

PU-CET (B.D.S.) – 2015**Paper – I : Physics**

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: _____

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. Please check that this Question Booklet contains **66** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. 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**. **There shall be no negative marking**. Each question carries 2 marks.
6. 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.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. For calculation, use of simple Log tables is permitted. Borrowing of log table or other material is not allowed.
11. 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.**
12. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
13. 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.
14. 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.
15. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
16. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

- The range of masses we study in Physics is
 - 10^{-30} kg to 10^{55} kg
 - 10^{-27} kg to 10^{55} kg
 - 10^{-30} kg to 10^{60} kg
 - 10^{-27} kg to 10^{60} kg
- A man standing on an international space station, which is orbiting earth at an altitude 520 km with a constant speed 7.6 km/s. If the man's weight is 50 kh, his acceleration is (radius of earth = 6400 km, value of $g = 9.8 \text{ m/s}^2$)
 - $\cot^{-1}(i)$
 - $\cos^{-1}(i)$
 - $\sin^{-1}(i)$
 - $\tan^{-1}(i)$
- The effect of temperature on the value of modulus of elasticity for various substances in general
 - It increases with increase in temperature
 - Remains constant
 - Decreases with rise in temperature
 - Sometimes increases sometimes decreases
- A table clock has its minute hand 4.0 cm long. The average velocity of the tip of the minute band between 6.00 am to 6.30 pm is
 - $1.1 \times 10^{-4} \text{ cm s}^{-1}$
 - $2.2 \times 10^{-4} \text{ cm s}^{-1}$
 - $3.14 \times 10^{-4} \text{ cm s}^{-1}$
 - $3.3 \times 10^{-4} \text{ cm s}^{-1}$
- Two particles of equal mass 'm' go around a circle of radius R under the action of their mutual gravitational attraction. The speed of each particle with respect to their centre of mass is
 - $\sqrt{(GM/R)}$
 - $\sqrt{(GM/3R)}$
 - $\sqrt{(GM/4R)}$
 - $\sqrt{(GM/2R)}$
- Specific heat of a substance at the melting point becomes
 - Infinite
 - Remains unchanged
 - Low
 - High
- A body is moving in a circle of radius 100 cm with a time period of 2 second. The acceleration of the body is
 - $100 \pi \text{ cm/s}^2$
 - $100 \pi^2 \text{ cm/s}^2$
 - $200 \pi^2 \text{ cm/s}^2$
 - $200 \pi \text{ cm/s}^2$
- A stone is dropped from a certain height which can reach the ground in 5 seconds. If the stone is dropped after 3 seconds of its fall and then allowed to fall again, then the time taken by the stone to reach the ground for remaining distance is
 - 4 s
 - 3 s
 - 5 s
 - 2 s
- The work done in increasing the size of a soap film from 10 cm x 6 cm to 10 cm x 11 cm is 3×10^{-4} J. The surface tension of the film is
 - $1.5 \times 10^{-2} \text{ Nm}^{-1}$
 - $3.0 \times 10^{-2} \text{ Nm}^{-1}$
 - $11.0 \times 10^{-2} \text{ Nm}^{-1}$
 - $6.0 \times 10^{-2} \text{ Nm}^{-1}$
- The coefficient of performance of a refrigerator, which extracts 100 calorie of heat/cycle from the sink and releases 140 calorie of heat/cycle to the source is
 - 4.0
 - 3.5
 - 5
 - 2.5

11. Which one of the following is a non-conservative force?
- A) Force of friction
B) Electrostatic force
C) Gravitational force
D) Magnetic force
12. The number of degrees of freedom associated with 2 gram of helium at NTP is
- A) 9.03×10^{23}
B) 9.03×10^{-23}
C) 6.01×10^{23}
D) 9.03×10^{26}
13. Angular velocity of minute's hand of a clock in radian/sec is
- A) $2\pi/1800$
B) $2\pi/30$
C) $\pi/30$
D) $\pi/1800$
14. When an ideal gas compressed adiabatically its temperature rises: the molecules on the average have more kinetic energy than before. The kinetic energy increases
- A) Because of collisions with moving parts of the wall only
B) Because of collisions with the entire wall
C) Because the molecules gets accelerated in their motion inside the volume
D) Because of redistribution of energy amongst the molecules
15. A sound wave is passing through air column in the form of compression and rarefaction. In consecutive compressions and rarefactions
- A) Boyle's law is obeyed
B) Density remains constant
C) Bulk modulus of air oscillates
D) There is no transfer of heat
16. How many disintegrations per second make up 1 curie?
- A) 3.7×10^{12}
B) 3.7×10^{13}
C) 3.7×10^7
D) 3.7×10^{10}
17. A thin lens of refractive index 1.5 has a focal length of 15 cm in air. When the lens is placed in a medium of refractive index $4/3$, its focal length will become
- A) 8.4 ms^{-2}
B) 10 ms^{-2}
C) 7.6 ms^{-2}
D) 4.6 ms^{-2}
18. A body is released from certain height. After falling for sometime, if acceleration due to gravity vanishes, then
- A) Body continues to move with uniform velocity
B) Body continues to move with uniform acceleration
C) Body continues to move with uniform retardation
D) Body continues to move with variable velocity
19. A monkey is sitting on a tree limb. The limb exerts a normal force of 48 N and a frictional force of 20 N. The magnitude of the total force exerted by the limb on the monkey will be
- A) 42 N
B) 32 N
C) 62 N
D) 52 N
20. If random error in the arithmetic mean of 100 observations is x , then the random error in the arithmetic mean of 500 observations should be
- A) $5x$
B) $25x$
C) $x/5$
D) $x/25$
21. Two spheres of same material and radii 4 m and 1 m respectively are at temperature 1000 K and 2000 K respectively. The ratio of energies radiated by them per second is
- A) 1:2
B) 2:1
C) 1:4
D) 1:1

22. Two forces equal in magnitude, act on a particle. When square of their resultant is equal to three times their product, find the angle between them
 A) 120° B) 90° C) 60° D) 30°
23. In a moving body of mass m once up and down a smooth incline of inclination θ , total work done is (S is length of the plane)
 A) $mg \sin\theta \times S$ B) $mg \cos \times S$ C) zero D) $mg (\sin\theta - \cos\theta) \times S$
24. A Carnot engine takes in 3000 k cal. Of heat from a reservoir at 627°C and gives it to a sink at 27°C . The work done by the engine is
 A) $2.8 \times 10^6 \text{ J}$ B) $8.4 \times 10^6 \text{ J}$ C) $16.8 \times 10^6 \text{ J}$ D) zero
25. A truck draws a tractor mass 1000 kg at a steady rate of 20 m s^{-1} on a level road. The tension in the coupling is 2000 N. Power spent on the tractor is
 A) 40 W B) 40 kW C) 20 kW D) 20 W
26. 1 mole of H_2 gas is contained in a box of volume $V = 1.00 \text{ m}^3$ at $T = 300 \text{ K}$. The gas is heated to a temperature $T = 3000 \text{ K}$ and the gas gets converted to a gas of hydrogen atoms. The final pressure would be (considering all gases to be ideal)
 When npn transistor is used as an amplifier, then
 A) Same as the pressure initially B) 10 times the pressure initially
 C) 20 times the pressure initially D) 2 times the pressure initially
27. Moment of inertia of a hollow cylinder of mass M and radius R , about the axis of cylinder is
 A) $2/5 MR^2$ B) $2/3 MR^2$ C) $1/2 MR^2$ D) MR^2
28. A hollow sphere is filled with water through a small hole in it. It is then hung by a long thread and made to oscillate. As the water slowly flows out of the hole at the bottom, the period of oscillation of the sphere
 A) Continuously increases B) Continuously decreases
 C) First increases and then decreases D) First decreases and then increases
29. A fork of frequency 400 Hz is in unison with a sonometer wire. Beats/sec will be heard when tension in the wire is increased by 2% will be
 A) 1 B) 4 C) 2 D) 3
30. A 40 kg flywheel in the form of a uniform circular disc of diameter 1 m is making 120 rpm. Its moment of inertia about a transverse axis through its centre is
 A) 20 kg m^2 B) 40 kg m^2 C) 10 kg m^2 D) 5 kg m^2
31. Two particles, each of mass m and carrying charge Q , are separated by some distance. If they are in equilibrium under mutual gravitational and electrostatic forces then Q/m (in C/kg) is of the order of
 A) 10^{-20} B) 10^{-15} C) 10^{-10} D) 10^{-5}

32. A ray of light incident on a slab of transparent material is partly reflected from the surface and partly refracted into the slab. The reflected and refracted rays are mutually perpendicular. The incident ray makes an angle i with the normal of the slab. The refractive index of the slab is
 A) $\cot^{-1}(i)$ B) $\cos^{-1}(i)$ C) $\sin^{-1}(i)$ D) $\tan^{-1}(i)$
33. The wavelength associated with a moving football is not observed because
 A) Football absorbs de-Broglie waves
 B) De-Broglie wavelength is not associated with football
 C) The de-Broglie wavelength is much smaller than the diameter of football
 D) The de-Broglie wavelength is much larger than the diameter of football
34. The drift velocity of electrons in a metallic conductor carrying a current is usually of the order of
 A) 1 cm/s B) 10^8 m/s C) 10^4 m/s D) 10 m/s
35. The energy of photon corresponding to visible light of maximum wavelength is nearly
 A) 1 eV B) 4.1 eV C) 3.2 eV D) 1.6 eV
36. Half the surface of a transparent sphere of refractive index 2 is silvered. A narrow, parallel beam of light is incident on the unsilvered surface, symmetrically with respect to the silvered part. The light finally emerging from the sphere will be a
 A) Widely divergent beam B) Slightly divergent beam
 C) Parallel beam D) Converging beam
37. An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude
 A) $\mu_0 n^2 e / 2r$ B) $\mu_0 n e / 2\pi r$ C) $\mu_0 n e / 2r$ D) zero
38. The energy gap of silicon is 1.14 eV. The maximum wavelength at which silicon will begin absorbing energy is
 A) 1088.8°A B) 10888°A C) 108.88°A D) 10.888°A
39. In an AC circuit, the reactance is equal to the resistance. The power factor of the circuit will be
 A) $1/2$ B) zero C) 1 D) $1/\sqrt{2}$
40. T.V. waves are
 A) Frequency modulated B) Amplitude modulated
 C) Both above D) Neither of above
41. An electric lamp designed for operation on 110 V AC is connected to a 220 V AC supply, through a choke coil of inductance $2H$, for proper operation. The angular frequency of the AC is $100\sqrt{10}$ rad/s. If a capacitor is to be used in place of the choke coil, its capacitance must be
 A) $2\ \mu\text{F}$ B) $10\ \mu\text{F}$ C) $1\ \mu\text{F}$ D) $5\ \mu\text{F}$

42. An oscillator produces
- A) Undamped oscillations
B) Damped oscillations
C) Unmodulated oscillations
D) Modulated oscillations
43. In a radioactive series, $^{92}\text{U}_{238}$ changes to $^{82}\text{Pb}_{206}$ through n_1 α -decay processes and n_2 β -decay processes
- A) $n_1 = 8, n_2 = 8$
B) $n_1 = 8, n_2 = 6$
C) $n_1 = 6, n_2 = 6$
D) $n_1 = 6, n_2 = 8$
44. A thin lens of refractive index 1.5 has a focal length of 15 cm in air. When the lens is placed in a medium of refractive index $4/3$, its focal length will become
- A) 60 cm
B) 75 cm
C) 30 cm
D) 45 cm
45. A and B are isotopes. B and C are isobars. All three are radioactive.
- A) A, B and C may belong to the same group
B) A, B and C must belong to the same group
C) It is possible that B will change to C through a radioactive decay process
D) It is possible that A will change to B through a radioactive decay process
46. A positive point charge, which is free to move, is placed inside a hollow conducting sphere with negative charge, away from its centre. It will
- A) Move towards the centre
B) Move towards the nearer wall of the conductor
C) Oscillate between the centre and nearer wall
D) Remains stationary
47. 90% of the active nuclei present in a radioactive sample are found to remain undecayed after 1 day. The percentage of undecayed nuclei after two days will be
- A) 81%
B) 79%
C) 80%
D) 85%
48. An electric bulb rated for 500 watts at 100 volts in a circuit having a 200-volt supply. The resistance R that must be put in series with the bulb, so that the bulb draws 500 watts is
- A) 500 Ω
B) 50 Ω
C) 100 Ω
D) 20 Ω
49. An astronomical telescope in normal adjustment receives light from a distant source S. The tube length is now decreased slightly
- A) No image will be formed
B) A virtual image of S will be formed at a finite distance
C) A large, real image of S will be formed behind the eyepiece, far away from it
D) A small, real image of S will be formed behind the eyepiece, close to it.
50. If we treat the earth as a conducting sphere of radius 6.4×10^3 km, its capacitance would be of the order of
- A) 1 mF
B) 10^3 F
C) 1 μ F
D) 1 F
51. In a moving coil instrument, the coil is suspended in a radial magnetic field instead of a uniform magnetic field. This is done to
- A) Increase the sensitivity of the instrument
B) Make its deflection proportional to the current through it
C) Increase the accuracy of the instrument
D) Make the instrument compact and portable

52. A metal surface is illuminated by a light of given intensity and frequency to cause photoemission. If the intensity of illumination is reduced to one fourth of its original value, then the maximum kinetic energy of the emitted photoelectrons would become
- A) Unchanged
 B) four times the original value
 C) Twice the original value
 D) $1/16^{\text{th}}$ of the original value
53. The ratio of areas within the electron orbits for the first excited state to the ground state for the hydrogen atom is
- A) 4:1
 B) 8:1
 C) 2:1
 D) 16:1
54. The dominant mechanism for the motion of charge carriers in forward and reverse biased silicon p-n junctions are
- A) Diffusion in forward bias, drift in reverse bias
 B) Drift in forward bias, diffusion in reverse bias
 C) Drift in both forward and reverse bias
 D) Diffusion in both forward and reverse bias
55. The magnitude of the earth's magnetic field at a place is B_0 and the angle of dip is δ . A horizontal conductor of length l , lying north-south, moves eastwards with velocity v . The emf induced across the rod is
- A) $B_0lv\sin\delta$
 B) $B_0lv\cos\delta$
 C) B_0lv
 D) zero
56. When npn transistor is used as an amplifier, then
- A) Holes move from base to collector
 B) Electrons move from collector to base
 C) Electrons move from base to collector
 D) Electrons move from emitter to base
57. A XOR gate has inputs $A = 1$ and $B = 1$, the output Y is
- A) 2
 B) 1
 C) uncertain
 D) zero
58. A inductance L , a capacitance C and a resistance R may be connected to an AC source of angular frequency ω , in three different combinations of RC, RL and LC in series. Assume that $\omega L = 1/(\omega C)$. The power drawn by the three combinations are P_1, P_2, P_3 respectively. Then
- A) $P_1 > P_2 > P_3$
 B) $P_1 = P_2 = P_3$
 C) $P_1 = P_2 < P_3$
 D) $P_1 = P_2 > P_3$
59. Digital circuit can be made by the repeated use of
- A) NOT gates
 B) OR gates
 C) NAND gates
 D) NOR gates
60. A flat coil carrying a current has a magnetic moment μ . It is placed in a magnetic field B such that μ is antiparallel to B . The coil is
- A) In unstable equilibrium
 B) In stable equilibrium
 C) Not in equilibrium
 D) In neutral equilibrium