

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(CPG-EE-2017)  
Subject : PHYSICS

Code

**A**

Sr. No. 10949

**SET-"A"**

Time : 1½ Hours

Total Questions : 100

Max. Marks : 100

Roll No. \_\_\_\_\_ (in figure) \_\_\_\_\_ (in words)

Name : \_\_\_\_\_ Date of Birth : \_\_\_\_\_

Father's Name : \_\_\_\_\_ Mother's Name : \_\_\_\_\_

Date of Examination : \_\_\_\_\_

(Signature of the candidate)

(Signature of the Invigilator)

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Rajin  
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Question No.	Questions
12.	<p>Atoms with <math>\frac{1}{2}</math> nuclear spin can not have :</p> <p>(1) Hyperfine structure                      (2) Electric dipole interaction  (3) Fine structure                              (4) None of these</p>
13.	<p>The average binding energy of a nucleon in a nucleus of the atom is :</p> <p>(1) 8 eV    (2) 80 eV  (3) 8 MeV    (4) 80 MeV</p>
14.	<p>A particle of mass 'm', moves under the action of a central force whose potential is <math>V(r) = k m r^3</math> (<math>k &gt; 0</math>), then angular momentum for which the orbit will be a circle of radius 'a', about the origin is :</p> <p>(1) <math>m\sqrt{3ka}</math>                                      (2) <math>ma^2\sqrt{ka}</math>  (3) <math>ma^2\sqrt{3ka}</math>                                  (4) <math>ma\sqrt{ka}</math></p>
15.	<p>The Lande g-factor for the <math>^3P_1</math> level of an atom is :</p> <p>(1) <math>\frac{1}{2}</math>    (2) <math>\frac{3}{2}</math>  (3) <math>\frac{5}{2}</math>    (4) <math>\frac{7}{2}</math></p>
16.	<p>If 50 kV is applied potential in an X-ray tube, then the minimum wavelength of X-rays produced is :</p> <p>(1) 0.2 nm    (2) 2 nm  (3) 0.2 Å    (4) 2 Å°</p>



Question No.	Questions
17.	<p>According to Moseley's law the frequency of the characteristic X-ray radiation is proportional to the square of :</p> <p>(1) Atomic weight of the element            (2) Atomic number of the element            (3) Both (1) and (2)            (4) None of these</p>
18.	<p>The continuous X-ray spectrum is the result of :</p> <p>(1) Photoelectric effect                      (2) Inverse photoelectric effect            (3) Compton effect                              (4) Auger effect</p>
19.	<p>All vibrations producing a change in the electric dipole moment of molecule yield :</p> <p>(1) Raman Effect                                  (2) Infrared spectra            (3) UV spectra                                    (4) X-ray spectra</p>
20.	<p>Semiconductor laser is made of :</p> <p>(1) Germanium                                    (2) Silicon            (3) GaAs based materials                      (4) Ruby crystal</p>
21.	<p>The separation between the first stokes and corresponding anti-stokes lines of the rotational Raman spectrum in terms of the rotational constant B is :</p> <p>(1) 12 B    (2) 6 B            (3) 4 B    (4) 2 B</p>
22.	<p>The classical electron radius is of the order of :</p> <p>(1) <math>10^{-8}</math> cm                                      (2) <math>10^{-11}</math> cm            (3) <math>10^{-13}</math> cm                                      (4) <math>10^{-15}</math> cm</p>



Question No.	Questions
23.	<p>The electrostatic attraction between the nucleus of one atom and the electrons of the other is called :</p> <p>(1) Coulomb forces                      (2) Gravitational (3) Strong forces                        (4) van der Waals forces</p>
24.	<p>Nuclear forces are :</p> <p>(1) Gravitational attractive (2) Electrostatic repulsive (3) Long range and strong attractive (4) Short range and strong attractive</p>
25.	<p>The maximum energy of deuteron coming from a cyclotron accelerator is 20 MeV. The maximum energy of protons that can be obtained from this accelerator is :</p> <p>(1) 10 MeV                                (2) 20 MeV (3) 30 MeV                                (4) 40 MeV</p>
26.	<p>The nuclear reaction :</p> $4 {}_1\text{H}^1 \rightarrow {}_2\text{He}^4 + 2 {}_{-1}\text{e}^0 + 26 \text{ MeV}$ <p>represents</p> <p>(1) Fusion                                      (2) Fission (3) <math>\beta</math>-decay                                (4) <math>\gamma</math>-decay</p>
27.	<p>Half life of a radioactive material is 4 days. After 20 days, the fraction remaining undecayed is :</p> <p>(1) <math>\frac{1}{32}</math>                                        (2) <math>\frac{1}{20}</math> (3) <math>\frac{1}{16}</math>                                        (4) <math>\frac{1}{8}</math></p>



Question No.	Questions
28.	The sun releases energy by : (1) Nuclear Fission                      (2) Nuclear Fusion (3) Spontaneous Combustion      (4) Hydro-thermal process.
29.	The particle which most easily penetrates through the nucleus of the atom is : (1) Neutron                                      (2) Electron (3) Proton                                        (4) Alpha particles
30.	Which of the following reaction forbidden ? (1) $\mu^- \rightarrow e^- + \nu_\mu + \bar{\nu}_e$ (2) $\pi^+ \rightarrow \mu^+ + \nu_\mu$ (3) $\pi^+ \rightarrow e^+ + \nu_e$ (4) $\mu^- \rightarrow e^+ + e^- + e^-$
31.	Choose the particle with zero Baryon number from the list given below : (1) Pion    (2) Neutron (3) Proton    (4) $\Delta^+$
32.	How many atoms per unit cell are in hcp structure : (1) 1    (2) 2 (3) 4    (4) 6
33.	The one which is not compatible with crystal symmetry is : (1) One-fold symmetry                      (2) Three-fold symmetry (3) Five-fold symmetry                      (4) Six-fold symmetry
34.	The ratio of the volume of atoms to the total volume available in a simple cubic lattice is : (1) 74%    (2) 66% (3) 52%    (4) 84%



Question No.	Questions
35.	The reciprocal lattice of a simple cubic lattice is : (1) Monoclinic (2) Triclinic (3) Cubic (4) Orthorhombic
36.	The specific heat of a solid (atomic weight-M), for unit mass is $C_v$ . Its atomic specific heat $C_v$ will be : (1) $C_v/M$ (2) $M/C_v$ (3) $MC_v$ (4) $C_v$
37.	The relationship between the Einstein's temperature $(\theta)_E$ and Einstein frequency $\nu_E$ is : (1) $(\theta)_E = \frac{h \nu_E}{k}$ (2) $(\theta)_E = \frac{\nu_E}{h k}$ (3) $\nu_E = \frac{h (\theta)_E}{k}$ (4) $\nu_E = \frac{h k}{(\theta)_E}$
38.	For all metals, the ratio of the thermal conductivity to the electrical conductivity is directly proportional to : (1) T (2) $T^2$ (3) The inverse of T (4) Inverse of $T^2$
39.	In the crystal structure of silicon we have : (1) Electrovalent Bonding (2) Covalent Bonding (3) Co-ordinate bonding (4) Mixture of covalent and electrovalent bonding







Question No.	Questions
45.	<p>If the Lagrangian of a particle moving in one dimension is given by <math>L = \frac{x^2}{2x} - V(x)</math> then Hamiltonian is :</p> <p>(1) <math>\frac{1}{2}xp^2 + V(x)</math>                      (2) <math>\frac{x^2}{2x} + V(x)</math></p> <p>(3) <math>\frac{1}{2}x^2 - V(x)</math>                      (4) <math>\frac{p^2}{2x} - V(x)</math></p>
46.	<p>How many degree of freedom a rigid body possess :</p> <p>(1) 3    (2) 6</p> <p>(3) 9    (4) Infinite</p>
47.	<p>When a cylinder rolls down without slipping on a plane, how many degrees of freedom it has :</p> <p>(1) 1    (2) 2</p> <p>(3) 3    (4) 4</p>
48.	<p>The mass of electron is double its rest mass than the velocity of electron is :</p> <p>(1) <math>\frac{C}{2}</math>    (2) <math>2C</math></p> <p>(3) <math>\frac{\sqrt{3}C}{2}</math>    (4) <math>\sqrt{\frac{3}{2}}C</math></p>
49.	<p>The first law of thermodynamics is the conservation of :</p> <p>(1) Momentum                                      (2) Energy</p> <p>(3) Both (1) and (2)                              (4) None of these</p>







Question No.	Questions
55.	<p>A particle of mass 'm' undergoes harmonic oscillation with period <math>T_0</math>. A force 'f' proportional to the speed v of the particle, <math>f = -kv</math>, is introduced. If the particle continues to oscillate, the period with f acting is :</p> <p>(1) Larger than <math>T_0</math>                      (2) Smaller than <math>T_0</math>  (3) Independent of k                      (4) Constantly changing</p>
56.	<p>Which of the following is equivalent to a unit of momentum ?</p> <p>(1) Newton-meter                      (2) Newton-Second  (3) Joule-Second                      (4) None of the above</p>
57.	<p>A simple pendulum swings with a period of 1.5 s. What would be the period of the pendulum if the length of its string were doubled, the mass of its bob were cut in half, and the force of gravity were doubled ?</p> <p>(1) 0.5 S  (2) 1.5 S  (3) 3 sec.  (4) There is not sufficient information to estimate the answer.</p>
58.	<p>If the force is applied at the centre of the mass then torque is :</p> <p>(1) Zero                                      (2) Maximum  (3) 1    (4) Infinity</p>
59.	<p>Two cylinders of the same size but different masses roll down an incline, starting from the rest. Cylinder A has a greater mass. Which reaches the bottom first ?</p> <p>(1) A    (2) B  (3) Both at same time                      (4) Can not be determined</p>



Question No.	Questions
60.	Steel is preferred for making springs over copper for the reason : (1) Steel is cheaper (2) Steel has greater value of Young's modulus (3) Young's modulus of copper is more than steel (4) Steel has higher density
61.	The first thermodynamic law is conservation of : (1) Momentum (2) Energy (3) Both (4) None of these
62.	Energy in a stretched wire is : (1) $\frac{1}{2}$ (load $\times$ extension) (2) Load $\times$ strain (3) Stress $\times$ strain (4) $\frac{1}{2}$ (Stress $\times$ strain)
63.	Which of the following set of Maxwell's relation is correct ? (U – Internal energy, G – Gibb's energy, H – enthalpy and F – Helmholtz free energy) (1) $T = \left(\frac{\partial U}{\partial V}\right)_S$ and $P = \left(\frac{\partial U}{\partial S}\right)_V$ (2) $V = \left(\frac{\partial H}{\partial P}\right)_S$ and $T = \left(\frac{\partial H}{\partial S}\right)_P$ (3) $P = \left(\frac{\partial G}{\partial V}\right)_T$ and $V = \left(\frac{\partial G}{\partial P}\right)_S$ (4) $P = \left(\frac{\partial F}{\partial S}\right)_T$ and $S = \left(\frac{\partial F}{\partial P}\right)_V$
64.	Pauli's exclusive principles is applicable to : (1) M.B. (2) F.D. (3) B.E. (4) None of these



Question No.	Questions
65.	<p>The root mean square speed <math>V_{\text{rms}}</math> is :</p> <p>(1) <math>\left(\frac{8kT}{\pi m}\right)^{1/2}</math>                      (2) <math>\left(\frac{2kT}{\pi m}\right)^{1/2}</math></p> <p>(3) <math>\left(\frac{2kT}{m}\right)^{1/2}</math>                      (4) <math>\left(\frac{3kT}{m}\right)^{1/2}</math></p>
66.	<p>When ice melts and become water, the ice – water system undergoes a change such that :</p> <p>(1) Entropy decreases and internal energy increases</p> <p>(2) Entropy increases the internal energy decreases</p> <p>(3) Entropy and Internal energy of the system increases</p> <p>(4) Entropy and Internal energy of the system decreases</p>
67.	<p>In a system of 'N' non-interacting and distinguishable particles of spin 1 in thermodynamic equilibrium. The entropy of system is :</p> <p>(1) <math>2 k_b \ln 2</math>                      (2) <math>3 k_b \ln 3</math></p> <p>(3) <math>N k_b \ln 2</math>                      (4) <math>N k_b \ln 3</math></p>
68.	<p>Specific heat of metals can be expressed as :</p> <p>(1) <math>T^3</math>                      (2) <math>AT + BT^2</math></p> <p>(3) <math>AT^2 + BT^3</math>                      (4) <math>AT + BT^3</math></p>
69.	<p>Which of the following Maxwell's equation implies the absence of magnetic monopoles ?</p> <p>(1) <math>\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0}</math>                      (2) <math>\vec{\nabla} \cdot \vec{B} = 0</math></p> <p>(3) <math>\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}</math>                      (4) <math>\vec{\nabla} \times \vec{B} = \left(\frac{1}{C^2}\right) \frac{\partial \vec{B}}{\partial t} + \mu_0 \hat{j}</math></p>



Question No.	Questions
70.	Which of the following materials is used for making permanent magnets : (1) Platinum Cobalt                      (2) Alnico V (3) Carbon steel                            (4) All of the above
71.	All materials have : (1) Paramagnetic property              (2) Ferrimagnetic property (3) Ferromagnetic property              (4) Diamagnetic property
72.	A magnetic material has magnetization of 3200 A/m and flux density 0.005 webers/m <sup>2</sup> . Its magnetization force is : (1) 780.9 A/m                                (2) 1560.1 A/m (3) 390.0 A/m                                (4) None of the above
73.	The unit of dipole moment is : (1) Coulomb                                    (2) Coulomb-metre (3) Metre / coulomb                        (4) Coulomb-metre <sup>2</sup>
74.	How many edges are there in a quartz crystal, if there are 18 faces and 14 angles in it : (1) 30    (2) 15 (3) 55    (4) None of these
75.	The constant ' $\alpha$ ' of a transistor is 0.95. What would be the change in the collector-current corresponding to a change of 0.4 mA in the base current in a common-emitter arrangement ? (1) 7.6 mA                                      (2) 15.2 mA (3) 19.0 mA                                    (4) None of the above



Question No.	Questions
76.	At any temperature the energy of the molecules of an ideal gas is : (1) Only P.E. (2) Only K.E. (3) Both K.E. and P.E. (4) None of these
77.	One kilogram of ice melts at $0^{\circ}\text{C}$ into water at the same temperature. The change in entropy is : (1) 0 (2) Infinite (3) 0.293 (4) 293
78.	The contents of which memory degrade with every read operation ? (1) EAROM (2) PROM (3) EPROM (4) All of the above
79.	A system call is a method by which a program makes a request to the : (1) Input management (2) Output management (3) Interrupt processing (4) Operating system
80.	Which of the following is invalid in FORTRAN ? (1) $P + Q +$ (2) $\text{DO } 100001 = 1, 5$ (3) $\text{DIMENSION } \times (30, 20)$ (4) CONTINUE
81.	A floating point number consists of : (1) Mantissa only (2) Base only (3) An exponent (4) All of the above
82.	The chief reason why digital computers use complemental subtraction is : (1) Simplifies their circuitary (2) Is a very simple process (3) Can handle negative numbers easily (4) Avoids direct subtraction









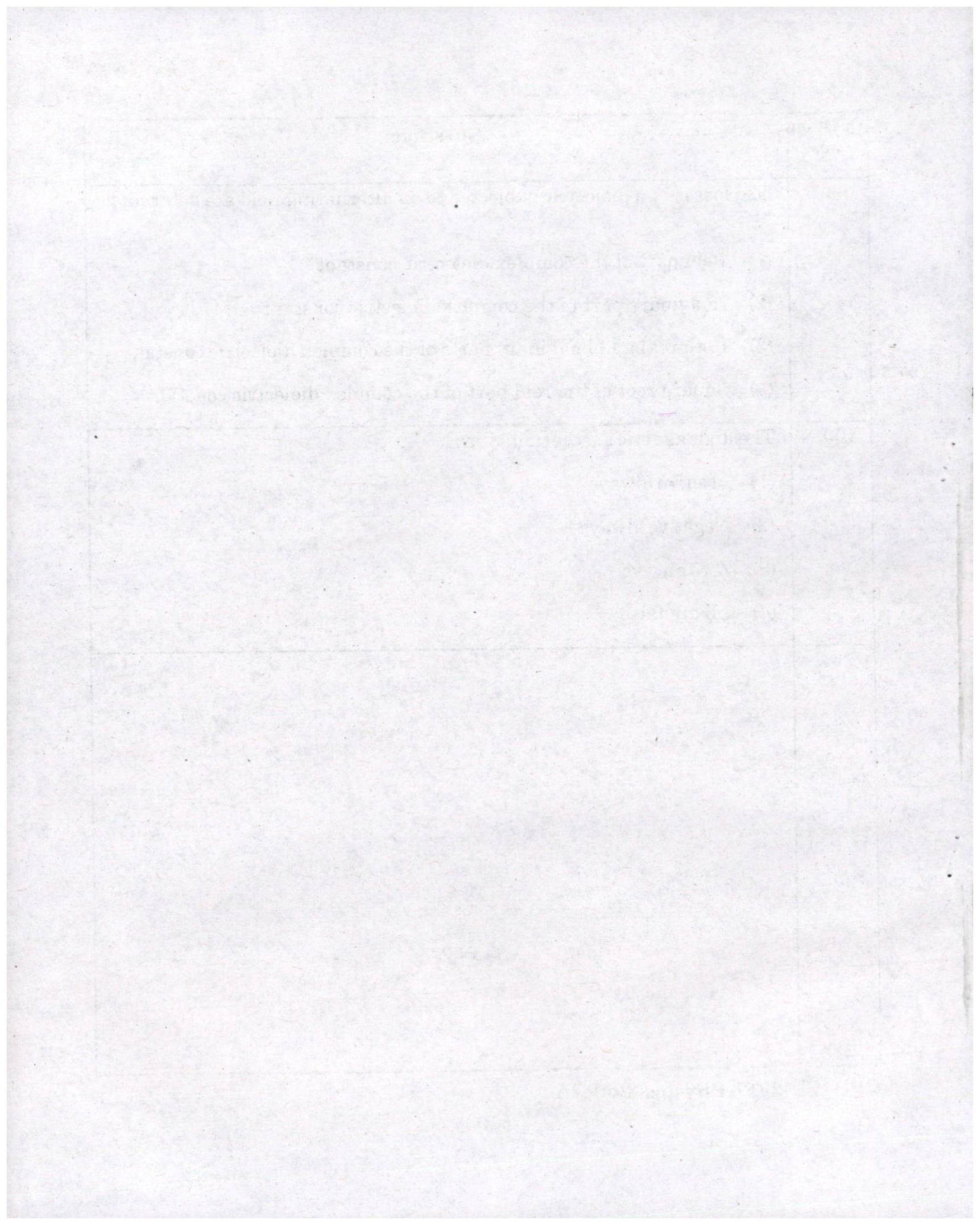






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99.	<p>The losses in a dielectric subjected to an alternating field are determined by :</p> <ol style="list-style-type: none"><li>(1) Real part of the complex dielectric constant</li><li>(2) Imaginary part of the complex dielectric constant</li><li>(3) Both real and imaginary parts of the complex dielectric constant</li><li>(4) Square root of the real part of the complex dielectric constant.</li></ol>
100.	<p>The diamagnetic susceptibility is :</p> <ol style="list-style-type: none"><li>(1) Positive always</li><li>(2) Negative always</li><li>(3) Zero always</li><li>(4) All are false</li></ol>







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10958

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**B**

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Amirul Jeev  
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10958

(7-2-51-207)

Subject: Physics



Code

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Question No.	Questions
34.	<p>Two beams of coherent light travel different paths arriving at point P. If the maximum constructive interference is to occur at point P, the two beams must :</p> <p>(1) Arrive <math>180^\circ</math> out of phase            (2) Arrive <math>90^\circ</math> out of phase            (3) Travel paths must differ by a whole number of wavelengths            (4) Travel paths that differ by an odd number of half-wavelengths</p>
35.	<p>A particle of mass 'm' undergoes harmonic oscillation with period <math>T_0</math>. A force 'f' proportional to the speed v of the particle, <math>f = -kv</math>, is introduced. If the particle continues to oscillate, the period with f acting is :</p> <p>(1) Larger than <math>T_0</math>                      (2) Smaller than <math>T_0</math>            (3) Independent of k                      (4) Constantly changing</p>
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37.	<p>A simple pendulum swings with a period of 1.5 s. What would be the period of the pendulum if the length of its string were doubled, the mass of its bob were cut in half, and the force of gravity were doubled ?</p> <p>(1) 0.5 S            (2) 1.5 S            (3) 3 sec.            (4) There is not sufficient information to estimate the answer.</p>











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61.	<p>The electric field at the centre of a uniformly charged conductor is :</p> <p>(1) <math>\frac{qr}{4\pi\epsilon_0 R^3}</math>                      (2) <math>\frac{q}{4\pi\epsilon_0 r^2}</math></p> <p>(3) Zero                                      (4) <math>\frac{q}{4\pi\epsilon_0 R^2}</math></p>
62.	<p>The time base of a CRO is developed by :</p> <p>(1) Sawtooth waveform                      (2) Square waveform</p> <p>(3) Triangular waveform                      (4) Sinusoidal waveform</p>
63.	<p>The ripple factor in a rectifier circuit means :</p> <p>(1) Amount of a.c. voltage present in output</p> <p>(2) Amount of d.c. voltage in the output</p> <p>(3) Change in d.c. voltage when input a.c. changes</p> <p>(4) Change in d.c. voltage when the load changes</p>
64.	<p>The cathode of a zener diode in a voltage regulator is normally :</p> <p>(1) More positive than the anode</p> <p>(2) More negative than the anode</p> <p>(3) At +0.7 V</p> <p>(4) Grounded</p>



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65.	<p>If the Lagrangian of a particle moving in one dimension is given by <math>L = \frac{\dot{x}^2}{2x} - V(x)</math> then Hamiltonian is :</p> <p>(1) <math>\frac{1}{2}xp^2 + V(x)</math>                      (2) <math>\frac{x^2}{2x} + V(x)</math></p> <p>(3) <math>\frac{1}{2}x^2 - V(x)</math>                      (4) <math>\frac{p^2}{2x} - V(x)</math></p>
66.	<p>How many degree of freedom a rigid body possess :</p> <p>(1) 3    (2) 6</p> <p>(3) 9    (4) Infinite</p>
67.	<p>When a cylinder rolls down without slipping on a plane, how many degrees of freedom it has :</p> <p>(1) 1    (2) 2</p> <p>(3) 3    (4) 4</p>
68.	<p>The mass of electron is double its rest mass than the velocity of electron is :</p> <p>(1) <math>\frac{C}{2}</math>    (2) <math>2C</math></p> <p>(3) <math>\frac{\sqrt{3}C}{2}</math>    (4) <math>\sqrt{\frac{3}{2}}C</math></p>
69.	<p>The first law of thermodynamics is the conservation of :</p> <p>(1) Momentum                                      (2) Energy</p> <p>(3) Both (1) and (2)                              (4) None of these</p>







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77.	<p>In a system of 'N' non-interacting and distinguishable particles of spin 1 in thermodynamic equilibrium. The entropy of system is :</p> <p>(1) <math>2 k_b \ln 2</math>                      (2) <math>3 k_b \ln 3</math></p> <p>(3) <math>N k_b \ln 2</math>                      (4) <math>N k_b \ln 3</math></p>
78.	<p>Specific heat of metals can be expressed as :</p> <p>(1) <math>T^3</math>                      (2) <math>AT + BT^2</math></p> <p>(3) <math>AT^2 + BT^3</math>                      (4) <math>AT + BT^3</math></p>
79.	<p>Which of the following Maxwell's equation implies the absence of magnetic monopoles ?</p> <p>(1) <math>\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0}</math>                      (2) <math>\vec{\nabla} \cdot \vec{B} = 0</math></p> <p>(3) <math>\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}</math>                      (4) <math>\vec{\nabla} \times \vec{B} = \left(\frac{1}{C^2}\right) \frac{\partial \vec{B}}{\partial t} + \mu_0 \hat{j}</math></p>



Question No.	Questions
80.	Which of the following materials is used for making permanent magnets : (1) Platinum Cobalt                      (2) Alnico V (3) Carbon steel                            (4) All of the above
81.	The ionization potential of hydrogen atom is 13.6 volts. The energy required to remove an electron from the second orbit of hydrogen is : (1) 3.4 eV                                      (2) 6.8 eV (3) 13.6 eV                                    (4) 27.0 eV
82.	Davisson and Germer experiment relates to : (1) Interference                              (2) Electron diffraction (3) Polarization                              (4) Quantization
83.	The degree of degeneracy for the three dimensional isotropic harmonic oscillator are : (1) $n^2$ (2) $\frac{1}{2} (2n + 1) (2n + 2)$ (3) $\frac{1}{2} (n + 1) (n + 2)$ (4) $2n + 1$
84.	The de-Broglie hypothesis is associated with : (1) Wave nature of electrons (2) Wave nature of $\alpha$ -particles (3) Wave nature of radiation (4) Wave nature of all material particles





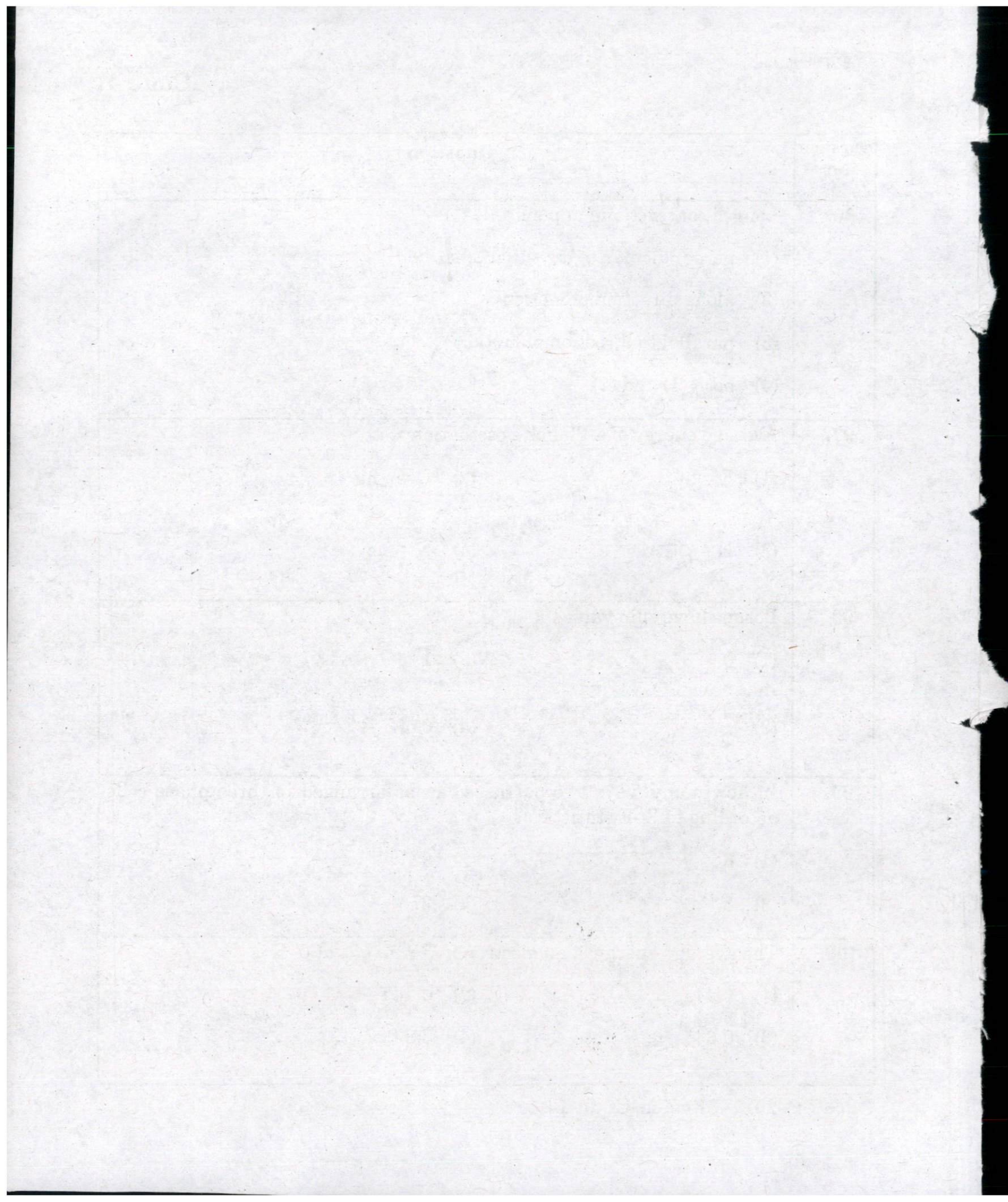














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(CPG-EE-2017)

Subject : PHYSICS

Code



10955

Sr. No. \_\_\_\_\_

SET-“A”

Time : 1½ Hours

Total Questions : 100

Max. Marks : 100

Roll No. \_\_\_\_\_ (in figure) \_\_\_\_\_ (in words)

Name : \_\_\_\_\_ Date of Birth : \_\_\_\_\_

Father's Name : \_\_\_\_\_ Mother's Name : \_\_\_\_\_

Date of Examination : \_\_\_\_\_

(Signature of the candidate)

(Signature of the Invigilator)

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seal open at 10.30 am  
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Annexure 25/6/17  
10-30 am  
25/6/17



10325

Subject: Physics

The following is a list of questions for the subject of Physics. The questions are arranged in order of increasing difficulty. The student is to answer all questions. The student is to show all work and to explain all answers. The student is to use the following information in answering the questions.

The speed of light in a vacuum is  $3.0 \times 10^8$  m/s. The speed of sound in air is 340 m/s. The acceleration due to gravity is  $9.8$  m/s<sup>2</sup>. The mass of the Earth is  $5.97 \times 10^{24}$  kg. The radius of the Earth is  $6.37 \times 10^6$  m. The mass of the Sun is  $1.99 \times 10^{30}$  kg. The radius of the Sun is  $6.96 \times 10^8$  m. The distance between the Earth and the Sun is  $1.496 \times 10^{11}$  m. The distance between the Earth and the Moon is  $3.84 \times 10^8$  m. The mass of the Moon is  $7.35 \times 10^{22}$  kg. The radius of the Moon is  $1.74 \times 10^6$  m. The distance between the Earth and the Moon is  $3.84 \times 10^8$  m. The mass of the Moon is  $7.35 \times 10^{22}$  kg. The radius of the Moon is  $1.74 \times 10^6$  m.

1. A car starts from rest and accelerates uniformly to a speed of 20 m/s in 5 seconds. Calculate the acceleration of the car.

2. A ball is thrown vertically upwards with an initial speed of 10 m/s. Calculate the maximum height reached by the ball.

3. A car starts from rest and accelerates uniformly to a speed of 20 m/s in 5 seconds. Calculate the distance traveled by the car during this time.

4. A ball is thrown vertically upwards with an initial speed of 10 m/s. Calculate the time taken for the ball to reach its maximum height.

5. A car starts from rest and accelerates uniformly to a speed of 20 m/s in 5 seconds. Calculate the average speed of the car during this time.

6. A ball is thrown vertically upwards with an initial speed of 10 m/s. Calculate the time taken for the ball to return to the ground.

7. A car starts from rest and accelerates uniformly to a speed of 20 m/s in 5 seconds. Calculate the final speed of the car after 10 seconds.

8. A ball is thrown vertically upwards with an initial speed of 10 m/s. Calculate the speed of the ball when it returns to the ground.

9. A car starts from rest and accelerates uniformly to a speed of 20 m/s in 5 seconds. Calculate the distance traveled by the car after 10 seconds.

10. A ball is thrown vertically upwards with an initial speed of 10 m/s. Calculate the distance traveled by the ball during its entire flight.

10325



Question No.	Questions
1.	<p>The electric field at the centre of a uniformly charged conductor is :</p> <p>(1) <math>\frac{qr}{4\pi\epsilon_0 R^3}</math>                      (2) <math>\frac{q}{4\pi\epsilon_0 r^2}</math></p> <p>(3) Zero                                      (4) <math>\frac{q}{4\pi\epsilon_0 R^2}</math></p>
2.	<p>The time base of a CRO is developed by :</p> <p>(1) Sawtooth waveform                      (2) Square waveform</p> <p>(3) Triangular waveform                      (4) Sinusoidal waveform</p>
3.	<p>The ripple factor in a rectifier circuit means :</p> <p>(1) Amount of a.c. voltage present in output</p> <p>(2) Amount of d.c. voltage in the output</p> <p>(3) Change in d.c. voltage when input a.c. changes</p> <p>(4) Change in d.c. voltage when the load changes</p>
4.	<p>The cathode of a zener diode in a voltage regulator is normally :</p> <p>(1) More positive than the anode</p> <p>(2) More negative than the anode</p> <p>(3) At +0.7 V</p> <p>(4) Grounded</p>
5.	<p>If the Lagrangian of a particle moving in one dimension is given by</p> <p><math>L = \frac{\dot{x}^2}{2x} - V(x)</math> then Hamiltonian is :</p> <p>(1) <math>\frac{1}{2}xp^2 + V(x)</math>                      (2) <math>\frac{x^2}{2x} + V(x)</math></p> <p>(3) <math>\frac{1}{2}x^2 - V(x)</math>                      (4) <math>\frac{p^2}{2x} - V(x)</math></p>



Question No.	Questions
6.	How many degree of freedom a rigid body possess : (1) 3 (2) 6 (3) 9 (4) Infinite
7.	When a cylinder rolls down without slipping on a plane, how many degrees of freedom it has : (1) 1 (2) 2 (3) 3 (4) 4
8.	The mass of electron is double its rest mass than the velocity of electron is : (1) $\frac{C}{2}$ (2) $2C$ (3) $\frac{\sqrt{3} C}{2}$ (4) $\sqrt{\frac{3}{2}} C$
9.	The first law of thermodynamics is the conservation of : (1) Momentum (2) Energy (3) Both (1) and (2) (4) None of these
10.	In statistical physics, the absolute temperature $T$ of a system is related to the total number of accessible state $\Omega$ as : (1) $kT = \frac{\partial \Omega}{\partial E}$ (2) $kT = \frac{\partial \log \Omega}{\partial E}$ (3) $\frac{1}{kT} = \frac{\partial \Omega}{\partial E}$ (4) $\frac{1}{kT} = \frac{\partial \log \Omega}{\partial E}$















Question No.	Questions
27.	The densest part of a probability cloud occurs at a radius proportional to : (1) $n$ (2) $n^2$ (3) $n^3$ (4) $n^4$
28.	The de-Broglie wavelength $\lambda$ for an electron of energy 150 eV is : (1) $10^{-8}$ m (2) $10^{-10}$ m (3) $10^{-12}$ m (4) $10^{-14}$ m
29.	No two electrons will have all the four quantum numbers equal. The statement is called : (1) Pauli exclusion principle (2) Uncertainty principle (3) Hund's rule (4) Aufbau's principle
30.	The radius of a hydrogen atom is in its ground state is : (1) $10^{-4}$ cm (2) $10^{-6}$ cm (3) $10^{-8}$ cm (4) $10^{-10}$ cm
31.	According to which statistics, the energy at absolute zero can not be zero ? (1) M - B (2) B - E (3) F - D (4) None of these
32.	In a grand canonical ensemble, a system A of fixed volume is in contact with a large reservoir B. Then (1) A can exchange only energy with B (2) A can exchange only particles with B (3) A can exchange neither energy nor particle with B. (4) A can exchange both energy and particles with B.











Question No.	Questions
42.	Energy in a stretched wire is :  (1) $\frac{1}{2}$ (load $\times$ extension)      (2) Load $\times$ strain  (3) Stress $\times$ strain      (4) $\frac{1}{2}$ (Stress $\times$ strain)
43.	Which of the following set of Maxwell's relation is correct ? (U – Internal energy, G – Gibb's energy, H – enthalpy and F – Helmholtz free energy)  (1) $T = \left(\frac{\partial U}{\partial V}\right)_S$ and $P = \left(\frac{\partial U}{\partial S}\right)_V$ (2) $V = \left(\frac{\partial H}{\partial P}\right)_S$ and $T = \left(\frac{\partial H}{\partial S}\right)_P$  (3) $P = \left(\frac{\partial G}{\partial V}\right)_T$ and $V = \left(\frac{\partial G}{\partial P}\right)_S$ (4) $P = \left(\frac{\partial F}{\partial S}\right)_T$ and $S = \left(\frac{\partial F}{\partial P}\right)_V$
44.	Pauli's exclusive principles is applicable to :  (1) M.B.      (2) F.D. (3) B.E.      (4) None of these
45.	The root mean square speed $V_{rms}$ is :  (1) $\left(\frac{8kT}{\pi m}\right)^{1/2}$ (2) $\left(\frac{2kT}{\pi m}\right)^{1/2}$  (3) $\left(\frac{2kT}{m}\right)^{1/2}$ (4) $\left(\frac{3kT}{m}\right)^{1/2}$







Question No.	Questions
51.	Choose the particle with zero Baryon number from the list given below : (1) Pion (2) Neutron (3) Proton (4) $\Delta^+$
52.	How many atoms per unit cell are in hcp structure : (1) 1 (2) 2 (3) 4 (4) 6
53.	The one which is not compatible with crystal symmetry is : (1) One-fold symmetry (2) Three-fold symmetry (3) Five-fold symmetry (4) Six-fold symmetry
54.	The ratio of the volume of atoms to the total volume available in a simple cubic lattice is : (1) 74% (2) 66% (3) 52% (4) 84%
55.	The reciprocal lattice of a simple cubic lattice is : (1) Monoclinic (2) Triclinic (3) Cubic (4) Orthorhombic
56.	The specific heat of a solid (atomic weight-M), for unit mass is $C_v$ . Its atomic specific heat $C_v$ will be : (1) $C_v/M$ (2) $M/C_v$ (3) $MC_v$ (4) $C_v$











Question No.	Questions
68.	The contents of which memory degrade with every read operation ? (1) EAROM (2) PROM (3) EPROM (4) All of the above
69.	A system call is a method by which a program makes a request to the : (1) Input management (2) Output management (3) Interrupt processing (4) Operating system
70.	Which of the following is invalid in FORTRAN ? (1) P + Q + (2) DO 100001 = 1, 5 (3) DIMENSION $\times$ (30, 20) (4) CONTINUE
71.	A floating point number consists of : (1) Mantissa only (2) Base only (3) An exponent (4) All of the above
72.	The chief reason why digital computers use complemental subtraction is : (1) Simplifies their circuitary (2) Is a very simple process (3) Can handle negative numbers easily (4) Avoids direct subtraction
73.	The Fourier transform of product of two time functions $[f_1(t) f_2(t)]$ is given by : (1) $[f_1(w) + f_2(w)]$ (2) $[f_1(w) / f_2(w)]$ (3) $[f_1(w) * f_2(w)]$ (4) $[f_1(w) \times f_2(w)]$
74.	The magnitude spectrum of a Fourier transform of a real-valued time signal has one of the following symmetry : (1) NO (2) ODD (3) EVEN (4) CONJUGATE



Question No.	Questions
75.	Mass of 700 N man moving in a car at $66 \text{ km h}^{-1}$ is : (1) 70 kg (2) 100 kg (3) Infinite (4) Zero
76.	Length contraction happens only : (1) perpendicular to direction of motion (2) along direction of motion (3) parallel to direction of motion (4) both (1) and (2)
77.	Average energy of a Planck's oscillation is : (1) $E = hv$ (2) $E = n hv$ (3) $E = \frac{hv}{(e^{hv/kT} - 1)}$ (4) $E = mc^2$
78.	Bosons have spin value : (1) 0 (2) 1 (3) $\frac{1}{2}$ (4) 0 or 1
79.	In how many ways two particles can be arranged in three phase cells according to B-E statistics ? (1) 6 (2) 9 (3) 3 (4) 27
80.	The average energy of an electron in Fermi gas at $0^\circ \text{ K}$ is (1) 0.24 f (2) 0.44 f (3) 0.64 f (4) 0.8 f









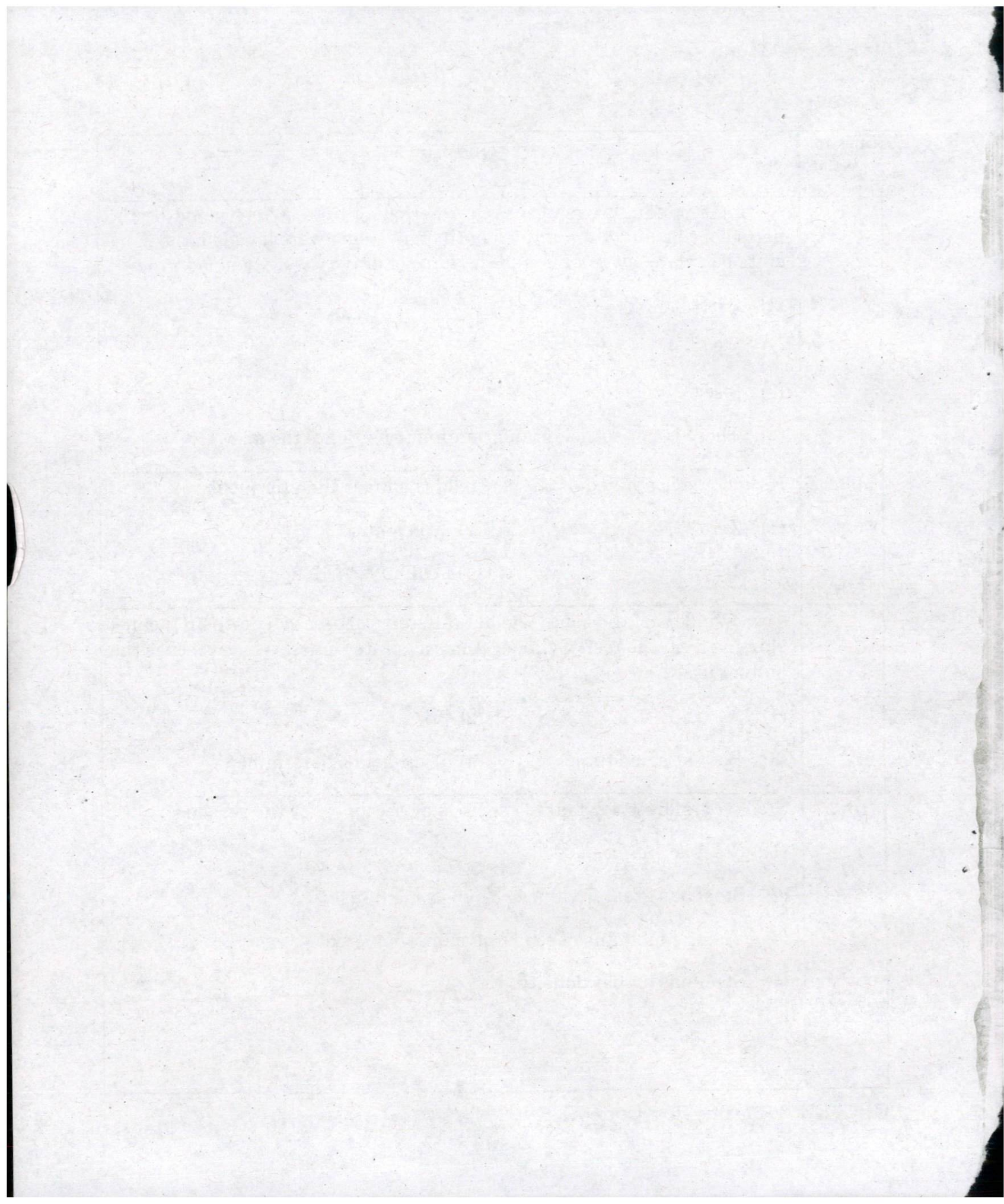






Question No.	Questions
97.	<p>A simple pendulum swings with a period of 1.5 s. What would be the period of the pendulum if the length of its string were doubled, the mass of its bob were cut in half, and the force of gravity were doubled ?</p> <p>(1) 0.5 S (2) 1.5 S (3) 3 sec. (4) There is not sufficient information to estimate the answer.</p>
98.	<p>If the force is applied at the centre of the mass then torque is :</p> <p>(1) Zero (2) Maximum (3) 1 (4) Infinity</p>
99.	<p>Two cylinders of the same size but different masses roll down an incline, starting from the rest. Cylinder A has a greater mass. Which reaches the bottom first ?</p> <p>(1) A (2) B (3) Both at same time (4) Can not be determined</p>
100.	<p>Steel is preferred for making springs over copper for the reason :</p> <p>(1) Steel is cheaper (2) Steel has greater value of Young's modulus (3) Young's modulus of copper is more than steel (4) Steel has higher density</p>







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(CPG-EE-2017)

Subject : PHYSICS

10956

Sr. No. \_\_\_\_\_

Code

**D**

**SET-“A”**

Time : 1½ Hours

Total Questions : 100

Max. Marks : 100

Roll No. \_\_\_\_\_ (in figure) \_\_\_\_\_ (in words)

Name : \_\_\_\_\_ Date of Birth : \_\_\_\_\_

Father's Name : \_\_\_\_\_ Mother's Name : \_\_\_\_\_

Date of Examination : \_\_\_\_\_

(Signature of the candidate)

(Signature of the Invigilator)

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25/6/17

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25/6/17  
Anuradh Jayaram  
10-25/6/17



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(CPG-EE-2017)

Subject : PHYSICS

10956

Gr. No.



Code

SET - A

Time : 1 1/2 Hours Total Questions : 100 Max. Marks : 100

Roll No. (in figures) (in words)

Name : Date of Birth :

Father's Name : Mother's Name :

Date of Examination :

(Signature of the candidate) (Signature of the Investigator)

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Question No.	Questions
1.	All materials have : (1) Paramagnetic property      (2) Ferrimagnetic property (3) Ferromagnetic property      (4) Diamagnetic property
2.	A magnetic material has magnetization of 3200 A/m and flux density 0.005 webers/m <sup>2</sup> . Its magnetization force is : (1) 780.9 A/m                              (2) 1560.1 A/m (3) 390.0 A/m                              (4) None of the above
3.	The unit of dipole moment is : (1) Coulomb                              (2) Coulomb-metre (3) Metre / coulomb                      (4) Coulomb-metre <sup>2</sup>
4.	How many edges are there in a quartz crystal, if there are 18 faces and 14 angles in it : (1) 30    (2) 15 (3) 55    (4) None of these
5.	The constant ' $\alpha$ ' of a transistor is 0.95. What would be the change in the collector-current corresponding to a change of 0.4 mA in the base current in a common-emitter arrangement ? (1) 7.6 mA                                      (2) 15.2 mA (3) 19.0 mA                                      (4) None of the above
6.	At any temperature the energy of the molecules of an ideal gas is : (1) Only P.E.                                      (2) Only K.E. (3) Both K.E. and P.E.                      (4) None of these



Question No.	Questions
7.	One kilogram of ice melts at $0^{\circ}\text{C}$ into water at the same temperature. The change in entropy is : (1) 0 (2) Infinite (3) 0.293 (4) 293
8.	The contents of which memory degrade with every read operation ? (1) EAROM (2) PROM (3) EPROM (4) All of the above
9.	A system call is a method by which a program makes a request to the : (1) Input management (2) Output management (3) Interrupt processing (4) Operating system
10.	Which of the following is invalid in FORTRAN ? (1) $P + Q +$ (2) $\text{DO } 100001 = 1, 5$ (3) $\text{DIMENSION} \times (30, 20)$ (4) CONTINUE
11.	Constructive interference happens when two waves are : (1) Out of phase (2) Zero amplitude (3) In phase (4) In front
12.	What principle is responsible for the fact that certain sunglasses can reduce glare from reflected surfaces ? (1) Refraction (2) Polarization (3) Diffraction (4) Total internal reflection
13.	Light of wavelength 575 nm falls on a double-slit and third order bright fringe is seen at an angle of 6.5 degrees. What is the separation between double slits ? (1) $5.0 \mu\text{m}$ (2) $10 \mu\text{m}$ (3) $15 \mu\text{m}$ (4) $20 \mu\text{m}$



Question No.	Questions
14.	<p>Two beams of coherent light travel different paths arriving at point P. If the maximum constructive interference is to occur at point P, the two beams must :</p> <p>(1) Arrive <math>180^\circ</math> out of phase            (2) Arrive <math>90^\circ</math> out of phase            (3) Travel paths must differ by a whole number of wavelengths            (4) Travel paths that differ by an odd number of half-wavelengths</p>
15.	<p>A particle of mass 'm' undergoes harmonic oscillation with period <math>T_0</math>. A force 'f' proportional to the speed v of the particle, <math>f = -kv</math>, is introduced. If the particle continues to oscillate, the period with f acting is :</p> <p>(1) Larger than <math>T_0</math>                      (2) Smaller than <math>T_0</math>            (3) Independent of k                      (4) Constantly changing</p>
16.	<p>Which of the following is equivalent to a unit of momentum ?</p> <p>(1) Newton-meter                      (2) Newton-Second            (3) Joule-Second                      (4) None of the above</p>
17.	<p>A simple pendulum swings with a period of 1.5 s. What would be the period of the pendulum if the length of its string were doubled, the mass of its bob were cut in half, and the force of gravity were doubled ?</p> <p>(1) 0.5 S            (2) 1.5 S            (3) 3 sec.            (4) There is not sufficient information to estimate the answer.</p>
18.	<p>If the force is applied at the centre of the mass then torque is :</p> <p>(1) Zero                                      (2) Maximum            (3) 1    (4) Infinity</p>



















Question No.	Questions
40.	Semiconductor laser is made of : (1) Germanium (2) Silicon (3) GaAs based materials (4) Ruby crystal
41.	According to which statistics, the energy at absolute zero can not be zero ? (1) M - B (2) B - E (3) F - D (4) None of these
42.	In a grand canonical ensemble, a system A of fixed volume is in contact with a large reservoir B. Then (1) A can exchange only energy with B (2) A can exchange only particles with B (3) A can exchange neither energy nor particle with B. (4) A can exchange both energy and particles with B.
43.	In a micro canonical ensemble, a system A of fixed volume is in contact with a large reservoir B. Then. (1) A can exchange only energy with B (2) A can exchange only particles with B. (3) A can exchange neither energy nor particles with B. (4) A can exchange both energy and particles with B.
44.	The quantum statistics reduces to classical statistics under the following condition : (1) $\rho A^3 = 1$ (2) $\rho A^3 \gg 1$ (3) $\rho A^3 \ll 1$ (4) $\rho = 0$







Question No.	Questions
50.	The diamagnetic susceptibility is : (1) Positive always (2) Negative always (3) Zero always (4) All are false
51.	The first thermodynamic law is conservation of : (1) Momentum (2) Energy (3) Both (4) None of these
52.	Energy in a stretched wire is : (1) $\frac{1}{2}$ (load $\times$ extension) (2) Load $\times$ strain (3) Stress $\times$ strain (4) $\frac{1}{2}$ (Stress $\times$ strain)
53.	Which of the following set of Maxwell's relation is correct ? (U – Internal energy, G – Gibb's energy, H – enthalpy and F – Helmholtz free energy) (1) $T = \left(\frac{\partial U}{\partial V}\right)_S$ and $P = \left(\frac{\partial U}{\partial S}\right)_V$ (2) $V = \left(\frac{\partial H}{\partial P}\right)_S$ and $T = \left(\frac{\partial H}{\partial S}\right)_P$ (3) $P = \left(\frac{\partial G}{\partial V}\right)_T$ and $V = \left(\frac{\partial G}{\partial P}\right)_S$ (4) $P = \left(\frac{\partial F}{\partial S}\right)_T$ and $S = \left(\frac{\partial F}{\partial P}\right)_V$
54.	Pauli's exclusive principles is applicable to : (1) M.B. (2) F.D. (3) B.E. (4) None of these



Question No.	Questions
55.	<p>The root mean square speed <math>V_{rms}</math> is :</p> <p>(1) <math>\left(\frac{8kT}{\pi m}\right)^{1/2}</math>                      (2) <math>\left(\frac{2kT}{\pi m}\right)^{1/2}</math></p> <p>(3) <math>\left(\frac{2kT}{m}\right)^{1/2}</math>                      (4) <math>\left(\frac{3kT}{m}\right)^{1/2}</math></p>
56.	<p>When ice melts and become water, the ice – water system undergoes a change such that :</p> <p>(1) Entropy decreases and internal energy increases</p> <p>(2) Entropy increases the internal energy decreases</p> <p>(3) Entropy and Internal energy of the system increases</p> <p>(4) Entropy and Internal energy of the system decreases</p>
57.	<p>In a system of 'N' non-interacting and distinguishable particles of spin 1 in thermodynamic equilibrium. The entropy of system is :</p> <p>(1) <math>2 k_b \ln 2</math>                      (2) <math>3 k_b \ln 3</math></p> <p>(3) <math>N k_b \ln 2</math>                      (4) <math>N k_b \ln 3</math></p>
58.	<p>Specific heat of metals can be expressed as :</p> <p>(1) <math>T^3</math>                      (2) <math>AT + BT^2</math></p> <p>(3) <math>AT^2 + BT^3</math>                      (4) <math>AT + BT^3</math></p>
59.	<p>Which of the following Maxwell's equation implies the absence of magnetic monopoles ?</p> <p>(1) <math>\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0}</math>                      (2) <math>\vec{\nabla} \cdot \vec{B} = 0</math></p> <p>(3) <math>\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}</math>                      (4) <math>\vec{\nabla} \times \vec{B} = \left(\frac{1}{C^2}\right) \frac{\partial \vec{B}}{\partial t} + \mu_0 \hat{j}</math></p>



Question No.	Questions
60.	<p>Which of the following materials is used for making permanent magnets :</p> <p>(1) Platinum Cobalt                      (2) Alnico V  (3) Carbon steel                              (4) All of the above</p>
61.	<p>A floating point number consists of :</p> <p>(1) Mantissa only                              (2) Base only  (3) An exponent                                (4) All of the above</p>
62.	<p>The chief reason why digital computers use complemental subtraction is :</p> <p>(1) Simplifies their circuitary  (2) Is a very simple process  (3) Can handle negative numbers easily  (4) Avoids direct subtraction</p>
63.	<p>The Fourier transform of product of two time functions <math>[f_1(t) f_2(t)]</math> is given by :</p> <p>(1) <math>[f_1(w) + f_2(w)]</math>                              (2) <math>[f_1(w) / f_2(w)]</math>  (3) <math>[f_1(w) * f_2(w)]</math>                                (4) <math>[f_1(w) \times f_2(w)]</math></p>
64.	<p>The magnitude spectrum of a Fourier transform of a real-valued time signal has one of the following symmetry :</p> <p>(1) NO    (2) ODD  (3) EVEN    (4) CONJUGATE</p>
65.	<p>Mass of 700 N man moving in a car at <math>66 \text{ km h}^{-1}</math> is :</p> <p>(1) 70 kg    (2) 100 kg  (3) Infinite    (4) Zero</p>



Question No.	Questions
66.	Length contraction happens only : (1) perpendicular to direction of motion (2) along direction of motion (3) parallel to direction of motion (4) both (1) and (2)
67.	Average energy of a Planck's oscillation is : (1) $E = h\nu$ (2) $E = n h\nu$ (3) $E = \frac{h\nu}{(e^{h\nu/kT} - 1)}$ (4) $E = mc^2$
68.	Bosons have spin value : (1) 0 (2) 1 (3) $\frac{1}{2}$ (4) 0 or 1
69.	In how many ways two particles can be arranged in three phase cells according to B-E statistics ? (1) 6 (2) 9 (3) 3 (4) 27
70.	The average energy of an electron in Fermi gas at $0^\circ$ K is (1) $0.24 f$ (2) $0.44 f$ (3) $0.64 f$ (4) $0.8 f$
71.	The electric field at the centre of a uniformly charged conductor is : (1) $\frac{qr}{4\pi\epsilon_0 R^3}$ (2) $\frac{q}{4\pi\epsilon_0 r^2}$ (3) Zero (4) $\frac{q}{4\pi\epsilon_0 R^2}$



Question No.	Questions
72.	The time base of a CRO is developed by : (1) Sawtooth waveform                      (2) Square waveform (3) Triangular waveform                    (4) Sinusoidal waveform
73.	The ripple factor in a rectifier circuit means : (1) Amount of a.c. voltage present in output (2) Amount of d.c. voltage in the output (3) Change in d.c. voltage when input a.c. changes (4) Change in d.c. voltage when the load changes
74.	The cathode of a zener diode in a voltage regulator is normally : (1) More positive than the anode (2) More negative than the anode (3) At +0.7 V (4) Grounded
75.	If the Lagrangian of a particle moving in one dimension is given by $L = \frac{x^2}{2x} - V(x)$ then Hamiltonian is : (1) $\frac{1}{2}xp^2 + V(x)$ (2) $\frac{x^2}{2x} + V(x)$ (3) $\frac{1}{2}x^2 - V(x)$ (4) $\frac{p^2}{2x} - V(x)$
76.	How many degree of freedom a rigid body possess : (1) 3    (2) 6 (3) 9    (4) Infinite
















Question No.	Questions
92.	Davisson and Germer experiment relates to : (1) Interference (2) Electron diffraction (3) Polarization (4) Quantization
93.	The degree of degeneracy for the three dimensional isotropic harmonic oscillator are : (1) $n^2$ (2) $\frac{1}{2} (2n + 1) (2n + 2)$ (3) $\frac{1}{2} (n + 1) (n + 2)$ (4) $2n + 1$
94.	The de-Broglie hypothesis is associated with : (1) Wave nature of electrons (2) Wave nature of $\alpha$ -particles (3) Wave nature of radiation (4) Wave nature of all material particles
95.	A particle is confined to the region $0 < x < L$ , in one dimension. If the particle is in the first excited state, then the probability of finding the particle is maximum at : (1) $x = \frac{L}{2}$ (2) $x = \frac{L}{3}$ (3) $x = \frac{L}{6}$ (4) $x = \frac{L}{4}$ and $\frac{3L}{4}$



Question No.	Questions
96.	Function of the wave vector in case of free particle motion is given by :  (1) $E = \frac{\hbar k^2}{2m}$ (2) $E = \frac{\hbar^2 k^2}{2m}$  (3) $E = \frac{\hbar k}{2m}$ (4) $E = \frac{\hbar^2 k^2}{2m^2}$
97.	The densest part of a probability cloud occurs at a radius proportional to :  (1) $n$ (2) $n^2$ (3) $n^3$ (4) $n^4$
98.	The de-Broglie wavelength $\lambda$ for an electron of energy 150 eV is :  (1) $10^{-8}$ m                              (2) $10^{-10}$ m (3) $10^{-12}$ m                              (4) $10^{-14}$ m
99.	No two electrons will have all the four quantum numbers equal. The statement is called :  (1) Pauli exclusion principle      (2) Uncertainty principle (3) Hund's rule                      (4) Aufbau's principle
100.	The radius of a hydrogen atom is in its ground state is :  (1) $10^{-4}$ cm                              (2) $10^{-6}$ cm (3) $10^{-8}$ cm                              (4) $10^{-10}$ cm



PHYSICS ENTRANCE EXAM CEE-2017 ANSWER KEY				
Srl. No.	CODE-A	CODE-B	CODE-C	CODE-D
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2	3	2	1	1
3	3	3	1	4
4	4	3	1	1
5	4	2	1	1
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7	2	2	2	4
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9	1	2	2	4
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47	2	1	4	3
48	3	1	4	4
49	2	2	2	2
50	4	3	4	2


 @Alan  
 25/6/17  
 checked and verified  
 Amirul Yaqub  
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PHYSICS ENTRANCE EXAM CEE-2017 ANSWER KEY				
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94	2	3	3	4
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97	3	3	2	2
98	4	4	1	2
99	2	1	3	1
100	2	3	2	3

Checked and Verified  
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 25/6/17