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Sr. No. : .....

**CET (UG) – 2017**Booklet Series Code : **A****Important :** Please consult your Admit Card / Roll No. Slip before filling your Roll Number on the Test Booklet and Answer Sheet.

(In Figures)

(In Words)

Roll No. :

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O.M.R. Answer Sheet Serial No. :

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Signature of the Candidate : .....

**Subject : PHYSICS**

Time : 70 Minutes]

[Maximum Marks : 120

No. of Questions : 60]

[Total No. of Printed Pages : 16

**DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO****INSTRUCTIONS :**

- Write your Roll No. on the Question Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
- Enter the Subject and Series Code of Question Booklet on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel pen**.
- Do not make any identification mark on the Answer Sheet or Question Booklet.
- To open the Question Booklet remove the paper seal gently when asked to do so.
- 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.
- Each question has four alternative answers (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**.
- If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Sheet. No marks will be deducted in such cases.
- Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the questions given in the Question Booklet.
- 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.
- For calculations, use of simple log tables is permitted. Borrowing of log tables and any other material is not allowed.
- For rough work only the sheets marked "**Rough Work**" at the end of the Question Booklet be used.
- 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.**
- After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
- 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.
- 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.
- Telecommunication equipment such as pager, cellular phone, wireless, scanner, etc., is not permitted inside the examination hall. Use of calculators is not allowed.

**SEAL**

1. The number of significant figures in 0.4270g and 0.00427g respectively are :
- (A) 4 and 5 (B) 3 and 5  
(C) 4 and 3 (D) 3 and 3
2. The velocity of a car at any time  $t$  is given by the equation  $v_x = 60 \text{ ms}^{-1} + (0.5 \text{ ms}^{-3}) t^2$ . The change in the velocity of car in the time interval between  $t_1 = 1.0\text{s}$  and  $t_2 = 3.0\text{s}$  is :
- (A)  $4 \text{ ms}^{-1}$  (B)  $6 \text{ ms}^{-1}$   
(C)  $3 \text{ ms}^{-1}$  (D)  $5 \text{ ms}^{-1}$
3. The airspeed indicator of a plane headed due north, indicates that it is moving through the air at 240 km/h. If there is a wind of 100 km/h from west to east, the velocity of the airplane relative to earth is :
- (A) 218 km/h (B) 260 km/h  
(C) 250 km/h (D) 230 km/h
4. A boy tosses a ball from a window that is 8.0 m above the ground. When the ball leaves boy's hand, it is moving at a speed of 10.0 m/s at an angle of  $20^\circ$  below the horizontal. When the ball hits the ground, its horizontal distance from the window is :
- (A) 12.2 m (B) 7.4 m  
(C) 10.0 m (D) 9.2 m
5. The angle between the two vectors  $\vec{A} = 2\hat{i} + 3\hat{j} + \hat{k}$  and  $\vec{B} = -4\hat{i} + 2\hat{j} - \hat{k}$  is :
- (A)  $80^\circ$  (B)  $100^\circ$   
(C)  $20^\circ$  (D)  $90^\circ$
6. A 50 kg woman stands on a weighing scale while riding in an elevator moving downwards with an acceleration of  $2 \text{ m/s}^2$ . The reading on the weighing scale is :
- (A) 390 N (B) 590 N  
(C) 490 N (D) 100 N

7. The frictional forces between the two surfaces are due to :
- (A) Electrical forces between the particles of the two surfaces
  - (B) Magnetic forces between the particles of the two surfaces
  - (C) Strong nuclear forces
  - (D) Gravitational forces between the two surfaces
8. In a uniform circular motion, the acceleration vector is :
- (A) Parallel to the velocity vector
  - (B) Antiparallel to the velocity vector
  - (C) Directed towards the centre of the circle
  - (D) Directed away from the centre of the circle
9. According to work energy theorem, if the work done on a particle is positive, then its kinetic energy :
- (A) Decreases
  - (B) Increases
  - (C) Remains constant
  - (D) May increase or decrease depending upon the magnitude of the work done
10. A batter hits two identical baseballs with the same initial speed and height, but different angles with the ground. At a given height  $h$  :
- (A) The ball with bigger angle with the ground has higher speed
  - (B) The ball with smaller angle with the ground has higher speed
  - (C) Both the balls have same speed
  - (D) It is not possible to compare the speeds

11. Which of the following is not true for the work done by a conservative force ?
- (A) It can be expressed as difference between the initial and final values of potential energy
  - (B) It is irreversible
  - (C) It is independent of the path followed by the body
  - (D) For a closed path, it is zero
12. A boy throws a ball with a mass of 0.40 Kg against a brick wall. The ball hits the wall at 30 m/s and rebounds at 20 m/s. During its collision with the wall, the impulse of the net force on the ball is :
- (A) 4Ns
  - (B) 20Ns
  - (C) 10Ns
  - (D) 50Ns
13. An ice skater is in a fast spin with her arms held tightly to her body. When she extends her arms :
- (A) She decreases her moment of inertia
  - (B) She increases her angular speed
  - (C) Her moment of inertia remains constant
  - (D) Her total angular momentum remains constant
14. A discus thrower moves the discus in a circle of radius 80.0 cm. At a certain instant, the thrower is spinning at an angular speed of 10.0 rad/s and the angular speed is increasing at 50.0 rad/s<sup>2</sup>. At this instant, the tangential component of the acceleration of the discus is :
- (A) 80 m/s<sup>2</sup>
  - (B) 50 m/s<sup>2</sup>
  - (C) 90 m/s<sup>2</sup>
  - (D) 40 m/s<sup>2</sup>
15. If the Young's Modulus of material A is more than the material B, then :
- (A) A is more elastic than B
  - (B) A is more stiff than B
  - (C) A and B may have same elasticity
  - (D) A is more ductile than B

16. Terminal velocity of a massive object :

- (A) is more than the terminal velocity of a lighter object
- (B) is less than the terminal velocity of a lighter object
- (C) is same as the terminal velocity of a lighter object
- (D) may be more or less than the terminal velocity of a lighter object, depending on the nature of the material

17. Hydraulic lift is an application of :

- (A) Archimedes' principle
- (B) Boyle's law
- (C) Pascal's law
- (D) Bernoulli's equation

18. Specific heat of a solid is :

- (A) amount of heat conducted to the colder end of the solid kept 1 m apart
- (B) amount of heat required to raise the temperature of 1 kg of the solid by  $1^{\circ}\text{C}$
- (C) amount of heat radiated by unit mass of the solid in 1 sec
- (D) amount of heat absorbed by the solid from the environment

19. The distance between the centres of two spheres of masses 500 g and 10 g is 0.05 m. The magnitude of the acceleration of the smaller sphere is :

- (A)  $1.33 \times 10^{-8} \text{ m/s}^2$
- (B)  $2.67 \times 10^{-8} \text{ m/s}^2$
- (C)  $3.13 \times 10^{-8} \text{ m/s}^2$
- (D)  $4.54 \times 10^{-8} \text{ m/s}^2$

20. The internal energy of an isolated system :

- (A) is zero
- (B) is constant
- (C) is variable
- (D) cannot be predicted

21. If  $G$  is the gravitational constant and  $g$  is the acceleration due to gravity, then :

- (A) Values of both  $G$  and  $g$  depend on the location
- (B) Values of both  $G$  and  $g$  are independent of the location
- (C)  $G$  is same everywhere in universe, but  $g$  is not
- (D)  $g$  is same everywhere in universe, but  $G$  is not

22. According to one of the Kepler's law, the periods of the planets are proportional to :

- (A)  $1/2$  powers of the major axis lengths of their orbits
- (B)  $2/3$  powers of the major axis lengths of their orbits
- (C)  $1/4$  powers of the major axis lengths of their orbits
- (D)  $3/2$  powers of the major axis lengths of their orbits

23. In an adiabatic process :

- (A) There is no heat transfer into or out of the system
- (B) Heat is transferred into the system and not out of the system
- (C) Heat is transferred out of the system and not into the system
- (D) Heat may be transferred both into the system as well as out of the system

24. The average translational kinetic energy of one molecule of an ideal gas at a temperature  $T$  is :

- (A)  $\frac{1}{2}kT$
- (B)  $\frac{3}{2}kT$
- (C)  $\frac{1}{2}RT$
- (D)  $\frac{3}{2}RT$

25. Root mean square speed of a molecule of oxygen ( $O_2$ ) is :

- (A) 550 m/s
- (B) 640 m/s
- (C) 328 m/s
- (D) 484 m/s

26. In a Carnot cycle, the temperature of the working substance at the end of the cycle is :
- (A) Less than the initial temperature
  - (B) Greater than the initial temperature
  - (C) Same as the initial temperature
  - (D) Zero
27. The speed of transverse waves on a string depends :
- (A) Both on the tension  $T$  and mass per unit length  $\mu$
  - (B) Only on the tension  $T$  and not on mass per unit length  $\mu$
  - (C) Only on the mass per unit length  $\mu$  and not on the tension  $T$
  - (D) Neither on the tension  $T$  nor on mass per unit length  $\mu$
28. The velocity of sound in air is 344 m/s. The range of wavelength to which the human ear is sensitive is :
- (A) 1.7 mm – 17 cm
  - (B) 1.7 cm – 17 cm
  - (C) 1.7 cm – 17 m
  - (D) 17 m – 170 m
29. A police siren emits a sinusoidal wave with frequency of 300 Hz. The speed of the sound is 340 m/s. If the siren is moving at a speed of 30 m/s, the wavelength of the waves ahead of the source is :
- (A) 1.03 m
  - (B) 10.3 m
  - (C) 1.23 m
  - (D) 12.3 m
30. Resonance in an oscillating system happens, when there is an amplitude peak at driving frequencies :
- (A) Close to the natural frequency of the system
  - (B) Approaching infinity
  - (C) Half the nature frequency of the system
  - (D) Twice the nature frequency of the system

31. Two point charges of magnitude  $1.0\text{nC}$  and  $-3.0\text{nC}$  are respectively located at a distance of  $2.0\text{ cm}$  and  $4.0\text{ cm}$  from the origin on the positive  $x$ -axis. The total force exerted by these two charges on a charge of  $5.0\text{nC}$  located at the origin is :
- (A)  $196\mu\text{C}$  towards  $-x$  axis                      (B)  $196\mu\text{C}$  towards  $+x$  axis  
(C)  $28\mu\text{C}$  towards  $-x$  axis                        (D)  $28\mu\text{C}$  towards  $+x$  axis
32. Which of the following statements about the electric flux through a closed surface is wrong ?
- (A) The sign of the enclosed charge decides whether there is inward or outward electric flux through the closed surface  
(B) Charges outside the surface do not give a net electric flux through the surface  
(C) The net electric flux is proportional to the net amount of the charge enclosed  
(D) The net electric flux depends on the size of the closed surface
33. If a dielectric is subjected to an electric field more than its dielectric strength, then :
- (A) The dielectric becomes a semiconductor  
(B) The dielectric becomes a conductor  
(C) The dielectric becomes an oscillator  
(D) The dielectric becomes a rectifier
34. Resistivity of a conductor :
- (A) Doubles on doubling its area  
(B) Doubles on doubling its length  
(C) Becomes half of doubling its area  
(D) Does not depend on its area and length
35. Two identical light bulbs, each having resistance  $2\Omega$  are connected to a source with e.m.f.  $E = 8\text{V}$ . If the bulbs are connected in series, the current and power delivered to each bulb is :
- (A)  $2\text{A}$  and  $16\text{W}$                                       (B)  $2\text{A}$  and  $8\text{W}$   
(C)  $4\text{A}$  and  $16\text{W}$                                       (D)  $4\text{A}$  and  $32\text{W}$



36. A resistor with resistance  $10\text{ M}\Omega$  is connected in series with a capacitance  $1.0\text{ }\mu\text{F}$  and a battery with e.m.f.  $12.0\text{ V}$ . Before the switch is closed at time  $t = 0$ , the capacitor is uncharged. After time  $t = 46\text{ s}$  :
- (A) The capacitor is 99% charged      (B) The capacitor is 1% charged  
(C) The capacitor is 44% charged      (D) The capacitor is 66% charged
37. The magnetic field is created in the surrounding space by :
- (A) A group of static point charges      (B) Moving charges  
(C) Magnetic monopoles      (D) A static electric dipole.
38. Two protons are moving parallel to  $x$ -axis in opposite directions with velocity  $v$ . At an instant, when they are apart by a distance  $r$ , the ratio of the magnitudes of magnetic and electric forces acting on one of the protons is :
- (A)  $\frac{\mu_0\epsilon_0}{v^2}$       (B)  $\frac{\mu_0}{\epsilon_0 v^2}$   
(C)  $\mu_0\epsilon_0 v^2$       (D)  $\mu_0\epsilon_0$
39. Two parallel conducting wires, carrying current in the same direction :
- (A) Attract each other  
(B) Repel each other  
(C) Neither attract nor repel each other  
(D) May attract or repel each other depending on the magnitude of the current
40. Which of the following is true ?
- (A) Magnetic Susceptibility of diamagnetic materials is small and positive  
(B) Magnetic Susceptibility of paramagnetic materials is small and negative  
(C) Magnetic Susceptibility of diamagnetic materials is zero  
(D) Magnetic Susceptibility of ferromagnetic materials is large and positive

41. The Potential energy of a magnetic dipole having dipole moment  $p$ , placed in magnetic field  $B$  is minimum when :
- (A)  $p$  is perpendicular to  $B$
  - (B)  $p$  is parallel to  $B$
  - (C)  $p$  is antiparallel to  $B$
  - (D)  $p$  is inclined to  $B$
42. The magnitude of the magnetic field between the poles of an electromagnet is increasing at the rate of  $0.020\text{T/s}$ . The area of a conducting loop placed in the field is  $120\text{ cm}^2$ . The magnitude of the emf induced in the coil is :
- (A) 240 mV
  - (B) 2.4 mV
  - (C) 2.4 V
  - (D) 0.24 mV
43. The inductance needed to store 1.0 kWh of energy in a coil carrying 200 A current is :
- (A) 180 H
  - (B) 150 H
  - (C) 100 H
  - (D) 200 H
44. In an oscillating LC circuit :
- (A) Both charge  $Q$  and current  $I$  are constant
  - (B) Both charge  $Q$  and current  $I$  vary sinusoidally
  - (C) Charge  $Q$  remains fixed, while the current  $I$  varies sinusoidally
  - (D) Current  $I$  remains fixed, while the charge  $Q$  varies sinusoidally
45. The Maxwell's equation  $\oint \mathbf{E} \cdot d\mathbf{l} = -\frac{d\phi_B}{dt}$  expresses :
- (A) Gauss's law
  - (B) Gauss's law for magnetism
  - (C) Faraday's law
  - (D) Ampere's law

46. In vacuum, the amplitudes of electric and magnetic field of an electromagnetic wave are related as :

(A)  $E_{\max} = B_{\max}/c$

(B)  $E_{\max} = B_{\max}/c^2$

(C)  $E_{\max} = B_{\max}c$

(D)  $E_{\max} = B_{\max}c^2$

47. Which of the following is true ?

(A) In glass, the speed of yellow light is more than the speed of blue light

(B) In glass, the speed of yellow light is less than the speed of blue light

(C) In vacuum, the speed of yellow light is more than the speed of blue light

(D) In vacuum, the speed of yellow light is less than the speed of blue light

48. The intensity transmitted, when an unpolarized light having intensity  $I_0$  is incident on two polarizers kept with their axes at angle of  $30^\circ$  is :

(A)  $\frac{1}{2}I_0$

(B)  $\frac{3}{4}I_0$

(C)  $\frac{3}{8}I_0$

(D)  $\frac{1}{4}I_0$

49. If a swimmer looks straight down into the water (refractive index of water is 1.33) in the pool that is 2.0 m deep, the pool appears to the swimmer to be :

(A) 2.5 m deep

(B) 1.5 m deep

(C) 1.0 m deep

(D) 3.0 m deep

50. The reflectivity of glass can be enhanced by coating its surface with a uniform film of optical thickness :

(A)  $\lambda/2$  and refractive index less than that of glass

(B)  $\lambda/2$  and refractive index greater than that of glass

(C)  $\lambda/4$  and refractive index less than that of glass

(D)  $\lambda/4$  and refractive index greater than that of glass

51. In a two slit interference experiment, the slits are 0.20 mm apart and the screen is at a distance of 1.0 m. The third bright fringe is found to be displaced 7.5 mm from the central fringe. The wavelength of the light used is :
- (A) 500 nm (B) 540 nm  
(C) 650 nm (D) 480 nm
52. In photoelectric effect experiment, the stopping potential is :
- (A) Proportional to the intensity of incident light  
(B) Proportional to the frequency of the incident light  
(C) Proportional to the work function of cathode material  
(D) Proportional to the threshold frequency of incident light
53. The kinetic energy of a neutron ( $m = 1.67 \times 10^{-27}$  kg) having a de-Broglie wavelength  $\lambda = 0.20$  nm is :
- (A)  $1.55 \times 10^{-21}$  J (B)  $4.56 \times 10^{-21}$  J  
(C)  $3.28 \times 10^{-21}$  J (D)  $2.54 \times 10^{-21}$  J
54. The emission of a  $\beta$ -particle involves :
- (A) Transformation of a  $p$  into  $n$  (B) Transformation of a  $n$  into  $p$   
(C) Transformation of a  $p$  into  $e$  (D) Transformation of a  $n$  into a photon
55. In a nuclear reactor, the function of Boron rods is to :
- (A) Slow down the neutrons (B) Speed up the reaction  
(C) Absorb gamma radiation (D) Absorb excess neutrons

56. The resistivity of an extrinsic semiconductor increases on :
- (A) Increasing the dopant concentration
  - (B) Increasing the area of the sample
  - (C) Decreasing the temperature
  - (D) Increasing the length of the sample
57. In a reverse biased  $p-n$  junction diode :
- (A) The depletion region width is reduced and the barrier height is increased
  - (B) The depletion region width is widened and the barrier height is reduced
  - (C) Both the depletion region width and the barrier height is reduced
  - (D) Both the depletion region width and the barrier height is increased
58. A bipolar junction transistor consists of :
- (A) Two regions of doped semiconductors and one region of pure semiconductor
  - (B) Two regions of pure semiconductors and one region of doped semiconductor
  - (C) Three regions of doped semiconductors
  - (D) Three regions of pure semiconductors
59. In a Zener diode, if the load resistance decreases :
- (A) The Zener current decreases
  - (B) The Zener current increases
  - (C) The Zener current remains the same
  - (D) The Zener diode approaches its breakdown
60. The electromagnetic waves used in the optical fiber communication lie in :
- (A) Visible region
  - (B) Gamma ray region
  - (C) Microwave region
  - (D) Radiowave region