Arjuna JEE (2026)

PRACTICE TEST - 01

DURATION : 180 Minutes   **DATE : 18/05/2025**   **M.MARKS : 300**

Topics Covered

Physics:	Units and Dimension (Complete Chapter), Mathematical Tools (Complete Chapter)
Chemistry:	Some Basic Concepts of Chemistry: Nature of Matter, Classification of Matter, Properties of Matter and their Measurement, International System of Units (S.I), Uncertainty in Measurement
	Laws of Chemical Combinations, Dalton's Atomic Theory, Atomic Mass, Atomic Mass Unit, Gram Atomic Mass, Average Atomic Mass, Molecular Mass, Gram Molecular Mass, Average Molecular Mass, Formula Mass, Percentage Composition, Empirical and Molecular formula, Mole, Vapour density, Atomicity, Mole Concept, Stoichiometry and Stoichiometric Calculations
Mathematics:	Basic Mathematics: Number system, Wavy Curve Method, Modulus

General Instructions:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours** duration.
3. The test booklet consists of **75 questions**. The maximum marks are **300**.
4. There are three sections in the question paper, Section I, II & III consisting of Section-I **(Physics)**, Section-II **(Chemistry)**, Section-III **(Mathematics)** and having **25 questions** in each Section in which first **20 questions** are Objective Type and last **5 questions** are integer type with answers ranging from **'0'** to **'999'** where answer needs to be rounded off to the nearest integer and all **25 questions** are compulsory.
5. There is only one correct response for each question.
6. Each correct answer will give **4** marks while **1** Mark will be deducted for a wrong response.
7. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
8. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.
9. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

OMR Instructions:

1. Use blue/black dark ballpoint pens.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

Name of the Student (In CAPITALS) : _____

Roll Number : _____

OMR Bar Code Number : _____

Candidate's Signature : _____   Invigilator's Signature _____

Section-I (PHYSICS)

Single Correct Type Questions

1. For $10^{(at+3)}$, if t is time, then the dimension of a is
   (1) $\left[M^0 L^0 T^0\right]$
   (2) $\left[M^0 L^0 T^1\right]$
   (3) $\left[M^0 L^0 T^{-1}\right]$
   (4) None of these

2. An unknown quantity α is expressed as $\alpha = \dfrac{2ma}{\beta} \log\left(1 + \dfrac{2\beta\ell}{ma}\right)$ where $m =$ mass, $a =$ acceleration, $l =$ length. The unit of α should be
   (1) meter
   (2) m/s
   (3) m/s^2
   (4) s^{-1}

3. Dimensional formula for energy in terms of momentum (p), area (A) and time (T) is. [Momentum = Mass × Velocity]
   (1) $\left[p^2 A^2 T^{-1}\right]$
   (2) $\left[p^1 A^{1/2} T^{-1}\right]$
   (3) $\left[p^{1/2} A^1 T^{-1}\right]$
   (4) $\left[p^0 A^{-2} T^{-2}\right]$

4. Force acting on a particle is given by $F = (A - x)/Bt$, where x is in metre and t is in seconds. The dimension of B is
   (1) $\left[MLT^{-2}\right]$
   (2) $\left[M^{-1} T^{-3}\right]$
   (3) $\left[M^{-1} T\right]$
   (4) $\left[MT^{-1}\right]$

5. Using the principle of homogeneity of dimensions find which is **correct**? [$r \to$ distance, $T \to$ time, $G \to$ Universal Gravitational Constant]
   (1) $T^2 = \dfrac{4\pi^2 r^3}{GM}$
   (2) $T^2 = 4\pi^2 r^2$
   (3) $T^2 = \dfrac{4\pi^2 r^3}{G}$
   (4) $T = \dfrac{4\pi^2 r^3}{G}$

6. When Bernoulli's theorem is expressed as $\dfrac{P}{\rho g} + \dfrac{1}{2}\dfrac{v^2}{g} + h =$ constant. The dimensions of the constant on the right hand side of the equation are given as ($p \to$ pressure $= \dfrac{\text{Force}}{\text{Area}}$, $h \to$ height, $v \to$ velocity, $p \to$ density $= \dfrac{\text{Mass}}{\text{Volume}}$, $g \to$ acceleration due to gravity)
   (1) $\left[M^0 L^0 T^0\right]$
   (2) $\left[M^0 L^1 T^0\right]$
   (3) $\left[M^1 L^0 T^0\right]$
   (4) $\left[M^1 L^2 T^{-2}\right]$

7. Considering force (F), velocity (v) and energy (E) as fundamental quantities, match the correct dimensions of following quantities.

   (Pressure $= \dfrac{\text{Force}}{\text{Area}}$, Light year $\to$ Distance travelled by light in one year)

Column-I		Column-II	
I.	Mass	P.	$\left[F^{-1} v^0 E^1\right]$
II.	Light year	Q.	$\left[F^1 v^1 E^{-1}\right]$
III.	Frequency	R.	$\left[F^3 v^0 E^{-2}\right]$
IV.	Pressure	S.	$\left[F^0 v^{-2} E^1\right]$

   (1) I-P, II-S, III-Q, IV-R
   (2) I-R, II-P, III-Q, IV-S
   (3) I-S, II-P, III-Q, IV-R
   (4) I-Q, II-P, III-S, IV-R

8. The physical quantity which has dimensional formula as that of $\dfrac{\text{Energy}}{\text{Mass} \times \text{Length}}$ is
   $\left[\text{Power} = \dfrac{\text{Energy}}{\text{Time}}\right]$
   (1) Force
   (2) Power
   (3) Pressure
   (4) Acceleration

9. The pressure of 10^6 dyne/cm^2 is equivalent to
   (1) 10^5 N/m^2
   (2) 10^6 N/m^2
   (3) 10^7 N/m^2
   (4) 10^8 N/m^2

10. Velocity is a derived physical quantity which depends on _____ fundamental quantities.
    (1) zero
    (2) 1
    (3) 2
    (4) 4

11. $\alpha = \dfrac{Fv^2}{\beta^2} \log_e\left(\dfrac{2\pi\beta}{v^2}\right)$ (where $v =$ velocity, $F =$ force). Find the dimensions of α and β
    (1) $M^0 L^2 T^{-2}, M^1 L^{-1} T^0$
    (2) $M^1 L^1 T^{-2}, M^1 L^{-1} T^0$
    (3) $M^1 L^{-1} T^0, M^0 L^2 T^{-2}$
    (4) $M^1 L^{-1} T^0, M^0 L^0 T^{-1}$

12. If the unit of length and force be increased four times, then the unit of energy is:
    (1) Increased 4 times
    (2) Increased 8 times
    (3) Increased 16 times
    (4) Decreased 16 times

13. A wave is represented by $y = a \sin(At - Bx + C)$ where A, B, C are constants and t is in seconds and x is in meter. The dimensions of A, B, C are

(1) $T^{-1}, L, M^0 L^0 T^0$

(2) $T^{-1}, L^{-1}, M^0 L^0 T^0$

(3) T, L, M

(4) T^{-1}, L^{-1}, M^{-1}

14. Calculate $(1001)^{1/3}$.

(1) 10.00   (2) 10.0034

(3) 10.003333   (4) 10.003

15. If $\tan\theta = \dfrac{4}{3}$. Find the value of $\sin\theta$

(1) $\dfrac{3}{5}$ (2) $\dfrac{4}{3}$

(3) $\dfrac{4}{5}$ (4) $\dfrac{5}{4}$

16. Find value of $e^{-\infty}$

(1) Zero   (2) Infinite

(3) e (4) 1

17. If P and Q have different non-zero dimensions. which of the following operation is possible:

(1) $P^2 + Q^2$

(2) PQ^2

(3) $P^2 - Q^2$

(4) All of these

18. Using Binomial approximation find the value of $(99)^{1/2}$

(1) 9.97   (2) 9.98

(3) 9.96   (4) 9.9498

19. If acceleration due to gravity g at height $h << R$ (where R is radius of earth) is $g_h = g_0\left(1 + \dfrac{h}{R}\right)^{-2}$, then using binomial theorem which is **correct**?

(1) $g_h = g_0$

(2) $g_h = g_0\left(1 - \dfrac{2h}{R}\right)$

(3) $g_h = g_0\left(1 + \dfrac{2h}{R}\right)$

(4) $g_h = g_0\left(1 - \dfrac{h}{2R}\right)$

20. $\sqrt{1 + \sin\theta}$ is equal to

(1) $(\sin\theta + \cos\theta)$ (2) $\sin\theta - \cos\theta$

(3) $\sin\dfrac{\theta}{2} + \cos\dfrac{\theta}{2}$ (4) $\sin\dfrac{\theta}{2} - \cos\dfrac{\theta}{2}$

Integer Type Questions

21. A gas bubble, from an explosion under water, oscillates with a period proportional to $P^a d^b E^c$. Where P is the static pressure, d is the density and E is the total energy of the explosion. Find the values of $a + b + c$

22. The time period of oscillation of a body is given by $T = 2\pi\sqrt{\dfrac{mgA}{K}}$, K represents the kinetic energy, m mass, g acceleration due to gravity and A is unknown. If $[A] = M^x L^y T^z$, then what is the value of $x + y + z$?

23. Energy of a particle is 5J. If unit of length and time are doubled and unit of mass is halved then numerical value of the energy in this new system will be $5n$. Value of n is.

24. Find the value of $\cos 105° + \cos 75°$.

25. Find angle (in degrees) subtended by a circular arc of radius 6 cm and length π cm at its centre.

Section-II (CHEMISTRY)

Single Correct Type Questions

26. The given statement, "the total mass of reactants is always equal to the total mass of products in a chemical reaction" is known as:

(1) Law of conservation of mass

(2) Law of definite proportions

(3) Law of multiple proportions

(4) Law of gaseous volume

27. Atomic mass unit (u) is equivalent to_____ the mass of carbon isotope C-12.

(1) 12 times   (2) $1/12^{th}$

(3) $1/6^{th}$ (4) 6 time

28. The total number of electrons present in one molecule of methane is;

(1) 16   (2) 32

(3) 10   (4) 4

29. Calculate the molecular mass of sucrose ($C_{12}H_{22}O_{11}$) molecule.
(1) 343 amu   (2) 342 amu
(3) 341 amu   (4) 340 amu

30. 88 g of CO_2 contains how many moles of carbon?
[Atomic mass of C = 12 amu and O = 16 amu]
(1) 2   (2) 3
(3) 4   (4) 5

31. The volume occupied by 4.4 g of CO_2 at STP will be:
(1) 2.24 L   (2) 22.4 L
(3) 0.224 L   (4) 1.12 L

32. The number of Cl^- and Ca^{2+} ions respectively in 222 g of $CaCl_2$ are;
[Atomic mass of Ca = 40 amu and Cl = 35.5 amu]
(1) $4\,N_A$, $2\,N_A$ (2) $2\,N_A$, $2\,N_A$
(3) $1\,N_A$, $2\,N_A$ (4) $2\,N_A$, $1\,N_A$

33. What amount of dioxygen (in gram) contains 1.8×10^{22} molecules? [$N_A = 6 \times 10^{23}$]
(1) 0.0960   (2) 0.960
(3) 9.60   (4) 96.0

34. Empirical formula of $C_2H_5COOCH_3$ is:
(1) CH_2O (2) C_2HO_2
(3) C_2H_4O (4) CH_4O

35. If the molecular formula of glucose is $C_6H_{12}O_6$, then its empirical formula is;
(1) CHO   (2) C_2HO_2
(3) CH_2O (4) CHO_2

36. The total number of neutrons present in 36 g of water is:
(1) $24\,N_A$ (2) $32\,N_A$
(3) $16\,N_A$ (4) $20\,N_A$

37. Select the correct statement regarding Dalton's atomic theory.
(1) Matter consists of divisible atoms.
(2) Chemical reaction involves reorganization of atoms.
(3) Compounds are formed when atoms of same elements combine in a fixed ratio.
(4) All atoms of a given elements have different properties.

38. A compound contains 30% of A (atomic mass = 10u) and 70% B (Atomic mass 10u). The correct formula of the compound is:

(1) AB   (2) A_3B_7
(3) A_7B_3 (4) A_2B

39. Significant figures in 0.00051 are:
(1) 5   (2) 3
(3) 2   (4) 4

40. The modern atomic weight scale is based on
(1) ^{13}C (2) ^{16}O
(3) ^{15}N (4) ^{12}C

41. How many molecules of O_2 will weigh equal to 10 molecules of CH_4?
(1) 10   (2) 5
(3) 15   (4) 8

42. Number of atoms of hydrogen in 5 mole of H_2SO_4 are:
(1) 20 mole   (2) 5 mole
(3) 10 mole   (4) 15 mole

43. The vapour density of carbon dioxide is: [Atomic mass of C = 12 amu, O = 16 amu]
(1) 44   (2) 32
(3) 22   (4) 12

44. Calculate the mass of 6.022×10^{23} molecules of calcium carbonate? [Atomic mass of Ca = 40 amu, C = 12 amu and O = 16 amu]
(1) 50 g   (2) 100 g
(3) 200 g   (4) 150 g

45. When two or more atoms of different elements combine with each other in a fixed ratio by weight, then the formation of _____takes place.
(1) a compound.   (2) an element.
(3) an atom.   (4) an ion.

Integer Type Questions

46. How many grams of silicon are present in 35-gram atoms of silicon (Given at. wt. of Si = 28)?

47. The volume occupied by 20 g of hydrogen gas at STP, is ____L
[Molar volume of gas at STP is 22.4 L]

48. What will be the vapour density of P_2O_5 ?
[Atomic mass of P = 31 amu and O = 16 amu]

49. The number of moles of nitrogen atoms present in 112 g of N_2 is: [Atomic mass of N = 14 amu]

50. Gram molecular mass of acetic acid (CH_3COOH) is ____g.

Section-III (MATHEMATICS)

Single Correct Type Questions

51. If $3 \leq 3t - 18 \leq 18$, then which of the following is not true?
(1) $7 \leq t \leq 12$
(2) $15 \leq 2t + 1 \leq 25$
(3) $t \leq 7$ or $t \geq 12$
(4) $t \geq 7$ and $t \leq 12$

52. If $xy + yz + zx = 1$, then the expression
$\dfrac{x+y}{1-xy} + \dfrac{y+z}{1-yz} + \dfrac{z+x}{1-zx}$ is equal to

(1) $\dfrac{1}{x+y+z}$
(2) xyz

(3) $x+y+z$
(4) $\dfrac{1}{xyz}$

53. If $1 \leq \dfrac{3x^2 - 7x + 8}{x^2 + 1} \leq 2$, then complete solution set to the inequality is
(1) $[6, \infty)$
(2) $[1, 6]$
(3) $(-\infty, 1]$
(4) $(-\infty, \infty)$

54. If $x = \sqrt{3 + 2\sqrt{2}}$, then value of $x^2 + \dfrac{1}{x^2}$ is equal to
(1) 4
(2) 2
(3) 5
(4) 6

55. The complete solution set of the inequality
$\dfrac{x^4 - 3x^3 + 2x^2}{x^2 - x - 30} \geq 0$ is
(1) $(-\infty, -5) \cup (1, 2) \cup (6, \infty) \cup \{0\}$
(2) $(-\infty, -5) \cup [1, 2] \cup (6, \infty) \cup \{0\}$
(3) $(-\infty, -5) \cup [1, 2] \cup [6, \infty)$
(4) None of these

56. Solution set of $||x - 1| - 2| = 1$ is
(1) $\{-1, 0, 1, 4\}$
(2) $\{-2, 0, 2, 3\}$
(3) $\{-2, 0, 3, 4\}$
(4) $\{-2, 0, 2, 4\}$

57. Complete solution set of $\left| \left| |x+1| - 1 \right| - 1 \right| \leq 1$, is
(1) $x \in [2, 4]$
(2) $x \in [-4, 2]$
(3) $x \in [8, 10]$
(4) $x \in [-6, 4]$

58. If $x + y = a$ and $x^2 + y^2 = b$, then value of $(x^3 + y^3)$, is
(1) ab
(2) $a^2 + b$
(3) $a + b^2$
(4) $\dfrac{3ab - a^3}{2}$

59. If $1.5 \leq x \leq 4.5$, then which one of the following is correct?
(1) $(2x - 3)(2x - 9) > 0$
(2) $(2x - 3)(2x - 9) < 0$
(3) $(2x - 3)(2x - 9) \geq 0$
(4) $(2x - 3)(2x - 9) \leq 0$

60. The largest positive integer which satisfies $\dfrac{8x^2 + 16x - 51}{(2x - 3)(x + 4)} < 3$, is
(1) 1
(2) 3
(3) 4
(4) 2

61. If $n > 0$ and exactly 15 integers satisfy
$(x + 6)(x - 4)(x - 5)(2x - n) \leq 0$,
then the least possible value of n is
(1) 10
(2) 12
(3) 14
(4) 16

62. If $x < 5$, then $\sqrt{x^2 - 10x + 25} + x + 7$ is equal to
(1) $2x + 2$
(2) 5
(3) 12
(4) 0

63. The solution set of $0 < |3x + 1| < \dfrac{1}{3}$ is

(1) $\left(-\dfrac{4}{9}, -\dfrac{2}{9} \right)$

(2) $\left[-\dfrac{4}{9}, -\dfrac{2}{9} \right]$

(3) $\left(-\dfrac{4}{9}, -\dfrac{2}{9} \right) - \left\{ -\dfrac{1}{3} \right\}$

(4) $\left[-\dfrac{4}{9}, -\dfrac{2}{9} \right] - \left\{ -\dfrac{1}{3} \right\}$

64. The sum of the roots of the equation
$|x^2 - x - 6| = x + 2$, is
(1) 0
(2) -2
(3) 2
(4) 4

65. If $\left|x^2-2x+2\right|-\left|2x^2-5x+2\right|=\left|x^2-3x\right|$, then the set of value of x is

(1) $(-\infty,0] \cup [3,\infty)$

(2) $\left[0,\dfrac{1}{2}\right] \cup [2,3]$

(3) $(-\infty,0] \cup \left[\dfrac{1}{2},2\right] \cup [3,\infty)$

(4) $[0,2] \cup [3,\infty)$

66. Complete solution of inequality $\left||3x-9|+2\right| > 2$ is

(1) $(-\infty,\infty)$

(2) $\{3\}$

(3) $R-\{3\}$

(4) ϕ

67. Let a and b ($a>b$) are the solution of the equation $2|x+1|+|x-2|=9$, then

(1) $a+b=6$

(2) $a-b=0$

(3) $|ab|=9$

(4) $\left|\dfrac{a}{b}\right|=|a+b|$

68. The set of all real x satisfying the inequality $\dfrac{3-|x|}{4-|x|} \geq 0$, is

(1) $(-\infty,-4) \cup [-3,3] \cup (4,\infty)$

(2) $(-\infty,-4) \cup (4,\infty)$

(3) $(-\infty,-3) \cup (4,\infty)$

(4) $(-\infty,-3) \cup (3,\infty)$

69. The sum of all the real roots of the equation $|x-2|^2+|x-2|-2=0$, is

(1) 1

(2) 2

(3) 3

(4) 4

70. If $\left|x^2-9\right|=9-x^2$; then

(1) $x \in [-3,3]$

(2) $x \in [0,5]$

(3) $x \in (-5,5)$

(4) $x \in R$

Integer Type Questions

71. If x is an integer satisfying $x^2-6x+5\leq 0$ and $x^2-2x>0$, the number of positive values of x, is

72. If $a^2-5a-3=0$, then the value of $a^2+\dfrac{9}{a^2}$ is equal to

73. If $a+b+c=6$, $a^2+b^2+c^2=14$, and $a^3+b^3+c^3=36$ then the value of $6\left(\dfrac{1}{a}+\dfrac{1}{b}+\dfrac{1}{c}\right)$ is equal to

74. Number of integers satisfying the inequality $\dfrac{\left(x^2-9x+20\right)\left(x^2-13x+42\right)}{\left(x^2-11x+30\right)} < 0$, is

75. If $x^2-5|x|-14<0$, then sum of all its integral solutions is