

TARGET : JEE (M + A) : 2026

CLASS : IIT-NURTURE (ELITE) - PHASE - 2

TEST TYPE: OFFLINE

DATE : 25.05.2024

PATTERN : JEE MAINS

Time : 3 Hours

INTERNAL TEST - 01

Maximum Marks : 300

Student's Form No. :

Batch :

Student's Name :

INSTRUCTIONS

Important Instructions :

- Immediately fill in the form number on this page of the Test Booklet with Blue/Black Ball Point Pen. Use of pencil is strictly prohibited.
- The candidates should not write their Form Number anywhere else (except in the specified space) on the Test Booklet/ Answer Sheet.
- The test is of **3 hours** duration.
- The Test Booklet consists of **90** questions. The maximum marks are **300**.
- There are **three** parts in the question paper 1, 2, 3 consisting of **Physics**, **Chemistry** and **Mathematics** having **30 questions** in each subject and each subject having **Two sections**.
 - Section-A** contains 20 multiple choice questions with **only one correct** option.
Marking scheme : +4 for correct answer, 0 if not attempted and -1 in all other cases.
 - Section-B** contains 10 **Numerical Value Type** questions. Attempt any 5 questions. First 5 attempted questions will be considered for marking or each question.
Marking scheme : +4 for correct answer, 0 if not attempted and -1 in all other cases.
- Use **Blue/Black Ball Point Pen only** for writing particulars/markings responses on **Side-1** and **Side-2** of the Answer Sheet. **Use of pencil is strictly prohibited**.
- Do not fold or make any stray marks on the Answer Sheet.**

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KARAIKAL CAMPUS : 9741018090

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SECTION-A : (Maximum Marks: 80)

This section contains **20 questions**. Each question has 4 options for correct answer. Multiple-Choice

Questions (MCQs) **Only one option is correct**. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

1. $xy = c^2$, then $\frac{dy}{dx}$:

- (A) $\frac{x}{y}$ (B) $-\frac{x}{y}$
(C) $\frac{y}{x}$ (D) $-\frac{y}{x}$

2. If $x = at^2$ and $y = 2at$, then $\frac{dy}{dx}$

- (A) t (B) 1
(C) $\frac{1}{t}$ (D) 0

3. Find the area bound between $y = x$ and $y = x^2$ from $x = 0$ to $x = 1$ is :

- (A) $5/6$ (B) $1/6$
(C) $1/3$ (D) $2/3$

4. The value of $\sin^2\theta$ always lies between

- (A) -1 and 1 (B) -1 and 0
(C) 0 and 1 (D) 0 and 2

5. The height reached in time t by a particle thrown upward with a speed u is given by $h = ut - \frac{1}{2}gt^2$. Find the time taken in reaching the maximum height?

- (A) $\frac{u}{g}$ (B) $\frac{2u}{g}$
(C) $\frac{u^2}{g^2}$ (D) $\frac{3u}{g}$

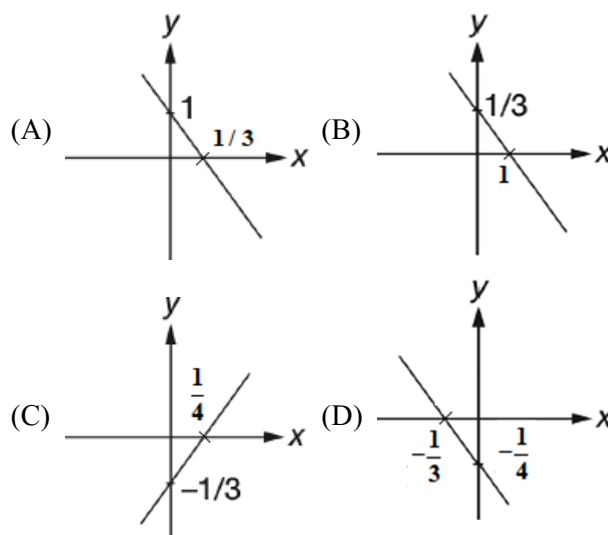
6. An equation of straight line $ay = bx + c$ is given, where a , b and c are constants. The slope of the given straight line is :

- (A) b (B) c
(C) $-\frac{a}{b}$ (D) $\frac{b}{a}$

7. For $x \ll 1$, the value of $(1 + x)^n$ is :

- (A) $1 - nx$ (B) $1 + nx$
(C) $\frac{1}{2}(1 - nx)$ (D) $\frac{1}{2}(1 + nx)$

8. Correct graph of $3x + 4y + 1 = 0$ is :



9. $\cos^2\theta - \sin^2\theta$ is equals :

- (A) $\cos(2\theta)$
(B) $\sin(2\theta)$
(C) $\tan(2\theta)$
(D) $\cot(2\theta)$

10. $\sin(100\pi)$ is equal to :

- (A) 0 (B) 1
(C) $1/2$ (D) 100

11. Which of the following statement is true?
- (A) At the point of maxima curve is concave downward.
- (B) At the point of minima curve is concave upwards.
- (C) At the point of maxima or minima the slope of the tangent is zero.
- (D) All are correct
12. If physical quantity $A = A_0 e^{-\beta t}$ then dimension formula of ' β '
- (A) $[T^{-1}]$ (B) $[T^{-2}]$
- (C) $[M^0 L^0 T^0]$ (D) $[MLT]$
13. If $y = 3x^2 + x + 5$. Then find value of $\frac{dy}{dx}$ at $x = 1$:-
- (A) 11 (B) 9
- (C) 7 (D) 5
14. If $y = 3 \tan(x)$, then $\frac{dy}{dx}$ is equal to
- (A) $\tan^2 x$ (B) $3 \sec^2 x$
- (C) $3 \tan^2 x$ (D) $\sec^2 x$
15. If $y = x^2 e^x$, then $\frac{dy}{dx}$ is equal to :
- (A) $2xe^x$ (B) $xe^x(x + e^x)$
- (C) $xe^x(x + 2)$ (D) None of these
16. $\int \sec x (\sec x - \tan x) dx =$
- (A) $\tan x - \sec x + C$
- (B) $\sec x + \tan x + C$
- (C) $\sec x - \cot x + C$
- (D) $\sec x + \cot x + C$
17. Force F is given in terms of time t and distance x by $F = A \sin C t + B \cos Dx$. Then the dimensions of $\frac{A}{B}$ and $\frac{C}{D}$ are given by:
- (A) $MLT^{-2}, M^0 L^0 T^{-1}$
- (B) $MLT^{-2}, M^0 L^{-1} T^0$
- (C) $M^0 L^0 T^0, M^0 L^1 T^{-1}$
- (D) $M^0 L^1 T^{-1}, M^0 L^0 T^0$
18. Find the slope of the tangent to the curve $y = 3x^4 - 4x$ at $x = 4$:-
- (A) 764
- (B) 763
- (C) 634
- (D) None of these
19. Consider two quantities A and B having different dimensions. Which mathematical operation given below is physically meaningful?
- (A) $A + B$
- (B) $A - B$
- (C) A/B
- (D) None of these
20. If $y = \sin(2x + 3)$ then $\int y dx$ will be :
- (A) $\frac{\cos(2x + 3)}{2} + C$
- (B) $\frac{-\cos(2x + 3)}{2} + C$
- (C) $-\cos(2x + 3) + C$
- (D) $-2\cos(2x + 3) + C$

SECTION-B : (Maximum Marks: 20)

This section contains 10 questions Candidates have to attempt any 5 questions out of 10. If more than 5 questions are attempted, then only first 5 attempted questions will be evaluated.

The answer to each question is a Numerical Value Type questions.

For each question, enter the correct numerical value (in decimal notation, truncated/rounded off to the second decimal place; e.g. 6.25, 7.00, -0.33, -0.30, 30.27, -127.30, if answer is 11.36777..... then both 11.36 and 11.37 will be correct)

+	●				
●	●	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	●	●	7	7
8	8	8	8	8	8
9	9	9	9	9	9

●	○				
●	●	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	●	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If correct answer is entered.

Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

- The tangent to the curve $y = 3x^2 - 5$ at the point (2, 7) makes an angle θ with the positive x-axis. Then the value of $\tan\theta$ is ____.
- The maximum value of $y = \sin x + \cos x$ is 't'. Find the value of t^2 .
- If $x = at^2$ and $y = 2at$, then the value of dy/dx , when $t = 1$.
- Current flowing in a circuit as a function of time (t) is given by $I = (3\sin 4t + 4\cos 4t)$ units. The maximum value of current is ____.

5. Find the value of $\int_0^{\sqrt{\pi}} x \sin\left(\frac{x^2}{2}\right) dx$

6. The integral $\int_0^2 (x+1)dx$ is equal to ____.

7. $\frac{\pi}{30}$ Radian = degrees

8. Evaluate: $\int_0^{\sqrt{\pi}} x \sin x^2 dx$.

9. $f(x) = x e^{2x}$. Find $f''(0) - f'(0) = ?$

10. The integral $\int_1^5 3x^2 dx$ is equal to ____.

SECTION-A : (Maximum Marks: 80)

This section contains **20 questions**. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) **Only one option is correct**. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

- The **INCORRECT** statement(s) for 14 gm CO is :
 (A) It occupies 2.24 L at S.T.P.
 (B) It corresponds to $\frac{1}{2}$ mol of CO
 (C) It corresponds to same mole of CO and N₂. (same mass)
 (D) It corresponds to 3.01×10^{23} molecules of CO.
- A compound contains 69.5% oxygen and 30.5% nitrogen and its molecular weight is 92. The formula of that compound is :
 (A) N₂O (B) NO₂
 (C) N₂O₄ (D) N₂O₅
- Molar mass of electron is nearly ($N_A = 6 \times 10^{23}$):
 (A) 9.1×10^{-31} kg/mol
 (B) 9.1×10^{-31} g/mol
 (C) 54.8×10^{-8} g/mol
 (D) 54.8×10^{-8} kg/mol
- What is the relationship between mole fraction of a solute (X_A) and its molality (m). If molar mass of solvent is 100. (g/mol).
 (A) $\frac{(X_A)}{10(1 - X_A)} = m$ (B) $\frac{(X_A)}{100(1 - X_A)} = m$
 (C) $\frac{10(1 - X_A)}{(X_A)} = m$ (D) $\frac{10(X_A)}{(1 - X_A)} = m$

- Calculate the number of Na⁺ ion present in 142 amu of Na₂SO₄ in aqueous solution.
 (A) 5 (B) 2
 (C) 1 (D) 4
- Calculate the number of mol of Ca(HCO₃)₂ required to get 1.5 mol of CO₂ according to the equation
 $\text{Ca(HCO}_3)_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{CO}_2 + 2\text{H}_2\text{O}$ is
 (A) 1.0 mol (B) 1.5 mol
 (C) 0.75 mol (D) 0.5 mol
- Calculate maximum mass of CaCl₂ produced when 2.4×10^{24} atoms of calcium is taken with 44.8 L of Cl₂ gas at S.T.P. [Ca-40u, Cl-35.5]
 (A) 111 g (B) 444 g
 (C) 61 g (D) 222 g
- The weight of 2.8 liter of gas at NTP is 3.50 g. Its vapour density is:
 (A) 14 (B) 28
 (C) 32 (D) 20
- For the reaction, $7\text{A} + 13\text{B} + 15\text{C} \rightarrow 17\text{P}$. If 15 moles of A, 26 moles of B and 30.5 moles of C are taken initially then limiting reactant is
 (A) A (B) B
 (C) C (D) None of these
- In an aqueous solution of barium nitrate, the [NO₃⁻] is 0.08 M. This solution is labelled as:
 (A) 0.08 M Ba(NO₃)₂
 (B) 0.160 M Ba(NO₃)₂
 (C) 0.04 M Ba(NO₃)₂
 (D) 1.6 M Ba(NO₃)₂

11. Atomic mass of Ne is 20.2. Ne is a mixture of Ne^{20} and Ne^{22} . Relative abundance of heavier isotope is :
 (A) 90 (B) 20
 (C) 40 (D) 10
12. The number of oxygen atoms in 0.4 mol of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ is :
 (A) 6.0×10^{24}
 (B) 1.56×10^{24}
 (C) 3.12×10^{24}
 (D) 1.2×10^{25}
13. The sample that does not contain same number of 'Na' atom as there are 'Na' atoms in 5.3 g of Na_2CO_3 , is: (Na-23u, O-16u, C-12u)
 (A) 4 g of NaOH
 (B) 5.85 g of NaCl
 (C) 0.25 mole of Na_2SO_4
 (D) 5.6 g of Na_3PO_4
14. An organic compound made of C, H and N contains 20% nitrogen. What will be its molecular mass if it contains only one nitrogen atom in it?
 (A) 70 (B) 140
 (C) 100 (D) 65
15. Which of the following contains maximum number of atoms in 100g sample?
 (A) CO_2 (B) N_2O
 (C) NO_2 (D) H_2O
16. Which has maximum molecules?
 (A) 7g N_2 (B) 2g H_2
 (C) 16g NO_2 (D) 16g O_2
17. If 0.5 mole of BaCl_2 , is mixed with 0.2 mol of Na_3PO_4 , the maximum amount of $\text{Ba}_3(\text{PO}_4)_2$ that can be formed is
 (A) 0.7 mol (B) 0.5 mol
 (C) 0.2 mol (D) 0.1 mol
18. Total number of electrons present in O^{2-} is 1.2×10^{22} , then the number of moles of oxide ion present is:
 (A) 2×10^{-3} moles (B) 10^{-3} moles
 (C) 10 moles (D) 0.02 moles
19. **Statement-I:** Dilution decreases molarity of the solution.
Statement-II: Number of moles of solute changes during dilution.
 (A) Statement-I and Statement-II are true and Statement-II is the correct explanation of Statement-I.
 (B) Statement-I and Statement-II are true, but Statement-II is not the correct explanation of Statement -I
 (C) Statement-I is true, but Statement -II is false
 (D) Statement-I is false, but Statement -II is true
20. Four one litre flasks are separately filled with the gases. H_2 , He, O_2 and O_3 at the same temperature and pressure. The ratio of total number of atoms of these gases are :
 (A) 1 : 1 : 1 : 1 (B) 1 : 2 : 2 : 3
 (C) 2 : 1 : 2 : 3 (D) 3 : 2 : 2 : 1

SECTION-B : (Maximum Marks: 20)

This section contains 10 questions Candidates have to attempt any 5 questions out of 10. If more than 5 questions are attempted, then only first 5 attempted questions will be evaluated.

The answer to each question is a Numerical Value Type questions.

For each question, enter the correct numerical value (in decimal notation, truncated/rounded off to the second decimal place; e.g. 6.25, 7.00, -0.33, -0.30, 30.27, -127.30, if answer is 11.36777..... then both 11.36 and 11.37 will be correct)

+										-									
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9

Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If correct answer is entered.

Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

1. XeF_6 fluorinates I_2 to IF_7 and liberates Xenon(g). 3.5 mmol of XeF_6 can yield a maximum of ____ mmol of IF_7 .
2. The weight of calcium oxide formed by burning 20 g of calcium in excess of oxygen is
3. The ratio of masses of nitrogen and oxygen in a particular gaseous mixture is 4 : 1. The ratio of number of their molecule is _____. (Nearest Integer)

4. Given that the abundance of isotopes ^{54}Fe , ^{56}Fe and ^{57}Fe is 5%, 90% and 5% respectively. The atomic mass of Fe is _____. (Nearest Integer)
5. The measured density at NTP of He is 0.1784 g/L. What is the weight of one mole of He?
6. Haemoglobin contains 0.25% iron by weight. The molecular weight of Haemoglobin is 89600. Calculate the number of iron atoms per molecule of Haemoglobin.
7. Find the weight of NaOH in its 50 milli moles.
8. 10 mL of gaseous hydrocarbon C_aH_b on combustion gives 40 mL of $\text{CO}_{2(g)}$ and 50 mL of H_2O (vapour). Then find a + b?
9. A sample of H_2SO_4 is 40% by mass and shows density 1.47 g/ml. What is the molarity of the acid?
10. Find the total number of moles of electrons in one mole of Azide ion?

SECTION-A : (Maximum Marks: 80)

This section contains **20 questions**. Each question has 4 options for correct answer. Multiple-Choice Questions (MCQs) **Only one option is correct**. For each question, marks will be awarded as follows:

Full Marks : +4 If correct answer is selected.

Zero Marks : 0 If none of the option is selected.

Negative Marks : -1 If wrong option is selected.

1. The sum of the series $1 + (1 + 2) + (1 + 2 + 3) + \dots$ upto n terms will be :

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

2. The first term of an infinitely decreasing G.P is unity and its sum is S . The sum of the squares of the terms of the progression is

(A) $\frac{S^2}{2S-1}$ (B) $\frac{S}{2-S}$
(C) S^2 (D) $\frac{S}{2S-1}$

3. If a, b, c are positive real numbers such that $ab^2c^3 = 64$, then minimum value of $\left(\frac{1}{a} + \frac{2}{b} + \frac{3}{c}\right)$ is equal to :

(A) 2 (B) 3
(C) 6 (D) 4

4. Given sum of first n terms of an A.P is $2n + 3n^2$. Another A.P is formed with the same first term and double of the common difference, the sum of n terms of the new A.P is

(A) $n + 4n^2$ (B) $6n^2 - n$
(C) $3n - 2n^2$ (D) $n + 4n$

5. The value of $1^2 + 3^2 + 5^2 + \dots + 25^2$ is :

(A) 1495 (B) 1728
(C) 2925 (D) 2529

6. Let a_1, a_2, \dots, a_{10} be a G.P. If $\frac{a_3}{a_1} = 25$, then $\frac{a_9}{a_5}$ is equal to :

(A) 4^5 (B) 5^3
(C) 5^4 (D) $2(5^2)$

7. If 19^{th} term of a non-zero A.P is zero, then its $(49^{\text{th}}$ term) : $(29^{\text{th}}$ term) is :

(A) 1 : 3 (B) 2 : 1
(C) 3 : 1 (D) 4 : 1

8. Let the sum of the first n terms of a non-constant A.P, a_1, a_2, a_3, \dots be $50n + \frac{n(n-7)}{2}A$, where A is a constant. If d is the common difference of this A.P, then the ordered pair (d, a_{50}) is equal to :

(A) $(50, 50 + 46A)$
(B) $(50, 50 + 45A)$
(C) $(A, 50 + 46A)$
(D) $(A, 50 + 45A)$

9. If the sum of the series $20 + 19\frac{3}{5} + 19\frac{1}{5} + 18\frac{4}{5} + \dots$ upto n^{th} term is 488 and the n^{th} term is negative, then :

(A) $n = 60$ (B) $n = 41$
(C) n^{th} term is $-4\frac{2}{5}$ (D) n^{th} term is -4

10. If $2^{10} + 2^9 3^1 + 2^8 3^2 + \dots + 2^1 3^9 + 3^{10} = S - 2^{11}$, then the value of S is equal to :

(A) 3^{11} (B) $2 \cdot 3^{11}$
(C) $3^{11} - 2^{11}$ (D) $\frac{3^{11}}{2} + 2^{10}$

11. If the sum of the first 20 terms of the series $\log_{(7^{1/2})}x + \log_{(7^{1/3})}x + \log_{(7^{1/4})}x + \dots$ is 460, then x is equal to :
- (A) $7^{1/2}$ (B) e^2
(C) 7^2 (D) $7^{46/21}$
12. The sum $\sum_{r=1}^{10} (r^2 + 1) \times (r!)$ is equal to :
- (A) $(11!)$ (B) $11 \times (11!)$
(C) $10 \times (11!)$ (D) $101 \times (10!)$
13. The sum $= \sum_{k=1}^{20} k \frac{1}{2^k}$ is equal to
- (A) $2 - \frac{11}{2^{19}}$ (B) $2 - \frac{3}{2^{17}}$
(C) $1 - \frac{11}{2^{20}}$ (D) $2 - \frac{21}{2^{20}}$
14. If the ratio of the sum of the first n terms of two A.P's is $(7n + 1) : (4n + 27)$, then find the ratio of their 9th terms.
- (A) $2 : 9$ (B) $24 : 19$
(C) $13 : 12$ (D) $3 : 2$
15. Let a_1, a_2, a_3, \dots be an A.P such that $\frac{a_1 + a_2 + \dots + a_p}{a_1 + a_2 + a_3 + \dots + a_q} = \frac{p^3}{q^3}$, $p \neq q$. Then $\frac{a_6}{a_{21}}$ is equal to :
- (A) $\frac{121}{1861}$ (B) $\frac{41}{11}$
(C) $\frac{11}{41}$ (D) $\frac{121}{1681}$
16. If $a_n = \frac{-2}{4n^2 - 16n + 15}$, then $a_1 + a_2 + \dots + a_{25}$ is equal to :
- (A) $\frac{49}{138}$ (B) $\frac{51}{144}$
(C) $\frac{52}{147}$ (D) $\frac{50}{141}$
17. If $A = \sum_{n=1}^{\infty} \frac{1}{(3 + (-1)^n)^n}$ and $B = \sum_{n=1}^{\infty} \frac{(-1)^n}{(3 + (-1)^n)^n}$, then $\frac{A}{B}$ is equal to :
- (A) $\frac{11}{3}$ (B) $\frac{9}{11}$
(C) $-\frac{11}{9}$ (D) $\frac{11}{9}$
18. If $\gcd(m, n) = 1$ and $1^2 - 2^2 + 3^2 - 4^2 + \dots + (2021)^2 - (2022)^2 + (2023)^2 = 1012m^2n$, then $m^2 - n^2$ is equal to :
- (A) 180 (B) 200
(C) 220 (D) 240
19. The sum of the first 20 terms of the series $5 + 11 + 19 + 29 + 41 + \dots$ is :
- (A) 3250 (B) 3450
(C) 3420 (D) 3520
20. Let $x, y > 0$. If $x^3y^2 = 2^{15}$, then the least value of $3x + 2y$ is :
- (A) 32 (B) 30
(C) 40 (D) 36

SECTION-B : (Maximum Marks: 20)

This section contains 10 questions Candidates have to attempt any 5 questions out of 10. If more than 5 questions are attempted, then only first 5 attempted questions will be evaluated.

The answer to each question is a Numerical Value

Type questions.

For each question, enter the correct numerical value (in decimal notation, truncated/rounded off to the second decimal place; e.g. 6.25, 7.00, -0.33, -0.30, 30.27, -127.30, if answer is 11.36777..... then both 11.36 and 11.37 will be correct)

+									
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

-									
0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +4 If correct answer is entered.

Zero Marks : 0 If the question is unanswered.

Negative Marks : -1 If wrong answer is entered.

1. The 8th common term of the series is

$$S_1 = 3 + 7 + 11 + 15 + 19 + \dots$$

$$S_2 = 1 + 6 + 11 + 16 + 21 + \dots$$

2. If

$$\frac{1}{2 \times 3 \times 4} + \frac{1}{3 \times 4 \times 5} + \frac{1}{4 \times 5 \times 6} + \dots + \frac{1}{100 \times 101 \times 102} = \frac{k}{101}$$

then $34k$ is equal to ____.

3. Let 3, 7, 11, 15, ..., 403 and 2, 5, 8, 11, ..., 409 be two arithmetic progressions. Then the sum of the common terms in them is equal to ____.

4. Let a_1, a_2, \dots, a_n be in A.P. If $a_5 = 2a_7$ and $a_{11} = 18$, then

$$12 \left(\frac{1}{\sqrt{a_{10}} + \sqrt{a_{11}}} + \frac{1}{\sqrt{a_{11}} + \sqrt{a_{12}}} + \dots + \frac{1}{\sqrt{a_{17}} + \sqrt{a_{18}}} \right)$$

is equal to ____.

5. Let a_1, a_2, a_3, \dots be a G.P of Increasing positive numbers. If the product of fourth and sixth terms is 9 and the sum of fifth and seventh terms is 24, then $a_1 a_9 + a_2 a_4 a_9 + a_5 + a_7$ is equal to ____.

6. Find the sum of first 24 terms of the A.P. a_1, a_2, a_3, \dots , if it is know that $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$.

(A) 600 (B) 900 (C) 300 (D) 1200

7. If $3 + \frac{1}{4}(3 + d) + \frac{1}{4^2}(3 + 2d) + \dots \infty = 8$, then the value of d is ____.

8. Let a_n be the n th term of a G.P of positive terms. If $\sum_{n=1}^{100} a_{2n+1} = 200$ and $\sum_{n=1}^{100} a_{2n} = 100$, then $\sum_{n=1}^{200} a_n$ is equal to ____.

9. The sum of the series

$$\frac{1}{1 + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \frac{1}{\sqrt{3} + \sqrt{4}} + \dots \text{ upto 15 terms}$$

is ____.

10. The value of $0.16^{\log_{2.5} \left(\frac{1}{3} + \frac{1}{3^2} + \frac{1}{3^3} + \dots \infty \right)}$ is equal to ____.

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