

Question Booklet Series: **A**

Question Booklet Serial No.: **122356**

CET (UG) – 2019

Important: Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.

(In Figure)

(In Words)

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: _____

Signature of Invigilator: _____

SUBJECT: PHYSICS

Time: 70 Minutes

Number of Questions: 60

Maximum Marks: 120

DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.

INSTRUCTIONS:

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. The medium of examination shall be **English** only.
5. Please check that this Question Booklet contains **60** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
6. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen**.
7. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
8. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
9. **Negative marking will be adopted for evaluation i.e. 1/4th of the marks of the question will be deducted for each wrong answer. A wrong answer means incorrect answer or wrong filling of bubble.**
10. For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
11. For rough work only the blank sheet at the end of the Question Booklet be used.
12. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
13. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
14. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
15. **20 minutes** extra should be given to the visually handicapped/Person with Disability (PwD) for each paper.
16. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
17. **Tele-communication equipment such as Cellular phones, pager, wireless, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
18. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

(1049-A)

- The dimensions of Planck's constant is same as that of
 - Angular momentum
 - Work
 - Energy
 - Linear momentum
- The following observations were taken for determining surface tension T of water by capillary method: diameter of capillary, $D = 1.25 \times 10^{-2}$ m and rise of water, $h = 1.45 \times 10^{-2}$ m. Using $g = 9.80$ m/s² and the simplified relation $T = \frac{r h g}{2} \times 10^3$ N/m, the possible error in surface tension is close to
 - 1.5%
 - 5.5 %
 - 0.15 %
 - 10%
- Planck's constant (h) speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length
 - $\frac{\sqrt{hG}}{c^3}$
 - $\sqrt{\frac{hc}{G}}$
 - $\sqrt{\frac{Gc}{h^3}}$
 - $\frac{\sqrt{hG}}{c^3}$
- Which of the following part of the electromagnetic spectrum characterized by approximate 400-700 nanometer wavelength range?
 - X-rays
 - Ultra-violet rays
 - Infrared
 - Visible
- The atomic mass unit scale is based on the mass of
 - ¹⁶O atom
 - ¹H atom
 - ¹²C atom
 - ⁴He atom
- The moment of inertia of a solid sphere of radius, R , mass, M is
 - $\frac{2}{5}MR^2$
 - $\frac{2}{3}MR^2$
 - $\frac{3}{5}MR^2$
 - $\frac{1}{3}MR^2$
- Consider the superposition of two sine waves of equal amplitude and different frequencies; 32 Hz and 34 Hz, respectively. How many beats would be produced in one second
 - None
 - 4 beats
 - 2 beats
 - 8 beats
- Which of the following region of the electromagnetic spectrum will have a frequency of 10 Giga Hz?
 - X-rays
 - Gamma rays
 - Radio waves
 - Ultra-Violet rays
- Which of the following property would generally not describe the nature of laser?
 - Coherence
 - Monochromatic
 - Unidirectional
 - Spontaneous emission
- Which of the following decay results in the net increase of the positive charge of the nucleus in the form of an additional proton?
 - Alpha decay
 - Beta (β^-) decay
 - Beta (β^+) decay
 - Gamma decay
- Which of the following fundamental particle is unstable in free state
 - Electron
 - Neutron
 - Alpha particle
 - Proton

12. The maximum kinetic energy of the photo-electrons in the photoelectric effect does not depend upon the,
 A) Energy of the incoming photon B) Work function of the metal surface
 C) Intensity of the incoming photons D) Discrete nature of the quanta of energy
13. Which of the following Hydrogen atomic spectra transition series predominately falls in the visible part of the electromagnetic spectrum?
 A) Paschen B) Balmer C) Brackett D) Pfund
14. A 0-300 V voltmeter has an error of $\pm 2\%$ of full scale deflection. What would be the range of readings if true voltage is 30 V?
 A) 24 V – 36 V B) 29.4 V – 30.6 V C) 20 V – 40 V D) 32 V – 34 V
15. In an experiment four quantities a, b, c, d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows
 $P = \frac{a^3 b^2}{cd} \%$. Error in P is
 A) 14% B) 10% C) 7% D) 4%
16. Which of the following quantity's SI unit is Steradian?
 A) Angle B) Solid Angle C) Volume D) Density
17. Under the action of a force $F = Cx$, the position of a body changes from 0 to x . The Work done is
 A) $\frac{1}{2} Cx^2$ B) Cx^2 C) Cx D) $\frac{1}{2} Cx$
18. If $\vec{a} = 2\hat{i} - 3\hat{j} + 6\hat{k}$ and $\vec{b} = a\hat{i} + \hat{j} + \hat{k}$ are perpendicular to each other, then the value of a is
 A) $\frac{3}{2}$ B) $\frac{1}{2}$ C) $\frac{5}{2}$ D) 0
19. The three sides of a parallelepiped are $\vec{A} = 2\hat{i} - 3\hat{j} + 7\hat{k}$, $\vec{B} = \hat{i} + 2\hat{j}$ and $\vec{C} = \hat{j} - \hat{k}$, the volume of this is
 A) 20 units B) 22 units C) 25 units D) Zero
20. A boat of mass 40 Kg is at rest. A dog of mass 4 Kg moves in the boat with a velocity of 10 ms^{-1} . What is the velocity of boat?
 A) 10 ms^{-1} B) 04 ms^{-1} C) 02 ms^{-1} D) 01 ms^{-1}
21. The acceleration due to gravity at a height 1 km above the earth is the same as at a depth d below the surface of earth. Then
 A) $d = \frac{1}{2} \text{ km}$ B) $d = 1 \text{ km}$ C) $d = \frac{3}{2} \text{ km}$ D) $d = 2 \text{ km}$
22. A student measured the diameter of a small rubber ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of -0.004cm, the correct diameter of the rubber ball is
 A) 0.053 cm B) 0.525 cm C) 0.521 cm D) 0.529 cm

23. A solid iron sphere is rotating freely about its symmetry axis in free space. The radius of the sphere is increased keeping its mass same. Which of the following physical quantities would remain constant for the sphere?
- A) Rotational kinetic energy B) Moment of Inertia
C) Angular velocity D) Angular momentum
24. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45° , the speed of the car is
- A) 20ms^{-1} B) 30ms^{-1} C) 05ms^{-1} D) 10ms^{-1}
25. Who discovered Neutron?
- A) Chadwick B) J.J. Thompson C) Goldstein D) Einstein
26. If a star can convert all the He nuclei completely into Oxygen nuclei, the energy released per Oxygen nucleus is [Mass of He Nucleus is 4.026 a.m.u and mass of Oxygen nucleus is 15.9994 a.m.u
- A) 7.6 MeV B) 56.12 MeV C) 10.24 MeV D) 23.9 MeV
27. A photon and an electron have same energy, the ratio of their wavelength is
- A) $\sqrt{\frac{m}{E}}$ B) $\sqrt{\frac{E}{m}}$ C) $\sqrt{\frac{2mc^2}{E}}$ D) $\sqrt{\frac{mc}{E}}$
28. The half-life of a radioactive substance is 30 minutes. The time (in minutes) taken between 40% decay and 85% decay of the same radioactive substance is
- A) 15 B) 30 C) 45 D) 60
29. Which of the following method is used for the determination of age of the wood?
- A) ^{16}O dating B) ^{14}C dating C) ^{12}C dating D) ^{14}N dating
30. A particle is dropped from a height H, the de-Broglie wavelength of the particle as a function of height is proportional to
- A) H B) $H^{\frac{1}{2}}$ C) H^0 D) $H^{-\frac{1}{2}}$
31. A photocell employs photoelectric effect to convert
- A) Change in the frequency of light into a change in electric voltage
B) Change in the intensity of illumination into a change in photoelectric current
C) Change in the intensity of illumination into a change in the work function of the photocathode
D) Change in the frequency of light into a change in the electric current.
32. In Rutherford scattering experiment, the number of α - particles scattered at 60° is 5×10^6 . The number of α - particles scattered at 120° will be
- A) 15×10^6 B) $\frac{3}{5} \times 10^6$ C) $\frac{5}{9} \times 10^6$ D) 3×10^6
33. If an electron in a hydrogen atom jumps from the 3rd orbit to the 2nd orbit, it emits a photon of wavelength λ . When it jumps from the 4th orbit to the 3rd orbit, the corresponding wavelength of the photon will be
- A) $\frac{16}{25}\lambda$ B) $\frac{9}{25}\lambda$ C) $\frac{20}{7}\lambda$ D) $\frac{20}{13}\lambda$

34. The ratio of kinetic energy to the total energy of an electron in a Bohr orbit of the hydrogen atom, is
 A) 2: -1 B) 1: -1 C) 1:3 D) 1:-3
35. At absolute zero Kelvin, the electrons in a metal can have energies in the range of
 A) MeV B) Zero C) keV D) eV
36. In a common emitter transistor amplifier, the audio signal voltage across the collector is 3V. The resistance of collector is 3 K Ω , if current gain is 100 and the base resistance is 2 K Ω , the voltage and power gain of the amplifier is
 A) 200 and 1000 B) 15 and 200 C) 150 and 15000 D) 20 and 2000
37. For a transistor amplifier, the voltage gain
 A) Remains constant at low frequencies
 B) Remains constant for all frequencies
 C) Is high at high and low frequencies and constant in the middle frequency range
 D) Is low at high and low frequencies and constant at mid-frequencies
38. A Zener diode is used for
 A) Voltage regulation B) Rectification
 C) Modulation D) Detection
39. The ratio of electron and hole current in a semiconductor is 7/4 and the ratio of drift velocities of electrons and holes is 5/4, then ratio of concentrations of electrons and holes will be
 A) 7/5 B) 5/7 C) 49/25 D) 25/49
40. Which one of the following is not an element of a basic communication system
 A) Modulator B) Demodulator C) Input Transducer D) Gauss meter
41. In amplitude modulation which of the following is modified in-order to transmit the signal.
 A) Amplitude of the information signal is modified
 B) Amplitude of the carrier wave is modified
 C) Amplitude of the inner wave is modified
 D) Phase of the information signal is modified
42. In an electromagnetic wave in free space the root mean square value of the electric field is $E_{r.m.s} = 6$ V/m, the peak value of the magnetic field is
 A) 2.83×10^{-8} T B) 4.23×10^{-8} T C) 3.4×10^{-8} T D) 5.26×10^{-8} T
43. A body of mass (4 m) is lying in xy -plane at rest. It suddenly explodes into three pieces. Two pieces each of mass m move perpendicular to each other with equal speed v . The total kinetic energy generated due to explosion is
 A) $3/2 mv^2$ B) $1/2 mv^2$ C) $4 mv^2$ D) $3 mv^2$
44. Moment of inertia of circular loop of radius R about the axis of rotation parallel to horizontal diameter at a distance R/2 from it is
 A) $1/2 MR^2$ B) $3/4 MR^2$ C) $4 MR^2$ D) $3 MR^2$

45. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?
 A) \sqrt{gR} B) $\sqrt{3gR}$ C) $\sqrt{5gR}$ D) $\sqrt{8gR}$
46. In designing, beam for its use to support a load. The depression at centre is proportional to (where, Y is Young's modulus)
 A) $1/Y$ B) Y^3 C) Y^5 D) Y
47. A sphere, a cube and a thin circular plate, all of same material and of same mass are initially heated to same high temperature
 A) Plate will cool faster and cube the slowest
 B) Plate will cool faster and sphere the slowest
 C) Cube will cool faster and plate the slowest
 D) Sphere will cool faster and cube the slowest
48. If λ_m denotes the wavelength at which the radiative emission from a black body at a temperature T K is maximum, then
 A) $\lambda_m \propto T^4$ B) λ_m is independent of T C) $\lambda_m \propto T^{-1}$ D) $\lambda_m \propto T$
49. The heat required to increase the temperature of 4 moles of a monoatomic ideal gas from 273 K to 473 K at constant volume is
 A) 1200 R B) 800 R C) 200 R D) 400 R
50. The displacement of a particle varies with time according to the relation $y = a \sin \omega t + b \cos \omega t$
 A) The motion is oscillatory but not SHM
 B) The motion is SHM with amplitude $a+b$
 C) The motion is SHM with amplitude a^2+b^2
 D) The motion is SHM with amplitude $\sqrt{a^2+b^2}$
51. With propagation of longitudinal waves through a medium, the quantity transmitted is
 A) Energy and matter B) Matter
 C) Energy, matter and momentum D) Energy
52. The velocity of sound in air at NTP is 430 m/s. What will be the value when the temperature is doubled and pressure is halved?
 A) $430\sqrt{2}$ m/s B) 185 m/s C) 430 m/s D) 215 m/s
53. A thin aluminum sheet is placed between the plates of a parallel plate capacitor. Its capacitance will
 A) Become infinite B) Remain same C) Become zero D) Increases
54. The resistance of a wire is R ohm. If it is melted and stretched to n times its original length, its new resistance will be
 A) n^2R B) nR C) $\frac{R}{n}$ D) $\frac{R}{n^2}$

55. A moving coil Galvanometer is an instrument to measure
A) Voltage B) Phase C) Current D) Frequency
56. If voltage across a bulb rated 220V – 100W drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is
A) 20% B) 10% C) 2.5% D) 5%
57. Which one of the following is not made of soft iron?
A) Magnet of loudspeaker B) Core of dynamo
C) Core of transformer D) Electromagnet
58. An electric generator is based on
A) Maxwell's law
B) Oersted's law
C) Faraday's law of electromagnetic induction
D) Wein's law
59. Young's double slit experiment is first performed in air and then in a medium other than air. It is found that 8th bright fringe in the medium lies where 5th dark fringe lies in air. The refractive index of the medium is nearly
A) 1.5 B) 1.25 C) 1.78 D) 1.69
60. In a common emitter amplifier circuit using an n-p-n transistor, the phase difference between the input and the output voltages will be
A) 45° B) 90° C) 135° D) 180°

x-x-x