

PhysicsByAaryan

CSIR NET · GATE · JEST · BARC – Physics

GATE Physics 2017 — Full Question Paper

Previous Year Questions with Official Answer Key

Inside this PDF

- Every GATE Physics (PH) 2017 question, in order
- Marking scheme + question type (MCQ/MSQ/NAT) on every question
- Subject & topic classification per question
- Official answer key at the end

65

Questions
with answer key

*Questions taken from official GATE Physics (PH) papers conducted by IITs / IISc.
Compiled by PhysicsByAaryan for free use by aspirants. Answer key at the end of this PDF.*

Q1. [Marks: 1 | MCQ]

Electromagnetism · Electrostatics

Gate 2017	MCQ	1M
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Identical charges q are placed at five vertices of a regular hexagon of side a . The magnitude of the electric field and the electrostatic potential at the centre of the hexagon are respectively

(A) 0,0

(B) $\frac{q}{4\pi\epsilon_0 a^2}, \frac{q}{4\pi\epsilon_0 a}$ (C) $\frac{q}{4\pi\epsilon_0 a^2}, \frac{5q}{4\pi\epsilon_0 a}$ (D) $\frac{\sqrt{5}q}{4\pi\epsilon_0 a^2}, \frac{\sqrt{5}q}{4\pi\epsilon_0 a}$

Q2. [Marks: 1 | NAT]

Electromagnetism · Electrostatics

Gate 2017	NAT	1M
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A parallel plate capacitor with square plates of side 1 m separated by 1 micro meter is filled with a medium of dielectric constant of 10 . If the charges on the two plates are 1 C and -1 C , the voltage across the capacitor is ___ kV . (up to two decimal places). ($\epsilon_0 = 8.854 \times 10^{-12}$ F/m)

Q3. [Marks: 1 | NAT]

Optics · Ray optics

Gate 2017	NAT	1M
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Light is incident from a medium of refractive index $n = 1.5$ onto vacuum. The smallest angle of incidence for which the light is not transmitted into vacuum is ___ degrees. (up to two decimal places).

Q4. [Marks: 1 | NAT]

Electromagnetism · EM Waves

Gate 2017	NAT	1M
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A monochromatic plane wave in free space with electric field amplitude of 1 V/m is normally incident on a fully reflecting mirror. The pressure exerted on the mirror is ___ $\times 10^{-12}$ Pa. (up to two decimal places) ($\epsilon_0 = 8.854 \times 10^{-12} \text{ F/m}$).

Q5. [Marks: 1 | NAT]

Electronics · AD/DA conversion

Gate 2017	NAT	1M
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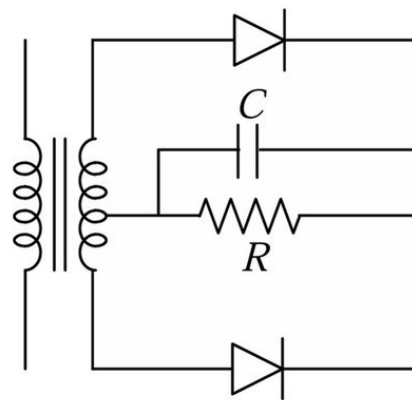
The best resolution that a 7 bit A/D convertor with 5 V full scale can achieve is ___ mV. (up to two decimal places).

Q6. [Marks: 1 | MCQ]

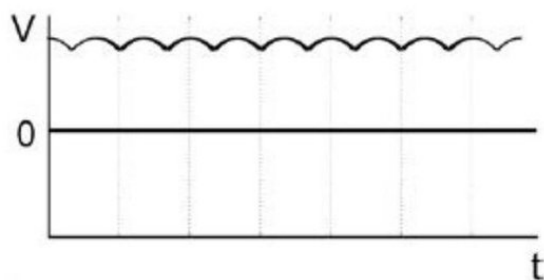
Electronics · Diodes

Gate 2017	MCQ	1M
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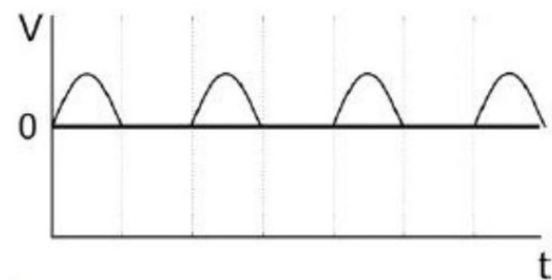
In the figure given below, the input to the primary of the transformer is a voltage varying sinusoidally with time. The resistor R is connected to the centre tap of the secondary. Which one of the following plots represents the voltage across the resistor R as a function of time?



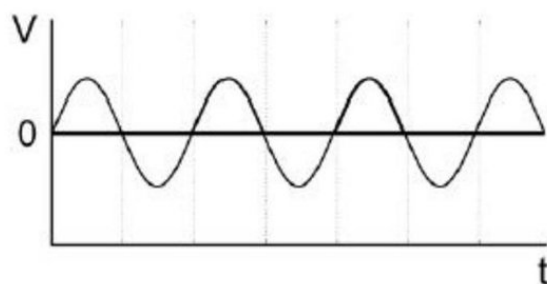
(A)



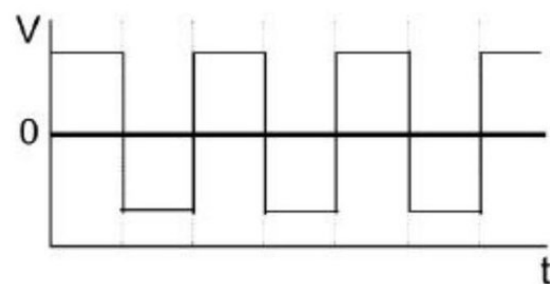
(B)



(C)



(D)



Q7. [Marks: 1 | NAT]

Solid State Physics · Crystallography

Gate 2017	NAT	1M
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The atomic mass and mass density of Sodium are 23 and 0.968 g cm^{-3} , respectively. The number density of valence electrons is $___ \times 10^{22} \text{ cm}^{-3}$.

(Up to two decimal places.)

(Avogadro number, $N_A = 6.022 \times 10^{23}$).

Q8. [Marks: 1 | MCQ]

Solid State Physics · Tight binding model

Gate 2017	MCQ	1M
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Consider a one-dimensional lattice with a weak periodic potential $U(x) = U_0 \cos\left(\frac{2\pi x}{a}\right)$. The gap at the edge of the Brillouin zone ($k = \frac{\pi}{a}$) is:

(A) U_0

(B) $\frac{U_0}{2}$

(C) $2U_0$

(D) $\frac{U_0}{4}$

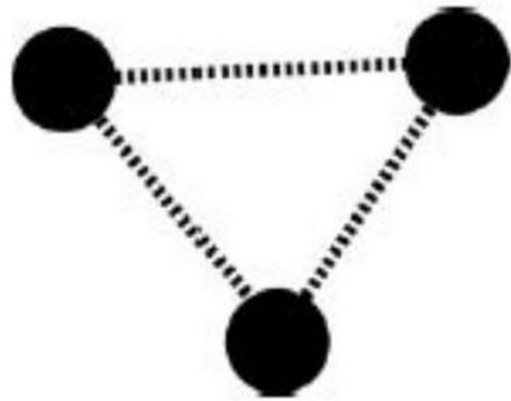
Q9. [Marks: 1 | MCQ]

Thermodynamics · Kinetic theory of gases

Gate 2017	MCQ	1M
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Consider a triatomic molecule of the shape shown in the figure below in three dimensions. The heat capacity of this molecule at high temperature (temperature much higher than the vibrational and rotational energy scales of the molecule but lower than its bond dissociation energies) is:

- (A) $\frac{3}{2}k_B$
- (B) $3k_B$
- (C) $\frac{9}{2}k_B$
- (D) $6k_B$



Q10. [Marks: 1 | MCQ]

Classical Mechanics · Lagrangian and Hamiltonian

Gate 2017	MCQ	1M
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If the Lagrangian $L_0 = \frac{1}{2} m \left(\frac{dq}{dt} \right)^2 - \frac{1}{2} m \omega^2 q^2$ is

modified to $L = L_0 + \alpha q \left(\frac{dq}{dt} \right)$, which one of the following is TRUE?

- (A) Both the canonical momentum and equation of motion do not change
- (B) Canonical momentum changes, equation of motion does not change
- (C) Canonical momentum does not change, equation of motion changes
- (D) Both the canonical momentum and equation of motion change

Q11. [Marks: 1 | NAT]

Classical Mechanics · Small Oscillations

Gate 2017	NAT	1M
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Two identical masses of 10 gm each are connected by a massless spring of spring constant 1 N/m. The non-zero angular eigenfrequency of the system is ___ rad/s. (up to two decimal places).

Q12. [Marks: 1 | MCQ]

Classical Mechanics · Phase diagram

Gate 2017	MCQ	1M
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The phase space trajectory of an otherwise free particle bouncing between two hard walls elastically in one dimension is a

- (A) straight line
- (B) parabola
- (C) rectangle
- (D) circle

Q13. [Marks: 1 | MCQ]

Classical Mechanics · Canonical Transformation and Poisson bracket

Gate 2017	MCQ	1M
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The Poisson bracket $[x, xp_y + yp_x]$ is equal to

- (A) $-x$
- (B) y
- (C) $2p_x$
- (D) p_y

Q14. [Marks: 1 | MCQ]

Quantum Mechanics · Orbital angular momentum and hydrogen atom

Gate 2017	MCQ	1M
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The wavefunction of which orbital is spherically symmetric:

- (A) p_x
- (B) p_y
- (C) s
- (D) d_{xy}

Q15. [Marks: 1 | NAT]

Mathematical Physics · Complex Analysis

Gate 2017	NAT	1M
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The contour integral $\oint \frac{dz}{1+z^2}$ evaluated along a contour going from $-\infty$ to $+\infty$ along the real axis and closed in the lower half-plane by a half circle is equal to ____ (up to two decimal places).

Q16. [Marks: 1 | NAT]

Quantum Mechanics · Basics Quantum Mechanics

Gate 2017	NAT	1M
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The Compton wavelength of a proton is ___ fm. (up to two decimal places).

$$(m_p = 1.67 \times 10^{-27} \text{ kg}, h = 6.626 \times 10^{-34} \text{ Js}, \\ e = 1.602 \times 10^{-19} \text{ C}, c = 3 \times 10^8 \text{ ms}^{-1})$$

Q17. [Marks: 1 | MCQ]

Nuclear and Particle Physics · Particle Physics

Gate 2017	MCQ	1M
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Which one of the following conservation laws is violated in the decay $\tau^+ \rightarrow \mu^+ \mu^+ \mu^-$

- (A) Angular momentum
- (B) Total Lepton number
- (C) Electric charge
- (D) Tau number

Q18. [Marks: 1 | MCQ]

Nuclear and Particle Physics · Particle Physics

Gate 2017	MCQ	1M
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Electromagnetic interactions are :

- (A) C conserving
- (B) C non-conserving but CP conserving
- (C) CP non-conserving but CPT conserving
- (D) CPT non-conserving

Q19. [Marks: 1 | MCQ]

Quantum Mechanics · Perturbation Theory

Gate 2017	MCQ	1M
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A one dimensional simple harmonic oscillator with

Hamiltonian $H_0 = \frac{p^2}{2m} + \frac{1}{2}kx^2$ is subjected to a small perturbation, $H_1 = \alpha x + \beta x^3 + \gamma x^4$. The first order correction to the ground state energy is dependent on

- (A) only β
- (B) α and γ
- (C) α and β
- (D) only γ

Q20. [Marks: 1 | MCQ]

Quantum Mechanics · Spin and Total Angular momentum

Gate 2017	MCQ	1M
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For the Hamiltonian $H = a_0 I + \vec{b} \cdot \vec{\sigma}$ where $a_0 \in R$, \vec{b} is a real vector, I is the 2×2 identity matrix, and $\vec{\sigma}$ are the Pauli matrices, the ground state energy is

- (A) $|\mathbf{b}|$
- (B) $2a_0 - |\mathbf{b}|$
- (C) $a_0 - |\mathbf{b}|$
- (D) a_0

Q21. [Marks: 1 | MCQ]

Mathematical Physics · Fourier and Laplace transform

Gate 2017	MCQ	1M
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The coefficient of e^{ikx} in the Fourier expansion of $u(x) = A \sin^2(\alpha x)$ for $k = -2\alpha$ is

- (A) $A/4$
- (B) $-A/4$
- (C) $A/2$
- (D) $-A/2$

Q22. [Marks: 1 | MCQ]

Quantum Mechanics · Quantum Harmonic Oscillator

Gate 2017	MCQ	1M
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The degeneracy of the third energy level of a 3-dimensional isotropic quantum harmonic oscillator is

- (A) 6
- (B) 12
- (C) 8
- (D) 10

Q23. [Marks: 1 | MCQ]

Atomic and Molecular Physics · Model of atom

Gate 2017	MCQ	1M
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The electronic ground state energy of the Hydrogen atom is -13.6 eV . The highest possible electronic energy eigenstate has an energy equal to

- (A) 0
- (B) 1 eV
- (C) $+13.6 \text{ eV}$
- (D) ∞

Q24. [Marks: 1 | MCQ]

Thermodynamics · Carnot Cycle

Gate 2017	MCQ	1M
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A reversible Carnot engine is operated between temperatures T_1 and T_2 ($T_2 > T_1$) with a photon gas as the working substance. The efficiency of the engine is

- (A) $1 - \frac{3T_1}{4T_2}$
- (B) $1 - \frac{T_1}{T_2}$
- (C) $1 - \left(\frac{T_1}{T_2}\right)^{3/4}$
- (D) $1 - \left(\frac{T_1}{T_2}\right)^{4/3}$

Q25. [Marks: 1 | MCQ]

Nuclear and Particle Physics · Radioactivity

Gate 2017	MCQ	1M
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In the nuclear reaction ${}^{13}\text{C}_6 + \nu_e \rightarrow {}^{13}\text{N}_7 + X$, the particle X is

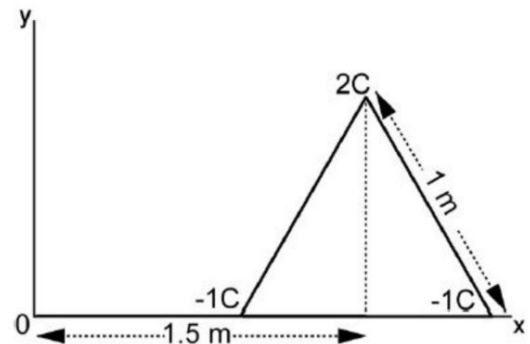
- (A) an electron
- (B) an anti-electron
- (C) a muon
- (D) a pion

Q26. [Marks: 2 | NAT]

Electromagnetism · Electrostatics

Gate 2017	NAT	2M
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Three charges ($2C, -1C, -1C$) are placed at the vertices of an equilateral triangle of side 1 m as shown in the figure. The component of the electric dipole moment about the marked origin along the \hat{y} direction is ___ cm .



Q27. [Marks: 2 | MCQ]

Electromagnetism · Magnetism

Gate 2017	MCQ	2M
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An infinite solenoid carries a time varying current $I(t) = At^2$, with $A \neq 0$. The axis of the solenoid is along the \hat{z} direction. \hat{r} and $\hat{\theta}$ are the usual radial and polar directions in cylindrical polar coordinates. $\vec{B} = B_r\hat{r} + B_\theta\hat{\theta} + B_z\hat{z}$ is the magnetic field at a point outside the solenoid. Which one of the following statements is true?

- (A) $B_r = 0, B_\theta = 0, B_z = 0$
 (B) $B_r \neq 0, B_\theta \neq 0, B_z = 0$
 (C) $B_r \neq 0, B_\theta \neq 0, B_z \neq 0$
 (D) $B_r = 0, B_\theta = 0, B_z \neq 0$

Q28. [Marks: 2 | NAT]

Electromagnetism · Electrostatics

Gate 2017	NAT	2M
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A uniform volume charge density is placed inside a conductor (with resistivity $10^{-2} \Omega \text{ m}$). The charge density becomes $1/(2.718)$ of its original value after time ___ femto seconds. (up to two decimal places) ($\epsilon_0 = 8.854 \times 10^{-12} \text{ F/m}$)

Q29. [Marks: 2 | NAT]

Thermodynamics · Phase transition

Gate 2017	NAT	2M
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Water freezes at 0°C at atmospheric pressure ($1.01 \times 10^5 \text{ Pa}$). The densities of water and ice at this temperature and pressure are 1000 kg/m^3 and 934 kg/m^3 respectively. The latent heat of fusion is $3.34 \times 10^5 \text{ J/kg}$. The pressure required for depressing the melting temperature of ice by 10°C is ___ GPa. (up to two decimal places)

Q30. [Marks: 2 | MCQ]

Electronics · Logic Gates

Gate 2017	MCQ	2M
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The minimum number of NAND gates required to construct an OR gate is:

- (A) 2
- (B) 4
- (C) 5
- (D) 3

Q31. [Marks: 2 | NAT]

Solid State Physics · Free electron model

Gate 2017	NAT	2M
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Consider a 2-dimensional electron gas with a density of 10^{19} m^{-2} . The Fermi energy of the system is ___ eV (up to two decimal places).
 ($m_e = 9.31 \times 10^{-31} \text{ kg}$, $h = 6.626 \times 10^{-34} \text{ Js}$,
 $e = 1.602 \times 10^{-19} \text{ C}$)

Q32. [Marks: 2 | NAT]

Solid State Physics · Lattice vibration

Gate 2017	NAT	2M
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The total energy of an inert-gas crystal is given by $E(R) = \frac{0.5}{R^{12}} - \frac{1}{R^6}$ (in eV), where R is the inter-atomic spacing in Angstroms. The equilibrium separation between the atoms is ___ Angstroms. (up to two decimal places).

Q33. [Marks: 2 | MCQ]

Statistical Mechanics · Canonical ensemble

Gate 2017	MCQ	2M
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Consider N non-interacting, distinguishable particles in a two-level system at temperature T . The energies of the levels are 0 and ε , where $\varepsilon > 0$. In the high temperature limit ($k_B T \gg \varepsilon$), what is the population of particles in the level with energy ε ?

- (A) $\frac{N}{2}$
(B) N
(C) $\frac{N}{4}$
(D) $\frac{3N}{4}$

Q34. [Marks: 2 | NAT]

Quantum Mechanics · Potential Well

Gate 2017	NAT	2M
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A free electron of energy 1 eV is incident upon a one-dimensional finite potential step of height 0.75 eV . The probability of its reflection from the barrier is ___ (up to two decimal places).

Q35. [Marks: 2 | MCQ]

Quantum Mechanics · Basics Quantum Mechanics

Gate 2017	MCQ	2M
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Consider a one-dimensional potential well of width 3 nm . Using the uncertainty principle ($\Delta x \cdot \Delta p \geq h/2$), an estimate of the minimum depth of the well such that it has at least one bound state for an electron is ($m_e = 9.31 \times 10^{-31}$ kg, $h = 6.626 \times 10^{-34}$ J s, $e = 1.602 \times 10^{-19}$ C) :

- (A) $1\mu\text{eV}$
- (B) 1 meV
- (C) 1 eV
- (D) 1 MeV

Q36. [Marks: 2 | NAT]

Electromagnetism · Plasma

Gate 2017	NAT	2M
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Consider a metal with free electron density of $6 \times 10^{22} \text{ cm}^{-3}$. The lowest frequency electromagnetic radiation to which this metal is transparent is $1.38 \times 10^{16} \text{ Hz}$. If this metal had a free electron density of $1.8 \times 10^{23} \text{ cm}^{-3}$ instead, the lowest frequency electromagnetic radiation to which it would be transparent is $___ \times 10^{16} \text{ Hz}$. (up to two decimal places).

Q37. [Marks: 2 | NAT]

Classical Mechanics · Special theory of relativity

Gate 2017	NAT	2M
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An object travels along the x-direction with velocity $c/2$ in a frame O . An observer in a frame O' sees the same object travelling with velocity $c/4$. The relative velocity of O' with respect to O in units of c is $___$. (up to two decimal places).

Q38. [Marks: 2 | NAT]

Mathematical Physics · Gamma, Beta and Delta function

Gate 2017	NAT	2M
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The integral $\int_0^{\infty} x^2 e^{-x^2} dx$ is equal to ____ . (up to two decimal places).

Q39. [Marks: 2 | NAT]

Mathematical Physics · Complex Analysis

Gate 2017	NAT	2M
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The imaginary part of an analytic complex function is $v(x, y) = 2xy + 3y$. The real part of the function is zero at the origin. The value of the real part of the function at $1 + i$ is ____ . (up to two decimal places).

Q40. [Marks: 2 | MCQ]

Mathematical Physics · Matrices

Gate 2017	MCQ	2M
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Let X be a column vector of dimension $n > 1$ with at least one non-zero entry. The number of non-zero eigenvalues of the matrix $M = XX^T$ is

- (A) 0
- (B) n
- (C) 1
- (D) $n - 1$

Q41. [Marks: 2 | MCQ]

Nuclear and Particle Physics · Shell Model

Gate 2017	MCQ	2M
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J^P for the ground state of the $^{13}\text{C}_6$ nucleus is

- (A) 1^+
- (B) $\frac{3^-}{2}$
- (C) $\frac{3^+}{2}$
- (D) $\frac{1^-}{2}$

Q42. [Marks: 2 | NAT]

Classical Mechanics · Rotation Motion

Gate 2017	NAT	2M
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A uniform solid cylinder is released on a horizontal surface with speed 5 m/s without any rotation (slipping without rolling). The cylinder eventually starts rolling without slipping. If the mass and radius of the cylinder are 10 gm and 1 cm respectively, the final linear velocity of the cylinder is ___ m/s. (up to two decimal places).

Q43. [Marks: 2 | NAT]

Statistical Mechanics · Quantum Statistical Mechanics

Gate 2017	NAT	2M
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The energy density and pressure of a photon gas are given by $u = aT^4$ and $P = u/3$, where T is the temperature and a is the radiation constant. The entropy per unit volume is given by αaT^3 . The value of α is ____ . (up to two decimal places).

Q44. [Marks: 2 | MCQ]

Atomic and Molecular Physics · ESR/EPR/NMR

Gate 2017	MCQ	2M
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Which one of the following gases of diatomic molecules is Raman, infrared, and NMR active?

- (A) $^1\text{H} - ^1\text{H}$
- (B) $^{12}\text{C} - ^{16}\text{O}$
- (C) $^1\text{H} - ^{35}\text{Cl}$
- (D) $^{16}\text{O} - ^{16}\text{O}$

Q45. [Marks: 2 | NAT]

Nuclear and Particle Physics · Radioactivity

Gate 2017	NAT	2M
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The π^+ decays at rest to μ^+ and ν_μ . Assuming the neutrino to be massless, the momentum of the neutrino is ___ MeV/c. (up to two decimal places) ($m_\pi = 139\text{MeV}/c^2$, $m_\mu = 105\text{MeV}/c^2$).

Q46. [Marks: 2 | MCQ]

Atomic and Molecular Physics · Effects in atomic physics

Gate 2017	MCQ	2M
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Using Hund's rule, the total angular momentum quantum number J for the electronic ground state of the nitrogen atom is

- (A) $1/2$
- (B) $3/2$
- (C) 0
- (D) 1

Q47. [Marks: 2 | MCQ]

Quantum Mechanics · Basics Quantum Mechanics

Gate 2017	MCQ	2M
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Which one of the following operators is Hermitian?

- (A) $i \frac{(p_x x^2 - x^2 p_x)}{2}$
- (B) $i \frac{(p_x x^2 + x^2 p_x)}{2}$
- (C) $e^{ip_x a}$
- (D) $e^{-ip_x a}$

Q48. [Marks: 2 | MCQ]

Solid State Physics · Crystallography

Gate 2017	MCQ	2M
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The real space primitive lattice vectors are

$\vec{a}_1 = a\hat{x}$ and $\vec{a}_2 = \frac{a}{2}(\hat{x} + \sqrt{3}\hat{y})$. The reciprocal space unit vectors \vec{b}_1 and \vec{b}_2 for this lattice are, respectively

- (A) $\frac{2\pi}{a}(\hat{x} - \frac{\hat{y}}{\sqrt{3}})$ and $\frac{4\pi}{a\sqrt{3}}\hat{y}$
- (B) $\frac{2\pi}{a}(\hat{x} + \frac{\hat{y}}{\sqrt{3}})$ and $\frac{4\pi}{a\sqrt{3}}\hat{y}$
- (C) $\frac{2\pi}{a\sqrt{3}}\hat{x}$ and $\frac{4\pi}{a}(\frac{\hat{x}}{\sqrt{3}} + \hat{y})$
- (D) $\frac{2\pi}{a\sqrt{3}}\hat{x}$ and $\frac{4\pi}{a}(\frac{\hat{x}}{\sqrt{3}} - \hat{y})$

Q49. [Marks: 2 | MCQ]

Statistical Mechanics · Microstates

Gate 2017	MCQ	2M
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Consider two particles and two non-degenerate quantum levels 1 and 2. Level 1 always contains a particle. Hence, what is the probability that level 2 also contains a particle for each of the two cases:

(i) when the two particles are distinguishable and
(ii) when the two particles are bosons?

- (A) (i) $1/2$ and (ii) $1/3$
(B) (i) $1/2$ and (ii) $1/2$
(C) (i) $2/3$ and (ii) $1/2$
(D) (i) 1 and (ii) 0

Q50. [Marks: 2 | NAT]

Classical Mechanics · Coriolis Force

Gate 2017	NAT	2M
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A person weighs w_p at Earth's north pole and w_e at the equator. Treating the Earth as a perfect sphere of radius 6400 km, the value $100 \times (w_p - w_e)/w_p$ is ____ . (up to two decimal places).
(Take $g = 10 \text{ ms}^{-2}$).

Q51. [Marks: 2 | MCQ]

Nuclear and Particle Physics · Nuclear Force, deuteron problem and scatteri

Gate 2017	MCQ	2M
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The geometric cross-section of two colliding protons at large energies is very well estimated by the product of the effective sizes of each particle.

This is closest to

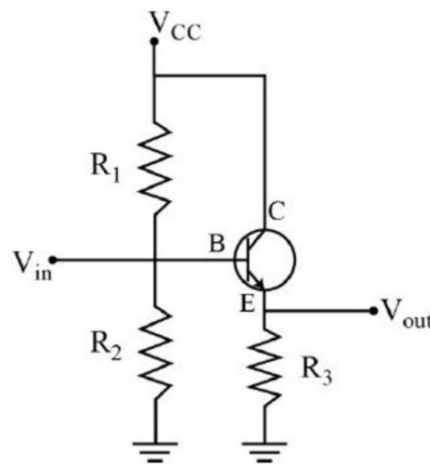
- (A) 10 b
- (B) 10 mb
- (C) 10μ b
- (D) 10 pb

Q52. [Marks: 2 | NAT]

Electronics · Transistors

Gate 2017	NAT	2M
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For the transistor amplifier circuit shown below with $R_1 = 10\text{k}\Omega$, $R_2 = 10\text{k}\Omega$, $R_3 = 1\text{k}\Omega$, and $\beta = 99$. Neglecting the emitter diode resistance, the input impedance of the amplifier looking into the base for small ac signal is ___ $\text{k}\Omega$. (up to two decimal places).

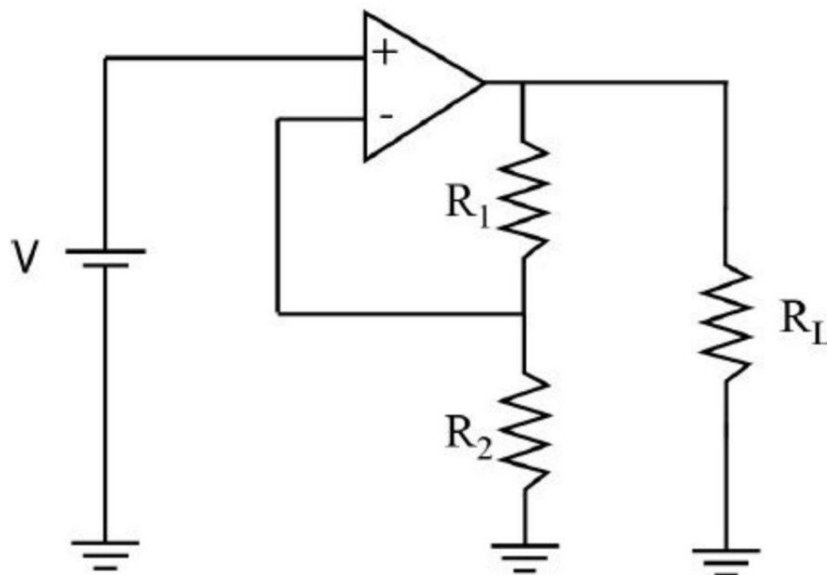


Q53. [Marks: 2 | NAT]

Electronics · OPAMP

Gate 2017	NAT	2M
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Consider an ideal operational amplifier as shown in the figure below with $R_1 = 5\text{k}\Omega$, $R_2 = 1\text{k}\Omega$, $R_L = 100\text{k}\Omega$. For an applied input voltage $V = 10\text{mV}$, the current passing through R_2 is ___ μA . (up to two decimal places).



Q54. [Marks: 2 | NAT]

Mathematical Physics · Differential Equations

Gate 2017	NAT	2M
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Consider the differential equation $dy/dx + y \tan(x) = \cos(x)$. If $y(0) = 0$, $y(\pi/3)$ is ____ . (up to two decimal places).

Q55. [Marks: 2 | NAT]

Atomic and Molecular Physics · Model of atom

Gate 2017	NAT	2M
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Positronium is an atom made of an electron and a positron. Given the Bohr radius for the ground state of the Hydrogen atom to be 0.53 Angstroms, the Bohr radius for the ground state of positronium is ____ Angstroms. (up to two decimal places).

Q56. [Marks: 1 | MCQ]

General Aptitude · English

Gate 2017	MCQ	1M
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The ninth and the tenth of this month are Monday and Tuesday ____ .

- (A) figuratively
- (B) retrospectively
- (C) respectively
- (D) rightfully

Q57. [Marks: 1 | MCQ]

General Aptitude · English

Gate 2017	MCQ	1M
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It is ____ to read this year's textbook ____ the last year's.

- (A) easier, than
- (B) most easy, than
- (C) easier, from
- (D) easiest, from

Q58. [Marks: 1 | MCQ]

General Aptitude · Reasoning

Gate 2017	MCQ	1M
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A rule states that in order to drink beer, one must be over 18 years old. In a bar, there are 4 people. P is 16 years old, Q is 25 years old, R is drinking milkshake and S is drinking a beer. What must be checked to ensure that the rule is being followed?

- (A) Only P's drink
- (B) Only P's drink and S's age
- (C) Only S's age
- (D) Only P's drink, Q's drink and S's age

Q59. [Marks: 1 | MCQ]

General Aptitude · Reasoning

Gate 2017	MCQ	1M
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Fatima starts from point P , goes North for 3 km, and then East for 4 km to reach point Q . She then turns to face point P and goes 15 km in that direction. She then goes North for 6 km. How far is she from point P , and in which direction should she go to reach point P ?

- (A) 8 km, East
- (B) 12 km, North
- (C) 6 km, East
- (D) 10 km, North

Q60. [Marks: 1 | MCQ]

General Aptitude · Mathematical Analysis

Gate 2017	MCQ	1M
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500 students are taking one or more courses out of Chemistry, Physics, and Mathematics. Registration records indicate course enrolment as follows:

Chemistry (329), Physics (186), Mathematics (295), Chemistry and Physics (83), Chemistry and Mathematics (217), and Physics and Mathematics (63). How many students are taking all 3 subjects?

- (A) 37
- (B) 43
- (C) 47
- (D) 53

Q61. [Marks: 2 | MCQ]

General Aptitude · Reasoning

Gate 2017	MCQ	2M
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"If you are looking for a history of India, or for an account of the rise and fall of the British Raj, or for the reason of the cleaving of the subcontinent into two mutually antagonistic parts and the effects this mutilation will have in the respective sections, and ultimately on Asia, you will not find it in these pages; for though I have spent a lifetime in the country, I lived too near the seat of events, and was too intimately associated with the actors, to get the perspective needed for the impartial recording of these matters."

Which of the following statements best reflects the author's opinion?

- (A) An intimate association does not allow for the necessary perspective.
- (B) Matters are recorded with an impartial perspective.
- (C) An intimate association offers an impartial perspective.
- (D) Actors are typically associated with the impartial recording of matters.

Q62. [Marks: 2 | MCQ]

General Aptitude · Reasoning

Gate 2017	MCQ	2M
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Each of P, Q, R, S, W, X, Y and Z has been married at most once. X and Y are married and have two children P and Q. Z is the grandfather of the daughter S of P. Further, Z and W are married and are parents of R. Which one of the following must necessarily be FALSE?

- (A) X is the mother-in-law of R
- (B) P and R are not married to each other
- (C) P is a son of X and Y
- (D) Q cannot be married to R

Q63. [Marks: 2 | MCQ]

General Aptitude · Mathematical Analysis

Gate 2017	MCQ	2M
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1200 men and 500 women can build a bridge in 2 weeks. 900 men and 250 women will take 3 weeks to build the same bridge. How many men will be needed to build the bridge in one week?

- (A) 3000
- (B) 3300
- (C) 3600
- (D) 3900

Q64. [Marks: 2 | MCQ]

General Aptitude · Reasoning

Gate 2017	MCQ	2M
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The number of 3 -digit numbers such that the digit 1 is never to the immediate right of 2 is

- (A) 781
- (B) 791
- (C) 881
- (D) 891

Q65. [Marks: 2 | MCQ]

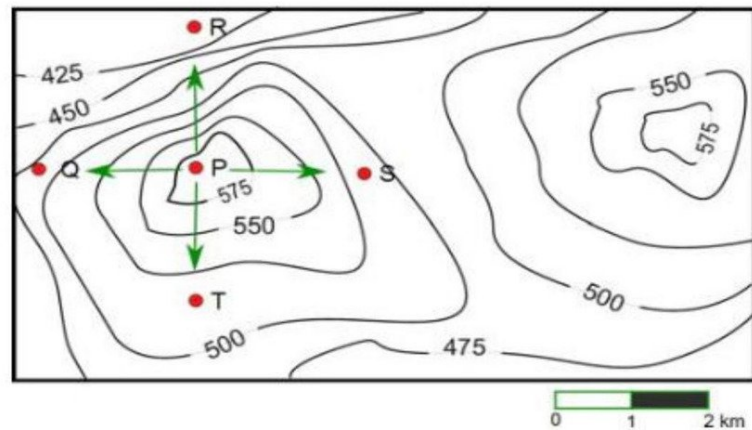
General Aptitude · Data Analysis

Gate 2017	MCQ	2M
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A contour line joins locations having the same height above the mean sea level. The following is a contour plot of a geographical region. Contour lines are shown at 25 m intervals in this plot.

Which of the following is the steepest path leaving from P ?

- (A) P to Q
- (B) P to R
- (C) P to S
- (D) P to T



Answer Key

65 questions · Subject & topic for quick revision · Official keys (IIT/IISc)

Q.No	Subject	Topic	Type	Marks	Answer
Q1	Electromagnetism	Electrostatics	MCQ	1	C
Q2	Electromagnetism	Electrostatics	NAT	1	11.25 to 11.34
Q3	Optics	Ray optics	NAT	1	41.60 to 42.00
Q4	Electromagnetism	EM Waves	NAT	1	8.80 to 8.90
Q5	Electronics	AD/DA coversion	NAT	1	39.30 to 39.50
Q6	Electronics	Diodes	MCQ	1	A
Q7	Solid State Physics	Crystallography	NAT	1	2.50 to 2.55
Q8	Solid State Physics	Tight binding model	MCQ	1	A
Q9	Thermodynamics	Kinetic theory of gases	MCQ	1	D
Q10	Classical Mechanics	Lagrangian and Hamiltonian	MCQ	1	B
Q11	Classical Mechanics	Small Oscillations	NAT	1	14.10 to 14.20
Q12	Classical Mechanics	Phase diagram	MCQ	1	C
Q13	Classical Mechanics	Canonical Transformation and Poiss...	MCQ	1	B
Q14	Quantum Mechanics	Orbital angular momentum and hydr...	MCQ	1	C
Q15	Mathematical Physics	Complex Analysis	NAT	1	3.13 to 3.15
Q16	Quantum Mechanics	Basics Quantum Mechanics	NAT	1	1.30 to 1.34
Q17	Nuclear and Particle Phy...	Particle Physics	MCQ	1	D
Q18	Nuclear and Particle Phy...	Particle Physics	MCQ	1	A
Q19	Quantum Mechanics	Perturbation Theory	MCQ	1	D
Q20	Quantum Mechanics	Spin and Total Angular momentum	MCQ	1	C
Q21	Mathematical Physics	Fourier and Laplace transform	MCQ	1	B
Q22	Quantum Mechanics	Quantum Harmonic Oscillator	MCQ	1	A
Q23	Atomic and Molecular Ph...	Model of atom	MCQ	1	D
Q24	Thermodynamics	Carnot Cycle	MCQ	1	B
Q25	Nuclear and Particle Phy...	Radioactivity	MCQ	1	A
Q26	Electromagnetism	Electrostatics	NAT	2	1.72 to 1.75
Q27	Electromagnetism	Magnetism	MCQ	2	D
Q28	Electromagnetism	Electrostatics	NAT	2	87.50 to 89.50
Q29	Thermodynamics	Phase transition	NAT	2	0.15 to 0.19
Q30	Electronics	Logic Gates	MCQ	2	D
Q31	Solid State Physics	Free electron model	NAT	2	2.32 to 2.40
Q32	Solid State Physics	Lattice vibration	NAT	2	0.90 to 1.10
Q33	Statistical Mechanics	Canonical ensemble	MCQ	2	A
Q34	Quantum Mechanics	Potential Well	NAT	2	0.10 to 0.12
Q35	Quantum Mechanics	Basics Quantum Mechanics	MCQ	2	B
Q36	Electromagnetism	Plasma	NAT	2	2.35 to 2.45

Answer Key

65 questions · Subject & topic for quick revision · Official keys (IIT/IISc)

Q.No	Subject	Topic	Type	Marks	Answer
Q37	Classical Mechanics	Special theory of relativity	NAT	2	0.27 to 0.31
Q38	Mathematical Physics	Gamma, Beta and Delta function	NAT	2	0.43 to 0.45
Q39	Mathematical Physics	Complex Analysis	NAT	2	2.90 to 3.10
Q40	Mathematical Physics	Matrices	MCQ	2	C
Q41	Nuclear and Particle Phy...	Shell Model	MCQ	2	D
Q42	Classical Mechanics	Rotation Motion	NAT	2	3.30 to 3.35
Q43	Statistical Mechanics	Quantum Statistical Mechanics	NAT	2	1.30 to 1.36
Q44	Atomic and Molecular Ph...	ESR/EPR/NMR	MCQ	2	C
Q45	Nuclear and Particle Phy...	Radioactivity	NAT	2	29.50 to 30.10
Q46	Atomic and Molecular Ph...	Effects in atomic physics	MCQ	2	B
Q47	Quantum Mechanics	Basics Quantum Mechanics	MCQ	2	A
Q48	Solid State Physics	Crystallography	MCQ	2	A
Q49	Statistical Mechanics	Microstates	MCQ	2	C
Q50	Classical Mechanics	Coriolis Force	NAT	2	0.32 to 0.36
Q51	Nuclear and Particle Phy...	Nuclear Force, deuteron problem an...	MCQ	2	B
Q52	Electronics	Transistors	NAT	2	4.75 to 5.01
Q53	Electronics	OPAMP	NAT	2	9.80 to 10.20
Q54	Mathematical Physics	Differential Equations	NAT	2	0.51 to 0.53
Q55	Atomic and Molecular Ph...	Model of atom	NAT	2	0.99 to 1.10
Q56	General Aptitude	English	MCQ	1	C
Q57	General Aptitude	English	MCQ	1	A
Q58	General Aptitude	Reasoning	MCQ	1	B
Q59	General Aptitude	Reasoning	MCQ	1	A
Q60	General Aptitude	Mathematical Analysis	MCQ	1	D
Q61	General Aptitude	Reasoning	MCQ	2	A
Q62	General Aptitude	Reasoning	MCQ	2	D
Q63	General Aptitude	Mathematical Analysis	MCQ	2	C
Q64	General Aptitude	Reasoning	MCQ	2	C
Q65	General Aptitude	Data Analysis	MCQ	2	B