

Question Booklet Series: A

Question Booklet Serial No.: 211608

CET (UG) – 2024

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

Total 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 / Gel Pen only**.
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 / Gel Pen only**.
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. 25% 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. The University will provide logarithmic table. 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 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 will 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 assistance or found giving or receiving assistance 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/cordless phones, pager, wireless, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. **Use of calculator is not allowed.**
18. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

1. Force F is given by $F = at + \frac{b}{t}$ where t is time. The dimensions of a and b are
 (A) MLT^{-3} and MLT^{-1} (B) MLT^{-1} and MLT^0
 (C) MLT^3 and MLT^2 (D) MLT^{-1} and MLT^{-3}
2. On a linear velocity time graph, velocity at 10s is 20ms^{-1} and 0 at 0s. The displacement in 15s will be
 (A) 200m (B) 450m (C) 225m (D) 100m
3. How many significant figures are there in 0.00548?
 (A) 6 (B) 3 (C) 5 (D) 7
4. The stopping distance of a car at 30 kmh^{-1} is 50m. What would be the stopping distance if the speed is 60 kmh^{-1} (deceleration remains same).
 (A) 50m (B) 100m (C) 200m (D) 150m
5. Projectiles A and B are launched with same initial velocity at angles 20° and 65° respectively. Their range will be
 (A) Same (B) Range of A is less than Range of B
 (C) Range of B is less than Range of A (D) None of the above
6. The displacement x of a particle moving along a straight line at time t is $x = a + bt + ct^2$. The acceleration is
 (A) b (B) $2c$ (C) a (D) c
7. A projectile is fired with velocity 28ms^{-1} making an angle of 30° with the ground and reaches a maximum height of 10m. With what velocity it should be fired to achieve 20m height.
 (A) 56 ms^{-1} (B) 32.5 ms^{-1} (C) 42.1 ms^{-1} (D) 39.6 ms^{-1}
8. A mass of 5 kg start sliding at angle of 15° from an inclined plane. The coefficient of static friction is
 (A) 0.5 (B) 0.2 (C) 0.27 (D) 0.1
9. A cork of 10g is floating on water. Net force on cork is
 (A) 0.1 N (B) Zero (C) 1 N (D) 10 N
10. Rocket propulsion is associated with
 (A) Newton's 3rd Law (B) Kepler's Law
 (C) Conservation of angular momentum (D) Conservation of mass
11. The work done in lifting an object of mass 10 kg to a height of 50 cm is
 (A) 10 J (B) 50 J (C) 200 J (D) 500 J
12. In completely inelastic collision
 (A) Both particles come to rest
 (B) Both particles move together
 (C) One particle comes to rest and other starts moving
 (D) Both particles move in opposite directions

13. If a heavenly body (star) expands and its radius becomes twice. The angular velocity of the body will
 (A) Remain same (B) Become twice (C) Becomes half (D) Be four times
14. At what height will the earth's gravity reduce by 1%. Given that $R_E = 6400$ km.
 (A) 32 km (B) 640 km (C) 320 km (D) 64 km
15. Fractional compression of water at 2000 m depth is... (Given that Bulk modulus of water = $2.2 \times 10^9 \text{ Nm}^{-2}$ and $g = 10 \text{ ms}^{-2}$)
 (A) 2.12% (B) 3.06% (C) 0.91% (D) 4.21%
16. Two wires of copper having length in the 3:1. The ratio of longitudinal strain between them will be
 (A) 1:3 (B) 3:1 (C) 1:9 (D) 9:1
17. Elastic limit and density of rock is $30 \times 10^7 \text{ Nm}^{-2}$ and $3 \times 10^3 \text{ kg m}^{-3}$. What is the maximum height a mountain on earth can have?
 (A) 20 km (B) 10 km (C) 15 km (D) 25 km
18. The force on $30 \times 20 \text{ cm}^2$ of a submarine at a depth of 1000 m ($\rho_w = 1.03 \times 10^3 \text{ kg m}^{-3}$, $g = 10 \text{ ms}^{-2}$)
 (A) $5.01 \times 10^3 \text{ N}$ (B) $6.01 \times 10^3 \text{ N}$ (C) $4.12 \times 10^5 \text{ N}$ (D) $6.18 \times 10^5 \text{ N}$
19. Speed of the water outflow at a depth of 20m from an open tank is
 (A) 30 ms^{-1} (B) 10 ms^{-1} (C) 20 ms^{-1} (D) 15 ms^{-1}
20. Pressure inside a bubble blown from a capillary of radius 2.00 mm is ($s = 7.30 \times 10^{-2} \text{ Nm}^{-1}$)
 (A) $1.02 \times 10^5 \text{ Pa}$ (B) 146 Pa (C) 10 Pa (D) $2.15 \times 10^5 \text{ Pa}$
21. How much the temperature on Kelvin scale reads which corresponds to the same reading on Fahrenheit and Celsius scale?
 (A) 313.15 (B) 273.15 (C) 233.15 (D) 0.0
22. Find the temperature raised by 0.14 kg of copper container containing 0.25 kg of water with 3.3 kJ of heat supplied.
 (A) 3°C (B) 5°C (C) 2°C (D) 4°C
23. Arrange silver (Ag), Aluminum (Al) and mercury (Hg) in increasing order of thermal conductivity
 (A) $\text{Hg} < \text{Ag} < \text{Al}$ (B) $\text{Hg} < \text{Al} < \text{Ag}$ (C) $\text{Al} < \text{Hg} < \text{Ag}$ (D) $\text{Ag} < \text{Al} < \text{Hg}$
24. A pan filled with hot water cools from 90°C to 80°C in 130s at a room temperature of 18°C . How long will it take to cool from 64°C to 60°C ?
 (A) 91s (B) 132s (C) 150s (D) 196s
25. The radiation energy emitted by a tungsten lamp at a temperature of 300K and surface area of 0.3 cm^2 is (emissivity = 0.4, $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$)
 (A) 100 W (B) 120 W (C) 60 W (D) 200 W

26. Which of the following is incorrect
 (A) Pressure is intensive quantity
 (B) Heat is a state variable
 (C) In adiabatic process no heat transfer takes place
 (D) Energy is extensive quantity
27. Given that mass of N_2 molecule is 4.65×10^{-26} kg at 300K the root mean square velocity is
 (A) 326 ms^{-1} (B) 602 ms^{-1} (C) 516 ms^{-1} (D) 362 ms^{-1}
28. For diatomic gas specific heat at constant volume is
 (A) $\frac{3}{2}R$ (B) $\frac{7}{2}R$ (C) $\frac{5}{2}R$ (D) R
29. Two simple pendulums A and B have same length but different masses m and $2m$ respectively. The ratio of their time period is
 (A) 1:1 (B) 1:2 (C) 2:1 (D) 1:4
30. Which of the following represents SHM when a = acceleration, x = displacement
 (A) $a = 12x$ (B) $a = 10x^2$ (C) $a = -12x$ (D) $a = +12x^3$
31. Speed of sound in air at standard temperature and pressure is (1 mole of air = 29.0×10^{-3} Kg, volume of 1 mole of any gas = 22.4 liters at STP)
 (A) 280 ms^{-1} (B) 332 ms^{-1} (C) 447 ms^{-1} (D) 516 ms^{-1}
32. Which of the following waves travels in the right forward direction?
 (A) $A \sin kx \cos \omega t$ (B) $A \sin(kx + \omega t)$
 (C) $A \sin(kx - \omega t)$ (D) $\cos(kx + \omega t)$
33. Two positive charges A (+2C) and B (+4C) are placed 10m apart. The position of 3rd charge such that F_{Total} on it is zero is
 (A) 5.86m from A (B) 4.14m from A (C) 3.57m from A (D) 3.75m from A
34. Two point charges $+10^{-9}$ C and -10^{-9} C are placed at 0.1m apart. Electric field in the middle is
 (A) $36 \times 10^2 \text{ Nc}^{-1}$ (B) $3.6 \times 10^4 \text{ Nc}^{-1}$ (C) $7.2 \times 10^4 \text{ Nc}^{-1}$ (D) $7.2 \times 10^2 \text{ Nc}^{-1}$
35. Electric field inside a uniformly charged spherical shell is
 (A) Zero (B) $\frac{q}{4\pi\epsilon_0 r^2}$ (C) $\frac{\sigma}{2\epsilon_0}$ (D) $\frac{\sigma}{\epsilon_0}$
36. The capacitance of a parallel plate capacitor of area 1m^2 and spacing 1mm is ($\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{N}^{-1} \text{m}^{-2}$)
 (A) $8.85 \times 10^{-6} \text{ F}$ (B) $8.85 \times 10^{-9} \text{ F}$ (C) $1.9 \times 10^{-8} \text{ F}$ (D) $1.9 \times 10^{-6} \text{ F}$
37. Three capacitors of capacitance $3\mu\text{F}$ each are connected in parallel. Equivalent capacitance of the circuit is
 (A) $1\mu\text{F}$ (B) $3\mu\text{F}$ (C) $9\mu\text{F}$ (D) $6\mu\text{F}$
38. Voltage applied across a capacitor is doubled. The capacitance of capacitor will be
 (A) Double (B) Same (C) Half (D) 4 times

39. Resistivity of iron at 0°C is $10^{-7}\Omega\text{m}$ and temperature coefficient is 0.0065. Find resistivity at 50°C .
 (A) $6.02 \times 10^{-7}\Omega\text{m}$ (B) $1.325 \times 10^{-6}\Omega\text{m}$ (C) $10^{-7}\Omega\text{m}$ (D) $1.325 \times 10^{-7}\Omega\text{m}$
40. Wheatstone bridge is used to determine
 (A) Resistance (B) Inductance (C) Charge (D) Voltage
41. H^+ and He^{+2} are subjected to same magnetic field perpendicular to their velocity. Velocity of H^+ is twice that of He^{+2} . The ratio of their cyclotron frequency $\nu_{\text{H}} : \nu_{\text{He}}$ is
 (A) 2:1 (B) 1:4 (C) 1:2 (D) 4:1
42. An electron moving along x-axis is subjected to a magnetic field along y-axis. Trajectory of the electron will be
 (A) Straight line (B) Circular clockwise
 (C) Circular anti-clockwise (D) Helical
43. Two parallel wires separated by 1 cm are carrying current 5A in the same direction. Force per unit length between them is ($\frac{\mu_0}{4\pi} = 10^{-7} \text{TmA}^{-1}$)
 (A) $5 \times 10^{-4} \text{Nm}^{-1}$ attractive (B) $5 \times 10^{-4} \text{Nm}^{-1}$ repulsive
 (C) $4.5 \times 10^{-1} \text{Nm}^{-1}$ attractive (D) $4.5 \times 10^{-1} \text{Nm}^{-1}$ repulsive
44. A magnetic needle having magnetic moment $6.7 \times 10^{-2} \text{Am}^2$ and moment of Inertia $I = 7.5 \times 10^{-6} \text{kgm}^2$ is placed in magnetic field. It completes 10 oscillations in 6.70s. Magnitude of B is
 (A) 1.1 T (B) 0.01 T (C) 3.5 T (D) 0.06 T
45. Meissner effect is related to
 (A) Electrical conductivity (B) Ferromagnetism
 (C) Superconductivity (D) Semiconductors
46. Magnetic Braking in trains is due to
 (A) Attractive force between opposite magnetic poles
 (B) Eddy currents
 (C) Attractive force between two current carrying wires
 (D) None of the above
47. A light bulb is rated 60 W for a 220 V supply. The resistance of the bulb is
 (A) 807 Ω (B) 708 Ω (C) 240 Ω (D) 502 Ω
48. Electric field in a plane electromagnetic wave is given by

$$E_y = 2 \times 10^{-7} \sin(0.5 \times 10^{-3}x + 1.5 \times 10^{11}t) \frac{\text{V}}{\text{m}}.$$

The wavelength of the electromagnetic wave is

- (A) 1.26m (B) 12.6m (C) 1.26cm (D) 126.0 cm

49. Arrange x-rays, visible, microwaves, AM radio waves in increasing wavelength order.
 (A) X-rays, Visible, AM radio waves, Microwaves
 (B) Visible, X-rays, Microwaves, AM radio waves
 (C) Microwaves, X-rays, Visible, AM radio waves
 (D) X-rays, Visible, Microwaves, AM radio waves
50. An object is placed 10cm in front of a concave mirror of radius of curvature 15cm. The image is formed at
 (A) 30cm from the mirror on the same side of the object
 (B) 30cm from the mirror on the opposite side of the object
 (C) 60cm from the mirror on the same side of the object
 (D) None of the above
51. The power of a concave lens of focal length 40cm is
 (A) +2.5 D (B) -2.5 D (C) +1.5 D (D) -1.5 D
52. What power should the reading spectacles have for a person for whom the least distance of distinct vision is 50cm. Take distance of normal vision as 25cm.
 (A) -2.0 D (B) -1.5 D (C) +2.0 D (D) +1.5 D
53. Light of wavelength $6000 \text{ \AA}$ is coming from a star. The limit of resolution of a telescope with objective 100 inch is
 (A) 1.9×10^{-7} radians (B) 2.9×10^{-7} radians (C) 3.0×10^{-6} radians (D) 1.9×10^{-8} radians
54. The de Broglie wavelength λ associated with electron through a potential difference of 54 V is
 (A) 0.167 nm (B) 0.176 nm (C) 1.76 nm (D) 1.67 nm
55. Find energy equivalent to one atomic mass unit ($1.6605 \times 10^{-27} \text{ Kg}$)
 (A) 1.0 MeV (B) 10.1 MeV (C) 931.5 MeV (D) 1.62 MeV
56. Tritium has half-life of 12.5 years. What fraction of the sample will remain un-decayed after 25 years?
 (A) Zero (B) $\frac{1}{16}$ (C) $\frac{1}{8}$ (D) $\frac{1}{4}$
57. The resistivity of insulators is of the order of
 (A) $10^{-5} \Omega\text{m}$ (B) $10^1 \Omega\text{m}$ (C) $10^{15} \Omega\text{m}$ (D) None of these
58. Suppose that a pure Si crystal has $5 \times 10^{28} \text{ atoms/m}^3$. It is doped with 1 ppm concentration of As. If $n_i = 1.5 \times 10^{16} \text{ m}^{-3}$, number of holes is
 (A) $1.5 \times 10^{16} \text{ m}^{-3}$ (B) $4.5 \times 10^9 \text{ m}^{-3}$ (C) $5 \times 10^{22} \text{ m}^{-3}$ (D) $4.5 \times 10^{22} \text{ m}^{-3}$
59. The name of first Indian nuclear reactor is
 (A) CIRUS (B) DHARVA (C) KAMINI (D) APSARA
60. Mirage formation is a consequence of
 (A) Reflection (B) Diffraction
 (C) Total internal reflection (D) Refraction

x-x-x