengths of sides of
(1) an isosceles triangle (2) an equilateral triangle
(3) a scalene triangle (4) none of these

12. If x, 2y, 3z are in AP, where the distinct numbers x, y, z are in GP then common ratio of GP is-
(1) 3 (2) $\frac{1}{3}$ (3) 2 (4) $\frac{1}{2}$

13. In the sequence 1, 2,2, 4, 4, 4, 4, 8, 8 ,8 ,8 , 8 ,8, 8, 8, ... where n consecutive terms have the value n, then 1025^{th} term is
(1) 2_9 (2) 2_{10} (3) 2_{11} (4) 2_8

14. If $(1 + x)(1 + x_2)(1 + x_4) \ldots (1 + x_{128}) = \sum_{r=0}^{n} x^r$ then n is equal to
(1) 255 (2) 127 (3) 60 (4) 256

15. The common ratio of a GP having 10^{th} term and 1^{st} term equal to 1536 and – 3 respectively, is
(1) 2 (2) 1 (3) – 2 (4) 2

16. The rational number 2.357357357 ..... is
(1) $\frac{2355}{10001}$ (2) $\frac{2379}{999}$ (3) $\frac{2355}{999}$ (4) $\frac{2379}{10001}$

17. Given a G.P. having an even number of terms. If the sum of all the terms be five times the sum of terms occupying odd places, then the common ratio will be -
(1) 3 (2) 5 (3) 4 (4) 2

18. The minimum value of $4_x + 4_{1-x}$, $x \in R$ is
(1) 2 (2) 1 (3) 4 (4) 8

19. x, y, z are positive then minimum value of $x^{\log y - \log z} + y^{\log z - \log x} + z^{\log x - \log y}$ is
(1) 3 (2) 1 (3) 9 (4) 16

20. If $\frac{a_2 a_3}{a_1 a_4} = \frac{a_2 + a_3}{a_1 + a_4} = \frac{3(a_2 - a_3)}{a_1 - a_4}$, then a_1, a_2, a_3, a_4 are in
(1) AP (2) GP (3) HP (4) none of these

21. Let a,b be two positive numbers, where a > b and 4(GM) = 5(HM) for the numbers, then a is equal to-

(1) b (2) 2b (3) 4b (4) $\frac{1}{4}$ b

22. The sum of infinite terms of the series

$1 + 2^{\left(1-\frac{1}{n}\right)} + 3^{\left(1-\frac{1}{n}\right)^2} + 4^{\left(1-\frac{1}{n}\right)^3}$ + ... is given by

(1) $n_2 + 1$ (2) n(n + 1) (3) $n^{\left(1-\frac{1}{n}\right)^2}$ (4) n_2

23. $\sum_{r=1}^{n} r^2 - \sum_{m=1}^{n}\sum_{r=1}^{m} r$ is equal to

(1) 0 (2) $\frac{1}{2}\left(\sum_{r=1}^{n} r^2 + \sum_{r=1}^{n} r\right)$ (3) $\frac{1}{2}\left(\sum_{r=1}^{n} r^2 - \sum_{r=1}^{n} r\right)$ (4) none of these

24. The length of three unequal edges of a rectangular solid block are in GP. The volume of the block is 216 cm_3 and the total surface area is 252 cm_2. The length of the largest edge is-

(1) 12 cm (2) 6 cm (3) 18 cm (4) 3 cm

25. Solution set for $\left(\sqrt{2+\sqrt{2}}\right)^x + \left(\sqrt{2-\sqrt{2}}\right)^x = 2.2_{x/4}$ is

(1) {2} (2) {0} (3) [0,2] (4) none of these

26. A person purchases one kg of tomatoes from each of the four places at the rate of 1 kg, 2 kg, 3kg & 4 kg per rupee respectively. On the average he has purchases x kg of tomatoes per ruppe , then the vlaue of x is

(1) 2 (2) 2.5 (3) 1.92 (4) 2.12

27. If the roots of the equation $x_3 - 12x_2 + 39x - 28 = 0$ are in AP then common difference will be-

(1) ± 1 (2) ± 2 (3) ± 3 (4) ± 4

28. If S_n denotes the sum of n terms of an AP, then $S_{n+3} - 3S_{n+2} + 3S_{n+1} - S_n$ =

(1) 0 (2) 1 (3) 2 (4) 3/2

29. If x, y, z, w are non – zero real numbers such that

$(x_2 + y_2 + z_2)(y_2 + z_2 + w_2) \le (xy + yz + zw)_2$ then x, y, z, w are in

(1) AP (2)GP (3) HP (4) none of these

30. The largest term of the sequence

$\frac{1}{503}, \frac{4}{524}, \frac{9}{581}, \frac{16}{692}$, ... is

(1) $\frac{16}{692}$ (2) $\frac{4}{524}$ (3) $\frac{49}{1529}$ (4) $\frac{36}{1148}$

Practice Test (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

1. The sum of those integers from 1 to 100 which are not divisible by 3 or 5 is
(1) 2489 (2) 4735 (3) 2317 (4) 2632

2. Let $a_1, a_2, a_3, ..., a_{11}$ be real numbers satisfying $a_1 = 15$, $27 - 2a_2 > 0$ and $a_k = 2a_{k-1} - a_{k-2}$ for k = 3, 4, ..., 11. If $\frac{a_1^2 + a_2^2 + ... + a_{11}^2}{11} = 90$, then the value of $\frac{a_1 + a_2 + ... + a_{11}}{11}$ is equal to
(1) 3 (2) 5 (3) 9 (4) 0

3*. If a, b & c are in arithmetic progression and a_2, b_2 & c_2 are in harmonic progression, then
(1) a = b = c (2) a, b, $-\frac{c}{2}$ are in A.P.
(3) a, b, $-\frac{c}{2}$ are in G.P. (4) a, b, $-\frac{c}{2}$ are in H.P.

4. a, b, c, d are four different real numbers which are in AP. If $2(a - b) + x(b - c)^2 + (c - a)^3 = 2(a - d) + (b - d)^2 + (c - d)^3$, then
(1) $-8 \le x \le 16$ (2) $x \le -8$ (3) $x \ge 16$ (4) $x \le -8$ or $x \ge 16$

5. The H.M. between two numbers is $\frac{16}{5}$, their A.M. is A and G.M. is G. If $2A + G^2 = 26$, then the numbers are
(1) 6, 8 (2) 4, 8 (3) 2, 8 (4) 1, 8

6. If $x \in R$, the numbers $5^{1+x} + 5^{1-x}$, a/2, $25^x + 25^{-x}$ form an A.P. then 'a' must lie in the interval:
(1) [1, 5] (2) [2, 5] (3) [5, 12] (4) [12, ∞)

7. If a, b, c, x are real numbers and equation $(a^2 + b^2)x^2 - 2b(a + c)x + (b^2 + c^2) = 0$ has equal roots, then a, b, c are in-
(1) A.P. (2) G.P. (3) H.P. (4) None of these

8. If $a_n = \frac{3}{4} - \left(\frac{3}{4}\right)^2 + \left(\frac{3}{4}\right)^3 - .....+ (-1)^{n-1}\left(\frac{3}{4}\right)^n$ and $b_n = 1 - a_n$, then the minimum natural number n_0 such that $b_n > a_n \; \forall \; n > n_0$ is
(1) 3 (2) 4 (3) 5 (4) 6

9. If S denotes the sum to infinity and S_n the sum of n terms of the series $1 + \frac{1}{2}+\frac{1}{4}+\frac{1}{8}$ ..... such that $S - S_n < \frac{1}{1000}$, then the least value of n is
(1) 11 (2) 9 (3) 10 (4) 8

10. Let $S_n = \sum_{k=1}^{4n}(-1)^{\frac{k(k+1)}{2}}$ k_2 . Then S_n can take value(s)
(1) 1056 (2) 1088 (3) 1120 (4) 1332

11. 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 the 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
(1) 7 (2) 8 (3) 9 (4) 11

12. The sum of 10 terms of the series $\left(x+\frac{1}{x}\right)^2+\left(x^2+\frac{1}{x^2}\right)^2+\left(x^3+\frac{1}{x^3}\right)^2$ +.....is (where $x \neq \pm 1$)
(1) $\left(\frac{x^{20}-1}{x^2-1}\right)\left(\frac{x^{22}+1}{x^{20}}\right)$ + 20 (2) $\left(\frac{x^{18}-1}{x^2-1}\right)\left(\frac{x^{11}+1}{x^9}\right)$ + 20
(3) $\left(\frac{x^{18}-1}{x^2-1}\right)\left(\frac{x^{11}-1}{x^9}\right)$ + 20 (4) None of these

13. The sum of the first n-terms of the series $1_2 + 2.2_2 + 3_2 + 2.4_2 + 5_2 + 2.6_2$ + ... is $\frac{n(n+1)^2}{2}$, when n is even. When n is odd, the sum is
(1) $\frac{n(n+1)^2}{4}$ (2) $\frac{n^2(n+2)}{4}$ (3) $\frac{n^2(n+1)}{2}$ (4) $\frac{n(n+2)^2}{4}$

14. If a, a_1, a_2, a_3, ..., a_{2n-1}, b are in AP, a, b_1, b_2, b_3,.....b_{2n-1}, b are in GP and a, c_1, c_2, c_3,.....c_{2n-1}, b are in HP, where a, b are positive, then the equation $a_nx_2 - b_nx + c_n = 0$ has its roots
(1) real and unequal (2) real and equal (3) imaginary (4) None of these

15. We know that $1 + 2 + 3 + ... = \frac{n(n+1)}{2} = f(n)$,
$1_2 + 2_2 + 3_2 + ... + n_2 = \frac{n(n+1)(2n+1)}{6} = g(n)$,
Greatest even natural number which divides g(n) – f(n), for every $n \geq 2$, is
(1) 2 (2) 4 (3) 6 (4) none of these

16. In a sequence of (4n + 1) terms the first (2n + 1) terms are in AP whose common difference is 2, and the last (2n + 1) terms are in GP whose common ratio 0.5. If the middle terms of the AP and GP are equal, then first term of the sequence is
(1) $\frac{4n+2n\,.\,2^n}{2^n-1}$ (2) $\frac{4n-2n\,.\,2^n}{2^n-1}$ (3) $\frac{2n-n\,.\,2^n}{2^n-1}$ (4) $\frac{2n+n\,.\,2^n}{2^n-1}$

APSP Answers

PART - I

1.	(3)	**2.**	(4)	**3.**	(2)	**4.**	(3)	**5.**	(1)	**6.**	(4)	**7.**	(1)
8.	(2)	**9.**	(1)	**10.**	(2)	**11.**	(4)	**12.**	(2)	**13.**	(2)	**14.**	(1)

15.	(3)	**16.**	(3)	**17.**	(3)	**18.**	(3)	**19.**	(1)	**20.**	(3)	**21.**	(3)
22.	(4)	**23.**	(3)	**24.**	(1)	**25.**	(2)	**26.**	(3)	**27.**	(3)	**28.**	(1)
29.	(2)	**30.**	(3)										

PART - II

1.	(4)	**2.**	(4)	**3.**	(1, 3)	**4.**	(4)	**5.**	(3)	**6.**	(4)	**7.**	(2)
8.	(3)	**9.**	(1)	**10.**	(1, 4)	**11.**	(3)	**12.**	(1)	**13.**	(3)	**14.**	(3)
15.	(1)	**16.**	(2)										