VLYMBOOQ · FULL-LENGTH MOCK PAPER

JEE Main - Paper 1 (B.E./B.Tech) (Full Paper)

75 questions · 300 marks · 180 minutes

Paper pattern

Exam: JEE Main - Paper 1 (B.E./B.Tech) (Full Paper)
Questions: 75 Marks: 300 Time: 180 minutes
Negative marking: -1 mark for a wrong MCQ; numerical questions carry no negative
Source: JEE Main Paper 1: 75 questions, 300 marks, 180 minutes; 25 per subject (20 MCQ + 5 numerical); +4/-1.
Generated: 2026-11-07T02:25:27.863Z By: reviewed question bank
Note: Each subject has 20 MCQs + 5 numerical-answer questions. This bank stores MCQ form only, so the paper is assembled as 25 MCQs per subject.

Sections

Physics - 25 questions, 100 marks
Chemistry - 25 questions, 100 marks
Mathematics - 25 questions, 100 marks

Instructions

The timer is for practice; the real paper allows 180 minutes.
Each question has exactly one correct option.
Negative marking: -1 mark for a wrong MCQ; numerical questions carry no negative.
The answer key and a full explanation for every question follow the paper.
Model-generated questions are marked as such in the HTML page; verify any factual detail against the official notification.

Physics

Q1. Hooke's law relates stress and:

A. Force
B. Strain
C. Area
D. Volume

Q2. The Doppler effect in sound is observed when there is relative motion between source and:

A. Observer only
B. Medium only
C. Observer or source
D. Neither

Q3. SI unit of resistance is:

A. Volt
B. Ampere
C. Coulomb
D. Ohm

Q4. The photon energy of light with wavelength 500 nm is ($h = 6.63 \times 10^{3}$ Js):

A. 2.48×10^{1} J
B. 3.98×10^{1} J
C. 1.99×10^{1} J
D. 4.97×10^{1} J

Q5. The momentum of a photon of energy E is:

A. E/c^2
B. E/c
C. Ec
D. hE/c

Q6. The unit of electric current in SI is:

A. Coulomb
B. Ampere
C. Volt
D. Ohm

Q7. The speed of sound is maximum in:

A. Air
B. Water
C. Steel
D. Vacuum

Q8. The momentum of a photon of energy E is:

A. E/c^2
B. E/c
C. Ec
D. hE/c

Q9. First law of thermodynamics is based on:

A. Conservation of momentum
B. Conservation of energy
C. Conservation of mass
D. Conservation of charge

Q10. The efficiency of a Carnot engine operating between 500 K and 300 K is:

A. 60%
B. 40%
C. 50%
D. 30%

Q11. A wire of resistance R is stretched to double its length. New resistance will be:

A. R/2
B. R
C. 4R
D. 2R

Q12. A particle is moving with velocity $v = 2t^2 + 3t$. Find its acceleration at t = 2s.

A. 11 m/s^2
B. 10 m/s^2
C. 8 m/s^2
D. 14 m/s^2

Q13. The de Broglie wavelength of an electron moving with velocity v is . If velocity is doubled, wavelength becomes:

A. 2
B. /2
C. 4
D. /4

Q14. Hooke's law relates stress and:

A. Force
B. Strain
C. Area
D. Volume

Q15. Two resistors 4 and 6 are connected in series. The total resistance is:

A. 2.4
B. 10
C. 24
D. 4

Q16. A ray of light passes from air into a glass slab with a refractive index of 1.5. If the angle of incidence is 30 degrees, what is the angle of refraction?

A. 19.5 degrees
B. 20 degrees
C. 45 degrees
D. 60 degrees

Q17. Two resistors 4 and 6 are connected in series. The total resistance is:

A. 2.4
B. 10
C. 24
D. 4

Q18. In SHM, the acceleration is maximum at:

A. Mean position
B. Equilibrium position
C. Extreme position
D. Same everywhere

Q19. A wire of resistance R is stretched to double its length. New resistance will be:

A. R/2
B. R
C. 4R
D. 2R

Q20. The escape velocity of a body from Earth is 11.2 km/s. What is the escape velocity from a planet having mass 4 times and radius twice that of Earth?

A. 22.4 km/s
B. 5.6 km/s
C. 15.8 km/s
D. 11.2 km/s

Q21. A ball dropped from height h hits the ground with speed v. The value of v is proportional to:

A. h
B. vh
C. h^2
D. 1/h

Q22. The de Broglie wavelength of an electron moving with velocity v is . If velocity is doubled, wavelength becomes:

A. 2
B. /2
C. 4
D. /4

Q23. The phenomenon of splitting of white light into its components is called:

A. Reflection
B. Refraction
C. Dispersion
D. Diffraction

Q24. Hooke's law relates stress and:

A. Force
B. Strain
C. Area
D. Volume

Q25. A capacitor of 10 μF is charged to 100 V. The energy stored is:

A. 0.05 J
B. 0.05 J
C. 0.5 J
D. 5 J

Chemistry

Q26. What is the oxidation number of chromium in the compound Cr2O7^2-?

A. +3
B. +4
C. +6
D. +8

Q27. Which gas is known as "Laughing Gas"?

A. NO
B. NO
C. CO
D. CO

Q28. Which gas is known as "Laughing Gas"?

A. NO
B. NO
C. CO
D. CO

Q29. The coordination number in NaCl crystal structure is:

A. 4
B. 6
C. 8
D. 12

Q30. Which of the following is a Lewis acid?

A. NH3
B. AlCl3
C. H2O
D. OH

Q31. The molar mass of CaCO3 is:

A. 50 g/mol
B. 84 g/mol
C. 100 g/mol
D. 150 g/mol

Q32. What is the IUPAC name of the compound with the formula CH3CH2CH2OH?

A. Propan-1-ol
B. Propan-2-ol
C. Butan-1-ol
D. Butan-2-ol

Q33. Which of the following elements is liquid at room temperature?

A. Sodium
B. Mercury
C. Gold
D. Silver

Q34. Which bond has the highest bond energy?

A. C-C
B. C=C
C. CC
D. All equal

Q35. Atomic number of oxygen is:

A. 6
B. 7
C. 8
D. 16

Q36. The number of moles in 18 g of H2O is:

A. 0.5
B. 1
C. 2
D. 18

Q37. What is the pH of a 0.1 M solution of NaOH?

A. 1
B. 12
C. 13
D. 14

Q38. Shape of water molecule is:

A. Linear
B. Trigonal planar
C. Bent/V-shaped
D. Tetrahedral

Q39. The most abundant element in Earth's crust is:

A. Iron
B. Oxygen
C. Silicon
D. Aluminum

Q40. The oxidation state of Mn in KMnO is:

A. +5
B. +6
C. +7
D. +4

Q41. The functional group in alcohol is:

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

Q42. The functional group in alcohol is:

A. -CHO
B. -COOH
C. -OH
D. -NH2

Q43. Which of the following is an aromatic compound?

A. Cyclohexane
B. Benzene
C. Cyclohexene
D. 1,3-Butadiene

Q44. The functional group in alcohol is:

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

Q45. The number of valence electrons in carbon is:

A. 2
B. 3
C. 4
D. 5

Q46. The gas used in welding is:

A. Methane
B. Ethane
C. Acetylene
D. Propane

Q47. The number of valence electrons in carbon is:

A. 2
B. 3
C. 4
D. 5

Q48. Which process is used to separate crude oil into useful fractions?

A. Distillation
B. Crystallization
C. Fractional distillation
D. Chromatography

Q49. The IUPAC name of CH CH CH(CH)COOH is:

A. 2-Methylbutanoic acid
B. 2-Methylbutanoic acid
C. 3-Methylbutanoic acid
D. Pentanoic acid

Q50. The pH of 10 ³ M HCl solution is:

A. 1
B. 3
C. 7
D. 11

Mathematics

Q51. If f(x) = 2x + 1, find f(3):

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

Q52. If sin A = 1/2, then the value of A (acute) is:

A. 30 degrees
B. 30 degrees
C. 60 degrees
D. 90 degrees

Q53. The solution of 2x + 3 = 7 is:

A. 1
B. 2
C. 3
D. 4

Q54. Find the derivative of f(x) = sin(x^2).

A. cos(x^2)
B. 2x cos(x)
C. 2x cos(x^2)
D. x^2 cos(x^2)

Q55. The number of permutations of 3 objects taken 2 at a time is:

A. 3
B. 6
C. 9
D. 2

Q56. The mode of 1, 2, 2, 3, 3, 3, 4 is:

A. 2
B. 3
C. 4
D. 1

Q57. The sum of first 10 natural numbers is:

A. 45
B. 55
C. 50
D. 60

Q58. The value of x^2 dx is:

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

Q59. The value of 5! is:

A. 60
B. 100
C. 120
D. 24

Q60. The probability of getting a head when a fair coin is tossed is:

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

Q61. If the function f(x) = sin(x) is given, what is the value of x for which f(x) = 1?

A. 0
B. pi/2
C. pi
D. 3pi/2

Q62. The quadratic equation whose roots are 1 and 2 is:

A. x^2 - 3x + 2 = 0
B. x^2 - 3x + 2 = 0
C. x^2 + 3x + 2 = 0
D. x^2 - x + 2 = 0

Q63. The probability of getting a head when a fair coin is tossed is:

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

Q64. The value of 5! is:

A. 60
B. 100
C. 120
D. 24

Q65. The median of 1, 3, 5, 7, 9 is:

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

Q66. Which of these is a perfect square?

A. 20
B. 24
C. 36
D. 48

Q67. The probability of getting a head when a fair coin is tossed is:

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

Q68. The number of permutations of 3 objects taken 2 at a time is:

A. 3
B. 6
C. 9
D. 2

Q69. The value of $\sin^2 30° + \cos^2 30°$ is:

A. 0
B. 1/2
C. 1
D. 3/4

Q70. The number of permutations of 3 objects taken 2 at a time is:

A. 3
B. 6
C. 9
D. 2

Q71. If A = {1, 2, 3} and B = {2, 3, 4}, find A n B.

A. {1}
B. {2, 3}
C. {2, 3, 4}
D. {1, 2, 3, 4}

Q72. The sum of angles in a triangle is:

A. 90°
B. 180°
C. 180°
D. 360°

Q73. The roots of equation $x^2 - 5x + 6 = 0$ are:

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

Q74. The value of sin^230 degrees + cos^230 degrees is:

A. 0
B. 1/2
C. 1
D. 3/4

Q75. Find the derivative of f(x) = sin(x^2).

A. cos(x^2)
B. 2x cos(x)
C. 2x cos(x^2)
D. x^2 cos(x^2)

Answer key

Q1 B	**Q2 C**	**Q3 D**	**Q4 B**
Q5 B	**Q6 B**	**Q7 C**	**Q8 B**
Q9 B	**Q10 B**	**Q11 C**	**Q12 A**
Q13 B	**Q14 B**	**Q15 B**	**Q16 A**
Q17 B	**Q18 C**	**Q19 C**	**Q20 C**
Q21 B	**Q22 B**	**Q23 C**	**Q24 B**
Q25 B	**Q26 C**	**Q27 B**	**Q28 B**
Q29 B	**Q30 B**	**Q31 C**	**Q32 A**
Q33 B	**Q34 C**	**Q35 C**	**Q36 B**
Q37 C	**Q38 C**	**Q39 B**	**Q40 C**
Q41 C	**Q42 C**	**Q43 B**	**Q44 C**
Q45 C	**Q46 C**	**Q47 C**	**Q48 C**
Q49 B	**Q50 B**	**Q51 C**	**Q52 B**
Q53 B	**Q54 C**	**Q55 B**	**Q56 B**
Q57 B	**Q58 C**	**Q59 C**	**Q60 C**
Q61 B	**Q62 B**	**Q63 C**	**Q64 C**
Q65 C	**Q66 C**	**Q67 C**	**Q68 B**
Q69 C	**Q70 B**	**Q71 B**	**Q72 C**
Q73 B	**Q74 C**	**Q75 C**	

Solutions and explanations

Q1. Hooke's law relates stress and:
Answer: B
Within elastic limit, stress strain (Hooke's law).

Q2. The Doppler effect in sound is observed when there is relative motion between source and:
Answer: C
Doppler effect occurs when source or observer is in motion relative to each other.

Q3. SI unit of resistance is:
Answer: D
Resistance is measured in Ohms ( ).

Q4. The photon energy of light with wavelength 500 nm is (h = 6.63 × 10 ³ Js):
Answer: B
E = hc/ = (6.63×10 ³ × 3×10)/(500×10) = 3.98×10 ¹ J.

Q5. The momentum of a photon of energy E is:
Answer: B
p = E/c for a photon (since E = pc).

Q6. The unit of electric current in SI is:
Answer: B
Electric current is measured in Amperes (A).

Q7. The speed of sound is maximum in:
Answer: C
Sound travels fastest in solids (steel ~5000 m/s) due to close molecular arrangement.

Q8. The momentum of a photon of energy E is:
Answer: B
p = E/c for a photon (since E = pc).

Q9. First law of thermodynamics is based on:
Answer: B
U = Q - W. First law is the law of conservation of energy for thermodynamic systems.

Q10. The efficiency of a Carnot engine operating between 500 K and 300 K is:
Answer: B
= 1 - T2/T1 = 1 - 300/500 = 0.4 = 40%.

Q11. A wire of resistance R is stretched to double its length. New resistance will be:
Answer: C
When length is doubled (L' = 2L), cross-sectional area halves (A' = A/2). R' = L'/A' = (2L)/(A/2) = 4 L/A = 4R.

Q12. A particle is moving with velocity v = 2t² + 3t. Find its acceleration at t = 2s.
Answer: A
a = dv/dt = d(2t² + 3t)/dt = 4t + 3. At t = 2: a = 4(2) + 3 = 11 m/s².

Q13. The de Broglie wavelength of an electron moving with velocity v is . If velocity is doubled, wavelength becomes:
Answer: B
= h/p = h/(mv). If v doubles, ' = h/(m·2v) = /2.

Q14. Hooke's law relates stress and:
Answer: B
Within elastic limit, stress strain (Hooke's law).

Q15. Two resistors 4 and 6 are connected in series. The total resistance is:
Answer: B
R = 4 + 6 = 10 .

Q16. A ray of light passes from air into a glass slab with a refractive index of 1.5. If the angle of incidence is 30 degrees, what is the angle of refraction?
Answer: A
Using Snell's law, n1 sin(1) = n2 sin(2), where n1 = 1 (air) and n2 = 1.5 (glass). Rearranging the equation to solve for 2, we get sin(2) = (n1 / n2) * sin(1) = (1 / 1.5) * sin(30) = (2/3) * 0.5 = 1/3. Then 2 = arcsin(1/3) 19.5 degrees.

Q17. Two resistors 4 and 6 are connected in series. The total resistance is:
Answer: B
R = 4 + 6 = 10 .

Q18. In SHM, the acceleration is maximum at:
Answer: C
a = - ²x. Acceleration is maximum at extreme positions (x = ±A) and zero at mean position.

Q19. A wire of resistance R is stretched to double its length. New resistance will be:
Answer: C
When length is doubled (L' = 2L), cross-sectional area halves (A' = A/2). R' = L'/A' = (2L)/(A/2) = 4L/A = 4R.

Q20. The escape velocity of a body from Earth is 11.2 km/s. What is the escape velocity from a planet having mass 4 times and radius twice that of Earth?
Answer: C
v_e = sqrt(2GM/R). For new planet: v_e' = sqrt(2G.4M/2R) = sqrt(2.2GM/R) = sqrt2.sqrt(2GM/R) = sqrt2 x 11.2 = 15.84 km/s.

Q21. A ball dropped from height h hits the ground with speed v. The value of v is proportional to:
Answer: B
v = (2gh) v h.

Q22. The de Broglie wavelength of an electron moving with velocity v is . If velocity is doubled, wavelength becomes:
Answer: B
= h/p = h/(mv). If v doubles, ' = h/(m.2v) = /2.

Q23. The phenomenon of splitting of white light into its components is called:
Answer: C
Dispersion is the splitting of white light into its constituent colors (VIBGYOR).

Q24. Hooke's law relates stress and:
Answer: B
Within elastic limit, stress strain (Hooke's law).

Q25. A capacitor of 10 μF is charged to 100 V. The energy stored is:
Answer: B
$E = \frac{1}{2}CV^2 = \frac{1}{2} \times 10 \times 10 \times 100^2 = 0.05$ J.

Q26. What is the oxidation number of chromium in the compound Cr2O7^2-?
Answer: C
Let's denote the oxidation number of chromium as x. The oxidation number of oxygen is -2. The compound has a charge of -2, so the sum of the oxidation numbers of all the atoms must be equal to -2. Therefore, 2x + 7(-2) = -2. Simplifying the equation, we get 2x - 14 = -2. Then 2x = 12, and x = 6.

Q27. Which gas is known as "Laughing Gas"?
Answer: B
Nitrous oxide (NO) is called laughing gas due to its euphoric effects when inhaled.

Q28. Which gas is known as "Laughing Gas"?
Answer: B
Nitrous oxide (NO) is called laughing gas due to its euphoric effects when inhaled.

Q29. The coordination number in NaCl crystal structure is:
Answer: B
NaCl has face-centered cubic (FCC) structure with each Na surrounded by 6 Cl and vice versa.

Q30. Which of the following is a Lewis acid?
Answer: B
AlCl3 is electron deficient (can accept electron pair), hence a Lewis acid.

Q31. The molar mass of CaCO3 is:
Answer: C
Ca(40) + C(12) + 3O(48) = 100 g/mol.

Q32. What is the IUPAC name of the compound with the formula CH3CH2CH2OH?
Answer: A
The IUPAC name of the compound with the formula CH3CH2CH2OH is Propan-1-ol.

Q33. Which of the following elements is liquid at room temperature?
Answer: B
Mercury (Hg) and bromine (Br) are the only elements liquid at room temp.

Q34. Which bond has the highest bond energy?
Answer: C
Triple bond (CC) has highest bond energy - 839 kJ/mol vs 614 for double, 348 for single.

Q35. Atomic number of oxygen is:
Answer: C
Oxygen has atomic number 8 (configuration $1s^2 2s^2 2p4$).

Q36. The number of moles in 18 g of H2O is:
Answer: B
Molar mass of H2O = 18 g/mol. n = 18/18 = 1 mol.

Q37. What is the pH of a 0.1 M solution of NaOH?
Answer: C
NaOH is a strong base, so it completely dissociates in water to give OH- ions. The concentration of OH- ions is equal to the concentration of NaOH, which is 0.1 M. Using the equation pOH = -log[OH-], we get pOH = -log(0.1) = 1. Then, pH + pOH = 14, so pH = 14 - pOH = 14 - 1 = 13.

Q38. Shape of water molecule is:
Answer: C
Water has 2 bond pairs + 2 lone pairs -> bent shape with ~104.5 degrees bond angle.

Q39. The most abundant element in Earth's crust is:
Answer: B
Oxygen (~46.6%) is the most abundant element in Earth's crust.

Q40. The oxidation state of Mn in KMnO is:
Answer: C
K(+1) + Mn + 4O(-2) = 0 -> +1 + Mn -8 = 0 -> Mn = +7.

Q41. The functional group in alcohol is:
Answer: C
Alcohols contain the hydroxyl (-OH) functional group.

Q42. The functional group in alcohol is:
Answer: C
Alcohols contain the hydroxyl (-OH) functional group.

Q43. Which of the following is an aromatic compound?
Answer: B
Benzene follows Hückel's rule (4n+2 p electrons, n=1) and is planar with delocalized electrons.

Q44. The functional group in alcohol is:
Answer: C
Alcohols contain the hydroxyl (-OH) functional group.

Q45. The number of valence electrons in carbon is:
Answer: C
Carbon (Z=6) has electronic configuration 2,4 -> 4 valence electrons.

Q46. The gas used in welding is:
Answer: C
Acetylene (C2H2) produces high temperature flame used in oxy-acetylene welding.

Q47. The number of valence electrons in carbon is:
Answer: C
Carbon (Z=6) has electronic configuration 2,4 -> 4 valence electrons.

Q48. Which process is used to separate crude oil into useful fractions?
Answer: C
Fractional distillation separates petroleum into fractions based on boiling points.

Q49. The IUPAC name of CH CH CH(CH)COOH is:
Answer: B
Longest chain has 4 C with COOH at C1 and methyl at C2 -> 2-Methylbutanoic acid.

Q50. The pH of 10 ³ M HCl solution is:
Answer: B
[H] = 10 ³ M. pH = -log[H] = -log(10 ³) = 3.

Q51. If f(x) = 2x + 1, find f(3):
Answer: C
f(3) = 2(3) + 1 = 7.

Q52. If sin A = 1/2, then the value of A (acute) is:
Answer: B
sin 30 degrees = 1/2.

Q53. The solution of 2x + 3 = 7 is:
Answer: B
2x = 4 x = 2.

Q54. Find the derivative of f(x) = sin(x^2).
Answer: C
Using chain rule: d/dx[sin(x^2)] = cos(x^2) . d/dx(x^2) = 2x cos(x^2).

Q55. The number of permutations of 3 objects taken 2 at a time is:
Answer: B
P = 3!/(3-2)! = 6.

Q56. The mode of 1, 2, 2, 3, 3, 3, 4 is:
Answer: B
3 appears 3 times (highest frequency).

Q57. The sum of first 10 natural numbers is:
Answer: B
Sum = n(n+1)/2 = 10×11/2 = 55.

Q58. The value of x^2 dx is:
Answer: C
x^2 dx = [x/3] = 1/3 - 0 = 1/3.

Q59. The value of 5! is:
Answer: C
5! = 5x4x3x2x1 = 120.

Q60. The probability of getting a head when a fair coin is tossed is:
Answer: C
P(Head) = 1/2 (favorable outcomes / total outcomes).

Q61. If the function f(x) = sin(x) is given, what is the value of x for which f(x) = 1?
Answer: B
The function f(x) = sin(x) has a value of 1 when x = pi/2. This is because the sine function has a maximum value of 1 at x = pi/2.

Q62. The quadratic equation whose roots are 1 and 2 is:
Answer: B
Sum = 3, Product = 2 -> x^2 - 3x + 2 = 0.

Q63. The probability of getting a head when a fair coin is tossed is:
Answer: C
P(Head) = 1/2 (favorable outcomes / total outcomes).

Q64. The value of 5! is:
Answer: C
5! = 5×4×3×2×1 = 120.

Q65. The median of 1, 3, 5, 7, 9 is:
Answer: C
Middle value of sorted 5 numbers = 5.

Q66. Which of these is a perfect square?
Answer: C
$36 = 6^2$. Others are not perfect squares.

Q67. The probability of getting a head when a fair coin is tossed is:
Answer: C
P(Head) = 1/2 (favorable outcomes / total outcomes).

Q68. The number of permutations of 3 objects taken 2 at a time is:
Answer: B
$^3P2 = 3!/(3-2)! = 6$.

Q69. The value of $\sin^2 30° + \cos^2 30°$ is:
Answer: C
$\sin^2 + \cos^2 = 1$ (identity).

Q70. The number of permutations of 3 objects taken 2 at a time is:
Answer: B
P = 3!/(3-2)! = 6.

Q71. If A = {1, 2, 3} and B = {2, 3, 4}, find A n B.
Answer: B
A n B = elements common to both sets = {2, 3}.

Q72. The sum of angles in a triangle is:
Answer: C
Sum of interior angles of a triangle = 180°.

Q73. The roots of equation $x^2 - 5x + 6 = 0$ are:
Answer: B
$x^2 - 5x + 6 = (x-2)(x-3) = 0$ x = 2 or x = 3.

Q74. The value of sin^230 degrees + cos^230 degrees is:
Answer: C
sin^2 + cos^2 = 1 (identity).

Q75. Find the derivative of f(x) = sin(x^2).
Answer: C
Using chain rule: d/dx[sin(x^2)] = cos(x^2) . d/dx(x^2) = 2x cos(x^2).