

JEE Main 2027 Sample Paper

Paper 1 – B.E./B.Tech. Practice Test

Subjects: Physics, Chemistry, Mathematics

Total Questions: 90

Questions per Subject: 30

Suggested Practice Time: 3 Hours

Maximum Practice Score: 360 marks

Disclaimer: This is an original practice paper prepared for JEE Main 2027 preparation. It is not an official NTA question paper. The official JEE Main 2027 pattern and syllabus should be checked after NTA releases the 2027 Information Bulletin. The latest official NTA material available at present is for JEE Main 2026.

SECTION A – PHYSICS

Q1. Units and Measurements

The dimensions of the quantity

$$\frac{1}{2}\rho v^2$$

are the same as those of:

- A. Force
- B. Pressure
- C. Energy
- D. Power

Answer: B

Solution:

Density has dimensions ML^{-3} , while $v^2 = L^2T^{-2}$.

$$[\rho v^2] = ML^{-1}T^{-2}$$

These are the dimensions of pressure.

Q2. Kinematics

A particle starts from rest and moves with constant acceleration 4 m/s^2 . Its displacement in 5 s is:

- A. 25 m
- B. 40 m

- C. 50 m
- D. 100 m

Answer: C

Solution:

$$s = ut + \frac{1}{2}at^2$$
$$s = 0 + \frac{1}{2}(4)(25) = 50 \text{ m}$$

Q3. Projectile Motion

A projectile is fired with speed 20 m/s at 30° to the horizontal. Taking $g = 10 \text{ m/s}^2$, its maximum height is:

- A. 2.5 m
- B. 5 m
- C. 10 m
- D. 20 m

Answer: B

Solution:

$$H = \frac{u^2 \sin^2 \theta}{2g}$$
$$H = \frac{400(1/2)^2}{20} = 5 \text{ m}$$

Q4. Newton's Laws

A force of 20 N acts on a body of mass 5 kg. Its acceleration is:

- A. 2 m/s^2
- B. 4 m/s^2
- C. 5 m/s^2
- D. 10 m/s^2

Answer: B

Solution:

$$F = ma$$
$$a = \frac{20}{5} = 4 \text{ m/s}^2$$

Q5. Friction

A block rests on a horizontal surface. If the coefficient of static friction is 0.4 and $g = 10 \text{ m/s}^2$, the maximum frictional force for a 5 kg block is:

- A. 10 N
- B. 15 N
- C. 20 N
- D. 25 N

Answer: C

Solution:

$$\begin{aligned} f_{\max} &= \mu_s N \\ &= 0.4(5)(10) = 20 \text{ N} \end{aligned}$$

Q6. Work, Energy and Power

A 2 kg body moving at 10 m/s has kinetic energy:

- A. 50 J
- B. 100 J
- C. 150 J
- D. 200 J

Answer: B

Solution:

$$\begin{aligned} K &= \frac{1}{2}mv^2 \\ K &= \frac{1}{2}(2)(100) = 100 \text{ J} \end{aligned}$$

Q7. Circular Motion

A particle moves in a circle of radius 2 m with speed 4 m/s. Its centripetal acceleration is:

- A. 2 m/s^2
- B. 4 m/s^2
- C. 8 m/s^2
- D. 16 m/s^2

Answer: B

Solution:

$$a_c = \frac{v^2}{r} = \frac{16}{2} = 8 \text{ m/s}^2$$

Correct Answer: C

Q8. Centre of Mass

Two particles of masses 2 kg and 3 kg are located at $x = 0$ m and $x = 10$ m respectively. The centre of mass is:

- A. 4 m
- B. 5 m
- C. 6 m
- D. 8 m

Answer: C

Solution:

$$x_{CM} = \frac{2(0) + 3(10)}{2 + 3} = 6 \text{ m}$$

Q9. Rotational Motion

The moment of inertia of a thin ring of mass M and radius R , about an axis through its centre perpendicular to its plane, is:

- A. $\frac{1}{2}MR^2$
- B. MR^2
- C. $2MR^2$
- D. $\frac{1}{4}MR^2$

Answer: B

Q10. Gravitation

The escape velocity from Earth's surface is v_e . If Earth's radius becomes four times while mass remains unchanged, the new escape velocity is:

- A. $v_e/2$
- B. v_e
- C. $2v_e$
- D. $4v_e$

Answer: A

Solution:

$$v_e = \sqrt{\frac{2GM}{R}}$$

Thus $v_e \propto 1/\sqrt{R}$.

For $R' = 4R$:

$$v'_e = \frac{v_e}{2}$$

Q11. Properties of Matter

The pressure at a depth h below the surface of a liquid of density ρ is:

- A. ρgh
- B. $\rho g/h$
- C. $h/\rho g$
- D. $\rho h/g$

Answer: A

Q12. Thermodynamics

For an ideal gas undergoing an isothermal process, the change in internal energy is:

- A. Positive
- B. Negative
- C. Zero
- D. Infinite

Answer: C

Solution: Internal energy of an ideal gas depends only on temperature. Temperature remains constant.

Q13. Kinetic Theory

The average translational kinetic energy of an ideal gas molecule is:

- A. kT
- B. $\frac{1}{2}kT$
- C. $\frac{3}{2}kT$
- D. $2kT$

Answer: C

Q14. SHM

The time period of a simple pendulum of length L is:

- A. $2\pi\sqrt{g/L}$
- B. $2\pi\sqrt{L/g}$
- C. $\sqrt{L/g}$
- D. $2\pi Lg$

Answer: B

Q15. Waves

The speed of a wave is 340 m/s and its frequency is 170 Hz. Its wavelength is:

- A. 0.5 m
- B. 1 m
- C. 2 m
- D. 4 m

Answer: C

$$\lambda = \frac{v}{f} = \frac{340}{170} = 2\text{ m}$$

Q16. Electrostatics

Two charges $+q$ and $+q$ are separated by distance r . The electrostatic force between them is:

- A. kq^2/r
- B. kq^2/r^2
- C. kq/r^2
- D. kr^2/q^2

Answer: B

Q17. Electric Potential

The electric potential due to a point charge q at distance r is:

- A. kq/r
- B. kq/r^2
- C. kr/q
- D. q/r^2

Answer: A

Q18. Capacitance

Two capacitors of $2\ \mu\text{F}$ and $3\ \mu\text{F}$ are connected in parallel. Their equivalent capacitance is:

- A. $1.2\ \mu\text{F}$
- B. $5\ \mu\text{F}$
- C. $6\ \mu\text{F}$
- D. $2.5\ \mu\text{F}$

Answer: B

Q19. Current Electricity

A $6\ \Omega$ resistor carries a current of $2\ \text{A}$. The potential difference across it is:

- A. $3\ \text{V}$
- B. $6\ \text{V}$
- C. $12\ \text{V}$
- D. $18\ \text{V}$

Answer: C

$$V = IR = 2(6) = 12\ \text{V}$$

Q20. Kirchhoff's Laws

A $10\ \text{V}$ battery is connected to a $5\ \Omega$ resistor. The current is:

- A. $0.5\ \text{A}$
- B. $1\ \text{A}$
- C. $2\ \text{A}$
- D. $5\ \text{A}$

Answer: C

Q21. Magnetic Effects

A charged particle moving parallel to a uniform magnetic field experiences magnetic force:

- A. Maximum
- B. Minimum but non-zero
- C. Zero
- D. Infinite

Answer: C

$$F = qvB \sin \theta$$

For $\theta = 0^\circ$, $F = 0$.

Q22. Electromagnetic Induction

According to Faraday's law, induced emf is proportional to:

- A. Magnetic field only
- B. Rate of change of magnetic flux
- C. Current only
- D. Resistance only

Answer: B

Q23. Alternating Current

The RMS value of an AC current having peak value I_0 is:

- A. I_0
- B. $2I_0$
- C. $I_0/\sqrt{2}$
- D. $\sqrt{2}I_0$

Answer: C

Q24. Ray Optics

For a convex lens, an object placed at $2F$ forms an image:

- A. At F
- B. Between F and 2F
- C. At 2F
- D. At infinity

Answer: C

Q25. Wave Optics

In Young's double-slit experiment, fringe width is:

- A. $\lambda d/D$
- B. $\lambda D/d$
- C. dD/λ
- D. $D/\lambda d$

Answer: B

Q26. Dual Nature

The de Broglie wavelength of a particle having momentum p is:

- A. hp
- B. p/h
- C. h/p
- D. $h + p$

Answer: C

Q27. Atoms

The energy of the electron in the hydrogen atom in the n th orbit is proportional to:

- A. n
- B. $1/n$
- C. $1/n^2$
- D. n^2

Answer: C

Q28. Nuclear Physics

The half-life of a radioactive substance is 10 days. The fraction remaining after 30 days is:

- A. $1/2$
- B. $1/4$
- C. $1/8$
- D. $1/16$

Answer: C

Q29. Semiconductors

A pure semiconductor is called:

- A. Extrinsic semiconductor
- B. Intrinsic semiconductor
- C. P-type semiconductor
- D. N-type semiconductor

Answer: B

Q30. Communication/Electronics

In a p-n junction diode under forward bias, the depletion layer:

- A. Increases
- B. Decreases
- C. Remains unchanged
- D. Becomes infinite

Answer: B

SECTION B – CHEMISTRY

Q31. Mole Concept

The number of molecules in 18 g of water is approximately:

- A. 6.022×10^{23}
- B. 3.011×10^{23}
- C. 1.204×10^{24}
- D. 18×10^{23}

Answer: A

Q32. Atomic Structure

The maximum number of electrons that can occupy the $n = 3$ shell is:

- A. 8
- B. 18
- C. 32
- D. 9

Answer: B

$$2n^2 = 2(3)^2 = 18$$

Q33. Periodic Table

Which element has the highest electronegativity?

- A. O
- B. F
- C. Cl
- D. N

Answer: B

Q34. Chemical Bonding

The shape of CH_4 is:

- A. Linear
- B. Trigonal planar
- C. Tetrahedral
- D. Bent

Answer: C

Q35. Hybridisation

The hybridisation of carbon in ethene is:

- A. sp
- B. sp^2
- C. sp^3
- D. dsp^2

Answer: B

Q36. States of Matter

At constant temperature, Boyle's law states:

- A. $P \propto V$
- B. $PV = \text{constant}$
- C. $P/V = \text{constant}$
- D. $P + V = \text{constant}$

Answer: B

Q37. Thermochemistry

For an exothermic reaction, the enthalpy change is:

- A. Positive
- B. Negative
- C. Zero
- D. Infinite

Answer: B

Q38. Chemical Equilibrium

For a reaction at equilibrium:

- A. Forward reaction stops
- B. Reverse reaction stops
- C. Rates of forward and reverse reactions are equal
- D. Concentrations must be equal

Answer: C

Q39. Ionic Equilibrium

At 25°C, the pH of a neutral solution is:

- A. 0
- B. 5
- C. 7
- D. 14

Answer: C

Q40. Redox Reactions

Oxidation involves:

- A. Gain of electrons
- B. Loss of electrons
- C. Gain of protons only
- D. Loss of neutrons

Answer: B

Q41. Electrochemistry

The SI unit of conductivity is:

- A. $\Omega \text{ m}$
- B. S m^{-1}
- C. $\Omega^{-1} \text{ cm}$
- D. V/A

Answer: B

Q42. Chemical Kinetics

The unit of rate constant for a first-order reaction is:

- A. $\text{mol L}^{-1} \text{s}^{-1}$
- B. s^{-1}
- C. $\text{L mol}^{-1} \text{s}^{-1}$
- D. $\text{mol}^2 \text{L}^{-2} \text{s}^{-1}$

Answer: B

Q43. Surface Chemistry

Adsorption is generally:

- A. A bulk phenomenon
- B. A surface phenomenon
- C. A nuclear phenomenon
- D. A photochemical phenomenon

Answer: B

Q44. Solutions

Molarity is defined as:

- A. Moles of solute per kg solvent
- B. Moles of solute per litre of solution
- C. Grams of solute per litre solvent
- D. Moles of solvent per litre solution

Answer: B

Q45. Coordination Compounds

The coordination number of the central metal ion in $[\text{Co}(\text{NH}_3)_6]^{3+}$ is:

- A. 3
- B. 4
- C. 6
- D. 9

Answer: C

Q46. Metallurgy

The chief ore of aluminium is:

- A. Haematite
- B. Bauxite
- C. Galena
- D. Cinnabar

Answer: B

Q47. Hydrogen

Heavy water is:

- A. H_2O_2
- B. D_2O
- C. H_3O^+
- D. HDO_2

Answer: B

Q48. s-Block Elements

The most reactive alkali metal among the following is:

- A. Li
- B. Na
- C. K
- D. Cs

Answer: D

Q49. p-Block Elements

The inert pair effect becomes more prominent:

- A. Up the group
- B. Down the group
- C. Across a period only
- D. In the first period only

Answer: B

Q50. d-Block Elements

Which ion is generally colourless?

- A. Cu^{2+}
- B. Fe^{3+}
- C. Zn^{2+}
- D. Mn^{2+}

Answer: C

Reason: Zn^{2+} has a $3d^{10}$ configuration.

Q51. Organic Chemistry

The functional group in alcohols is:

- A. $-CHO$
- B. $-COOH$
- C. $-OH$
- D. $-CO-$

Answer: C

Q52. Hydrocarbons

The general formula of alkanes is:

- A. C_nH_{2n}
- B. C_nH_{2n+2}
- C. C_nH_{2n-2}
- D. C_nH_n

Answer: B

Q53. Aromatic Compounds

Benzene contains:

- A. 3 π electrons
- B. 4 π electrons
- C. 6 π electrons
- D. 8 π electrons

Answer: C

Q54. Haloalkanes

The reaction of an alkyl halide with aqueous KOH generally gives:

- A. Alkene
- B. Alcohol
- C. Aldehyde
- D. Ketone

Answer: B

Q55. Alcohols and Phenols

Phenol is more acidic than ethanol mainly because:

- A. Phenol has greater molecular mass
- B. Phenoxide ion is resonance-stabilised
- C. Ethanol contains more hydrogen
- D. Phenol is saturated

Answer: B

Q56. Aldehydes and Ketones

The functional group of aldehydes is:

- A. -COOH
- B. -CHO
- C. -OH
- D. -COO-

Answer: B

Q57. Carboxylic Acids

Acetic acid has the molecular formula:

- A. CH_3OH
- B. CH_3CHO
- C. CH_3COOH
- D. CH_3COCH_3

Answer: C

Q58. Amines

The functional group of primary amines is:

- A. -NH_2
- B. -NO_2
- C. -CN
- D. -OH

Answer: A

Q59. Biomolecules

The basic structural unit of proteins is:

- A. Glucose
- B. Amino acid
- C. Nucleotide
- D. Fatty acid

Answer: B

Q60. Polymers

The monomer of polyethylene is:

- A. Ethane
- B. Ethene
- C. Ethyne
- D. Benzene

Answer: B

SECTION C – MATHEMATICS

Q61. Sets

If $A = \{1, 2, 3\}$, the number of subsets of A is:

- A. 3
- B. 6
- C. 8
- D. 9

Answer: C

$$2^3 = 8$$

Q62. Complex Numbers

The value of i^2 is:

- A. 1
- B. -1
- C. i
- D. -i

Answer: B

Q63. Quadratic Equations

The roots of $x^2 - 5x + 6 = 0$ are:

- A. 1, 6
- B. 2, 3
- C. -2, -3
- D. 0, 6

Answer: B

Q64. Sequence and Series

The 10th term of the AP 2, 5, 8, 11, ... is:

- A. 27
- B. 29
- C. 30
- D. 32

Answer: B

$$a_{10} = 2 + 9(3) = 29$$

Q65. Binomial Theorem

The coefficient of x^2 in $(1 + x)^5$ is:

- A. 5
- B. 10
- C. 15
- D. 20

Answer: B

$${}^5C_2 = 10$$

Q66. Permutations

The number of ways to arrange 5 distinct objects is:

- A. 25
- B. 60
- C. 100
- D. 120

Answer: D

$$5! = 120$$

Q67. Probability

A fair coin is tossed once. Probability of obtaining a head is:

- A. 0
- B. $1/4$
- C. $1/2$
- D. 1

Answer: C

Q68. Matrices

If

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix},$$

then $\det A$ equals:

- A. -2
- B. 2
- C. 10
- D. -10

Answer: A

$$\det A = 1(4) - 2(3) = -2$$

Q69. Determinants

If the two rows of a determinant are identical, its value is:

- A. 1
- B. -1
- C. 0
- D. 2

Answer: C

Q70. Limits

$$\lim_{x \rightarrow 0} \frac{\sin x}{x}$$

is:

- A. 0
- B. 1
- C. -1
- D. ∞

Answer: B

Q71. Differentiation

The derivative of x^3 is:

- A. x^2
- B. $2x$
- C. $3x^2$
- D. $3x$

Answer: C

Q72. Application of Derivatives

A function is increasing at a point if its derivative there is:

- A. Negative
- B. Zero
- C. Positive
- D. Infinite only

Answer: C

Q73. Integration

$$\int x^2 dx$$

is:

- A. $x^3 + C$
- B. $\frac{x^3}{3} + C$
- C. $2x + C$
- D. $x^2/2 + C$

Answer: B

Q74. Definite Integration

$$\int_0^1 x dx$$

equals:

- A. 0
- B. 1/2
- C. 1
- D. 2

Answer: B

Q75. Differential Equations

The order of the differential equation

$$\frac{d^2 y}{dx^2} + y = 0$$

is:

- A. 0
- B. 1
- C. 2
- D. 3

Answer: C

Q76. Coordinate Geometry

The distance between (0, 0) and (3, 4) is:

- A. 3
- B. 4
- C. 5
- D. 7

Answer: C

Q77. Straight Lines

The slope of the line

$$y = 3x + 5$$

is:

- A. 3
- B. 5
- C. -3
- D. -5

Answer: A

Q78. Circle

The radius of the circle

$$x^2 + y^2 = 25$$

is:

- A. 5
- B. 10
- C. 25
- D. $\sqrt{5}$

Answer: A

Q79. Parabola

The standard equation of a parabola opening rightwards is:

- A. $x^2 = 4ay$
- B. $y^2 = 4ax$
- C. $x^2 + y^2 = a^2$
- D. $xy = a$

Answer: B

Q80. Ellipse

The standard equation of an ellipse centred at origin is:

- A. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
- B. $x^2 + y^2 = a$
- C. $y^2 = 4ax$
- D. $xy = 1$

Answer: A

Q81. Hyperbola

The standard equation

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$$

represents a:

- A. Circle
- B. Ellipse
- C. Hyperbola
- D. Parabola

Answer: C

Q82. Vectors

The magnitude of vector

$$\vec{A} = 3\hat{i} + 4\hat{j}$$

is:

- A. 3
- B. 4
- C. 5
- D. 7

Answer: C

Q83. Vector Product

If two non-zero vectors are parallel, their cross product is:

- A. Maximum
- B. Zero
- C. One
- D. Infinite

Answer: B

Q84. Three-Dimensional Geometry

The distance between points $(1, 2, 3)$ and $(1, 2, 8)$ is:

- A. 3
- B. 4
- C. 5
- D. 6

Answer: C

Q85. Statistics

The mean of 2, 4, 6, 8 and 10 is:

- A. 5
- B. 6
- C. 7
- D. 8

Answer: B

Q86. Probability

The probability of getting an even number when a fair die is thrown is:

- A. $1/6$
- B. $1/3$
- C. $1/2$
- D. $2/3$

Answer: C

Q87. Trigonometry

The value of

$$\sin^2 \theta + \cos^2 \theta$$

is:

- A. 0
- B. 1
- C. 2
- D. $\sin \theta \cos \theta$

Answer: B

Q88. Trigonometric Equations

The general solution of

$$\sin x = 0$$

is:

- A. $x = n\pi$
- B. $x = 2n\pi + \pi/2$
- C. $x = n\pi/2$
- D. $x = \pi/4 + n\pi$

Answer: A

where $n \in \mathbb{Z}$.

Q89. Mathematical Reasoning

If $p \Rightarrow q$ is true and p is true, then q is:

- A. False
- B. True
- C. Undefined
- D. Neither true nor false

Answer: B

Q90. Functions

If

$$f(x) = 2x + 3,$$

then $f(5)$ is:

- A. 8
- B. 10

- C. 13
D. 15

Answer: C

$$f(5) = 2(5) + 3 = 13$$

COMPLETE ANSWER KEY

Q	Ans.	Q	Ans.	Q	Ans.
1	B	31	A	61	C
2	C	32	B	62	B
3	B	33	B	63	B
4	B	34	C	64	B
5	C	35	B	65	B
6	B	36	B	66	D
7	C	37	B	67	C
8	C	38	C	68	A
9	B	39	C	69	C
10	A	40	B	70	B
11	A	41	B	71	C
12	C	42	B	72	C
13	C	43	B	73	B
14	B	44	B	74	B
15	C	45	C	75	C
16	B	46	B	76	C
17	A	47	B	77	A
18	B	48	D	78	A
19	C	49	B	79	B
20	C	50	C	80	A
21	C	51	C	81	C
22	B	52	B	82	C
23	C	53	C	83	B

Q	Ans.	Q	Ans.	Q	Ans.
24	C	54	B	84	C
25	B	55	B	85	B
26	C	56	B	86	C
27	C	57	C	87	B
28	C	58	A	88	A
29	B	59	B	89	B
30	B	60	B	90	C

QUICK ANSWER SUMMARY

Physics

1-B, 2-C, 3-B, 4-B, 5-C, 6-B, 7-C, 8-C, 9-B, 10-A,
11-A, 12-C, 13-C, 14-B, 15-C, 16-B, 17-A, 18-B, 19-C, 20-C,
21-C, 22-B, 23-C, 24-C, 25-B, 26-C, 27-C, 28-C, 29-B, 30-B

Chemistry

31-A, 32-B, 33-B, 34-C, 35-B, 36-B, 37-B, 38-C, 39-C, 40-B,
41-B, 42-B, 43-B, 44-B, 45-C, 46-B, 47-B, 48-D, 49-B, 50-C,
51-C, 52-B, 53-C, 54-B, 55-B, 56-B, 57-C, 58-A, 59-B, 60-B

Mathematics

61-C, 62-B, 63-B, 64-B, 65-B, 66-D, 67-C, 68-A, 69-C, 70-B,
71-C, 72-C, 73-B, 74-B, 75-C, 76-C, 77-A, 78-A, 79-B, 80-A,
81-C, 82-C, 83-B, 84-C, 85-B, 86-C, 87-B, 88-A, 89-B, 90-C

Important Note for JEE Main 2027 Aspirants

NTA's official website currently lists the **JEE Main 2026 Information Bulletin and 2026 syllabus**, while the 2027 bulletin has not yet appeared in the official documents listing.

Therefore, students should use this paper for **concept practice and revision**, and should compare the final question pattern, marking scheme and syllabus with the official **JEE Main 2027 Information Bulletin** when NTA releases it.

Official JEE Main website: <https://jeemain.nta.nic.in/>