CET– 2014
Physics
QUESTION BOOKLET

INSTRUCTIONS

Maximum Time Allowed : 1 Hour 30 Minutes.
Negative Marking : 0.2

No. of Questions: 75
Maximum Marks: 75

Roll Number: | | | | | | | | |

Answer Sheet Number: | | | | | | |

Please read the following instructions carefully:

1) **Check the booklet thoroughly**: In case of any defect – Misprint, Missing question(s), Missing page, Blank page, Damaged or Defaced page or duplication of question(s) / Page(s), get the booklet changed with the booklet of the same series from the Room Invigilator. No complaint shall be entertained after the entrance test is over

2) Write your Roll Number and the OMR Answer Sheet Number on the question booklet.

3) Mark carefully your Roll Number, Question Booklet Number and Question Booklet series on OMR Answer sheet and sign at the appropriate place. Incomplete and/or incorrect particulars will result in the non-evaluation of your answer sheet.

4) Strictly follow the instructions given by the Centre Supervisor / Room Invigilator and those given on the Question Booklet.

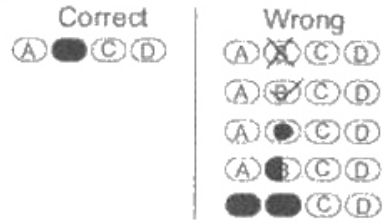
5) Candidates are not allowed to carry any papers, notes, books, calculators, cellular phones, scanning devices, pagers etc. to the Examination Hall. Any candidate found using, or in possession of such unauthorized material, indulging in copying or impersonation or adopting unfair means / reporting late / without Admit Card will be debarred from the written test.

6) Please mark the right responses on the OMR Sheet with ONLY a Blue/Black ball point pen. Use of eraser, whitener (fluid) and cutting on the OMR Answer Sheet is NOT allowed.

7) The test is of objective type containing multiple choice questions (MCQs). Each objective question is followed by four responses. Your task is to choose the correct/best response and mark your response on the OMR Answer Sheet and NOT on the Question Booklet.

8) There will be 0.2 negative marking for every wrong answer.

9) For marking response to a question, completely darken the CIRCLE so that the alphabet inside the CIRCLE is not visible. Darken only ONE circle for each question. If you darken more than one circle, it will be treated as wrong answer. The CORRECT and the WRONG methods of darkening the CIRCLE on the OMR Answer Sheet are shown below.



10) Please be careful while marking the response to questions. The response once marked cannot be changed and if done shall be treated as wrong answer.

11) In view of the tight time span, do NOT waste your time on a question which you find to be difficult. Attempt easier questions first and come back to the difficult questions later during the test.

12) DO NOT make any stray marks anywhere on the OMR Answer Sheet. DO NOT fold or wrinkle the OMR answer sheet.

13) Rough work MUST NOT be done on the OMR Answer Sheet. Use your test booklet for this purpose.

14) Candidates are provided carbonless OMR Answer Sheet having original copy and candidate's copy. After completing the examination, candidates are directed to fold at perforation on the top of the sheet, tear it to separate original copy and candidate's copy and then hand over the original copy of OMR Answer Sheet to the Room Invigilator and take candidate's copy with them.

1. A solenoid of length 0.6 m has a radius of 1 cm and is made up of 600 turns. It carries a current of 6 A. What is the magnitude of the magnetic field inside the solenoid?
   (A) 7.54×10^{-3} T
   (B) 10.84×10^{-3} T
   (C) 4.87×10^{-3} T
   (D) 2.36×10^{-2} T
2. The bus moving with a speed of 42 km/hr is brought to a stop by brakes after 6 m. If the same bus is moving at a speed of 90 km/hr , then the minimum stopping distance is
   (A) 15.48 m
   (B) 18.64 m
8. A galaxy is moving away from an observer on earth so that sodium light of wavelength 5892A° is observed at 5896A°.The speed of galaxy is
   (A) 306 km/s
   (B) 204 km/s
   (C) 185 km/s
   (D) 158 km/s
9. The correct order of arrangement of Electromagnetic waves according to their wavelength is
   (A) Gamma rays <Micro waves <A.M radio waves < FM radio waves
   (B) Micro waves < A.M radio waves < FM radio wave< Gamma rays
   (C) Gamma rays<A.M radio waves< FM radio wave <Micro waves

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(C) 22.13 m
(D) 27.55 m

3. A 15 pF capacitor is connected to a 60V battery. How much electrostatic energy is stored?
(A) 2.77×10^{-8} Joules
(B) 1.77×10^{-8} Joules
(C) 2.35×10^{-8} Joules
(D) 1.35×10^{-8} Joules

4. In a video signal for transmission of picture, What value of bandwidth is used in communication system?
(A) 2.4 MHz
(B) 4.2 MHz
(C) 24 MHz
(D) 42 MHz

5. A straight wire of mass 300 g and length 2.5 m carries a current of 3.5 A. It is suspended in mid-air by a uniform horizontal magnetic field B. What is the magnitude of the magnetic field?
(A) 0.654 T
(B) 0.336 T
(C) 1.576 T
(D) 0.939 T

6. When longitudinal wave propagates, what happens in the region of compressions and rarefactions?
(A) Density varies
(B) Density remains constant
(C) There is heat transfers
(D) Boyle's law is obeyed

7. Calculate average thermal energy of the typical star if the temperature of the star is 12 million kelvins.
(A) 2.07×10^{-16} Joules
(B) 1.07×10^{-16} Joules
(C) 4.07×10^{-16} Joules
(D) 3.07×10^{-16} Joules

(D) Gamma rays <Micro waves <F.M radio waves < AM radio waves

10. A constant retarding force of 80 N is applied to a body of mass 50 Kg which is moving initially with a speed of 20m/s. What would be the time required by the body to come to rest?
(A) 15s
(B) 14s
(C) 12.5s
(D) 18s

11. Light from a point source in air falls on a spherical glass surface (n=1.67 and radius of curvature = 25 cm). The distance of the light source from the glass surface is 95 cm. At what position the image is formed?
(A) 75.45 cm
(B) 90.50 cm
(C) 105 .25 cm
(D) 99.40 cm

12. The length of the wire is increase by 2% by applying a load of 2.5 kg-wt. What is the linear strain produced in the wire?
(A) 0.1
(B) 0.01
(C) 0.2
(D) 0.02

13. The half life of an old rock element is 5800 years.In how many years its sample of 25 gm is reduced to 6.25 gm.
(A) 2900 years
(B) 5800 years
(C) 11600 years
(D) 23200 years

14. The earth takes 24 Hr. to rotate once about its axis. How much time does the sun take to shift by 5° when viewed from the earth?
(A) 20 min
(B) 15 min
(C) 10 min
(D) 5 min

15. Which of the following is a dimensionless quantity?
(A) Magnetic flux density
(B) Electric flux density
(C) Lumen flux density
(D) Optical density

16. A crane lifts weight of 75 kg to a height of 15 m in 15 seconds. The power of the crane is (assuming $g=9.8 m/s^2$)
(A) 635 watt
(B) 735 watt
(C) 835 watt
(D) 1135 watt

17. The escape velocity from the surface of earth is 11.2 Kms^{-1}. What is the escape velocity in a planet whose radius is three times that of earth and on which the acceleration due to gravity is three times of that on earth?
(A) 11.2 Kms^{-1}
(B) 22.4 Kms^{-1}
(C) 33.6 Kms^{-1}

21. A wheel with 30 metallic spokes each of 0.7 m long is rotated with a speed of 120 rev/min, in a plane normal to the horizontal component of earth's magnetic field H_E at a place.If H_E = 0.8 G at the place, what is the induced emf between the axle and the rim of the wheel?Given 1G = 10^{-4} T
(A) 2.46×10^{-4}volt
(B) 6.28×10^{-4}volt
(C) 5.76×10^{-5} volt
(D) 4.92×10^{-4}volt

22. In a circuit, 3 resistors of resistances 1.2Ω, 2 Ω, 3Ω are connected in parallel.The value of equivalent resistance is
(A) Less than 1.2 Ω
(B) Greater than 1.2Ω
(C) Between 1.2Ω and 2Ω
(D) Between 2Ω and 3Ω

23. The Magnetic field is absent in which one of the following physical situation?
(A) Surface of Neutron star
(B) Surface of Earth
(C) Human nerve fiber
(D) At some point on the axis of bar magnet

24. What amount of energy is associated with mass of 2.5 Kg?
(A) 6.27×10^{17}Joules
(B) 4.27×10^{17} Joules

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(C) 55.6 Kms
(D) 5.6 Kms^{-1}

18. What is the dimensional formula for work?
(A) $[MLT^{-2}]$
(B) $[ML^2T^{-2}]$
(C) $[ML^3T^{-2}]$
(D) $[ML^2T^{-1}]$

19. When the gas expands with temperature using the relation $V=KT^{2/3}$ for the temperature change of 40 K, the work done is
(A) 20.1 R
(B) 30.2R
(C) 26.6 R
(D) 35.6R

20. The resonant frequency of a L-C-R circuit depends upon
(A) L and R
(B) C and R
(C) L and C
(D) L, C and R

28. A message signal of frequency 20 kHz and peak voltage of 15 volts is used to modulate a carrier wave of 1000 kHz and peak voltage of 30 volts.The modulation index and upper side band are respectively
(A) 0.50 and 1020 kHz
(B) 0.66 and 1020 kHz
(C) 0.50 and 980 kHz
(D) 0.66 and 980 kHz

29. Calculate the efficiency of the engine if Carnot cycle operates at T_1=550 K and T_2=320 K producing 2.3 kJ of mechanical work per cycle?
(A) 0.418
(B) 0.622
(C) 0.823
(D) 0.902

30. Which of the following device is the application of Photoelectric effect?
(A) Light emitting Diode
(B) Diode
(C) Photocell
(D) Transistor

31. The waves used for Line-of-Sight (LOS) communication are
(A) Ground waves
(B) Space waves
(C) Sound waves
(D) Sky waves

32. The inductance L of a solenoid depends upon its radius R as
(A) L α R
(B) L α 1/R
(C) L α R^2
(D) L α R^3

33. How much revolution does the engine make during the time when a motor wheel with angular speed is increased from 720 rpm to 2820 rpm in 14 seconds?
(A) 354
(B) 490
(C) 413
(D) 620

34. If the pressure at half of the lake is equal to 1/2

(C) 0.27 x10^{17}Joules
(D) 2.27 x10^{17}Joules

25. The ratio of radii of nuclei of two atoms of elements of atomic mass numbers 27 and 64 is
(A) 3 : 4
(B) 4 : 3
(C) 9 : 16
(D) 16: 9

26. MSI integrated chip contains
(A) Less than 10 gates
(B) 10 to 100 gates
(C) 100 to 1000 gates
(D) 1000 to 10000 gates

27. What is the torque of a force 3i +7j+4k about the origin, if the force acts on a particle whose position vector is 2i + 2j+1k?
(A) i-5j+8k
(B) 2i+2j+2k
(C) i+j+k
(D) 3i+2j+3k

35. The value of Rydberg constant is
(A) 1.997 x 10^7 m^{-1}
(B) 1.097 x 10^{-7} m^{-1}
(C) 1.097 x 10^7 m^{-1}
(D) 19.97 x 10^7 m^{-1}

36. A car moving on a straight road covers 1/3 of the distance with 25 km/h and rest with 75 km/h.The average speed is
(A) 25 km/hr
(B) 45 km/hr
(C) 55 km/hr
(D) 75 km/hr

37. The distance at which average radius of the earth orbit subtends an angle of 1 arc second is
(A) Parsec
(B) Astronomical unit
(C) Light year
(D) Unified atomic unit

38. What happens to the acceleration due to gravity with the increase in altitude from the surface of the earth?
(A) Increases
(B) Decreases
(C) First decreases and then increases
(D) Remains same

39. Lenz's law is a consequence of the law of conservation of
(A) Charge
(B) Mass
(C) Momentum
(D) Energy

40. The angle between the true geographic north and the north shown by a compass needle is called as
(A) Inclination
(B) Magnetic Declination
(C) Angle of meridian
(D) Magnetic pole

41. An air bubble of 2 cm^3 rises from the bottom of a lake of 32 m at a temperature of 9°C. When the bubble reaches the surface of the lake from the bottom of the lake, what volume does it grows for which temperature is 30°C (assume g=10 m/s^2 and density

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41. If the pressure at half of the lake is equal to 1/3 pressure at the bottom of the lake, what is the depth of the lake? (Assume g=10 m/s²& 1 atm= 1 x10⁵ ; pwater=10³)
(A) 9.6 m
(B) 7.5 m
(C) 4.4 m
(D) 3.2 m

42. Which Quantity is transmitted with propagation of longitudinal waves through a medium?
(A) Dispersion
(B) Energy
(C) Matter
(D) Frequency

43. A monochromatic light of frequency 3 x10¹⁴ Hz is produced by a LASER, emits the power of 3 x10⁻³ W. find how many number of photons are emitted per second.
(A) 1.5 x10¹⁶
(B) 2.5 x10¹⁶
(C) 4.5 x10¹⁶
(D) 8.5 x10¹⁶

44. A mountaineer standing on the edge of a cliff 441m above the ground throws a stone horizontally with an initial speed of 20m/s. What is the speed with which the stone reaches the ground?
(A) 90m/s
(B) 95.08m/s
(C) 85m/s
(D) 92m/s

45. A zener diode is used as
(A) An amplifier
(B) A rectifier
(C) A voltage regulator
(D) A light emitting device

46. In which of the following does the Intensity of sound vary with time?
(A) Doppler effect
(B) Beats
(C) Transverse waves
(D) Longitudinal waves

47. A solid cylinder of mass 30 Kg rotates about its axis with an angular speed of 50 rad/s. What is the K.E associated with the rotation of the cylinder, if the radius of the cylinder is 0.30 m?
(A) 1500.5 J
(B) 1687.5 J
(C) 2000.7 J
(D) 1350.0 J

48. The circuits that make rippled AC to pure DC are known as
(A) DC converters
(B) Junction Diodes
(C) Bipolar transistors
(D) Filters

56. Which of the law representing Maxwell's third equation?
(A) Gauss's law for electricity
(B) Ampere-Maxwell law

ρ=10³ kg/m³)
(A) 5.937 cm³
(B) 8.937 cm³
(C) 12.937 cm³
(D) 16.937 cm³

49. A string of mass 3 Kg is under tension of 400N. The length of the stretched string is 25 cm. If the transverse jerk is stuck at one end of the string how long does the disturbance take to reach the other end?
(A) 0.047 s
(B) 0.055 s
(C) 0.034 s
(D) 0.065 s

50. The total energy of an electron in 4th orbit of Hydrogen atom is
(A) -13.6 eV
(B) -3.4 eV
(C) -1.51 eV
(D) - 0.85 eV

51. The graph between voltage and current across a conductor that follows Ohm's law is
(A) Straight line
(B) Parabolic
(C) Sine-curve
(D) Cos-curve

52. An athlete throws the shot-put of mass 4 kg with initial speed of 2.2 m.s⁻¹ at 41° from a height of 1.3 m from the ground. What is the K.E of the shot-put when it reaches the ground? (Ignoring the air resistance and gravity g=9.8m/s²)?
(A) 42.84 Joules
(B) 52.84 Joules
(C) 62.84 Joules
(D) 72.84 Joules

53. Two bulbs operating on standard voltage 110 Volt have resistances in the ratio 9:16.The ratio of brightness of light from them is
(A) 9 : 16
(B) 16 : 9
(C) 3 : 4
(D) 4 : 3

54. The neutral point on potentiometer's scale for two cells of EMF 2.1 and E volts is observed at distances 40 cm and 56 cm. respectively. The value of E is
(A) 2.10 volts
(B) 2.94 volts
(C) 1.50 volts
(D) 1.20 volts

55. Which one of the following equation is Torricelli law?
(A) P=ρgh
(B) v=√2hg
(C) ηRe=ρvd
(D) S(2dl)=Fd

63. An infinite line charge produces a field of 18 X 10⁵ N/C at a distance of 4 cm. What is the linear charge density?
(A) 18 μC/m

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(C) Gauss's law of magnetism
(D) Faraday's law

57. A silver wire has a resistance of 1.6 Ω at 25.5 °C, and a resistance of 2.5 Ω at 100 °C, then temperature coefficient of resistivity of silver is
(A) 5.55×10^{-3} °C
(B) 7.55×10^{-3} °C
(C) 11.75×10^{-2} °C
(D) 15.5×10^{-3} °C

58. When a particle returns to its initial point, its
(A) Displacement is zero
(B) Average velocity is zero
(C) Distance is zero
(D) Average speed is zero

59. A body weight 45 N on the surface of the earth. What is the gravitational force on it due to the earth at a height equal to half of the radius of the earth?
(A) 20 N
(B) 45 N
(C) 40 N
(D) 90 N

60. The angle of a prism is 42° and refractive index of its material is 3/2.Then angle of minimum deviation for this prism is
(A) 63°
(B) 42°
(C) 28°
(D) 21°

61. A conducting sphere of radius 5cm has an unknown charge. The electric field at 10cm from the centre of the sphere is 1.8×10^3 N/C and points radially inward. What is the net charge on the sphere?
(A) 1.8 nC
(B) 2 nC
(C) 1 nC
(D) 1.5 nC

62. For transistor the value of β is 50 then the value of α is
(A) 50/51
(B) 49/50
(C) 51/50
(D) 50/49

(B) 5 μC/m
(C) 4 μC/m
(D) 10 μC/m

64. What is the fraction of molecular volume to the actual volume occupied by oxygen gas at STP? Given the diameter of oxygen molecule is 2Å.
(A) 1.75×10^{-4}
(B) 1.5×10^{-4}
(C) 12×10^{-4}
(D) 1.125×10^{-4}

65. A 400 pF capacitor is charged by a 100 V supply. How much electrostatic energy is lost in the process of disconnecting from the supply and connecting another uncharged 400 pF capacitor?
(A) 10^{-5} Joules
(B) 10^{-6} Joules
(C) 10^{-7} Joules
(D) 10^{-4} Joules

66. The ratio of magnitude of electric displacement (D) and electric field (E) is
(A) Charge density
(B) Permittivity
(C) Electric susceptibility
(D) Dielectric constant

67. An object is gently placed on a long converges belt moving with 11 ms^{-1}. If the coefficient of friction is 0.4, then the block will slide in the belt up to a distance of
(A) 10.21 m
(B) 15.43 m
(C) 20.3 m
(D) 25.6 m

68. A spring balance has a scale that reads from 0 to 60 Kg. The length of the scale is 30cm. A body suspended from this balance and when displaced and released, oscillates with a period of 0.8s, What is the weight of the body when oscillating?
(A) 350.67 N
(B) 540.11 N
(C) 311.24 N
(D) 300.5 N

69. The magnetic needle has magnetic moment 8.7×10^{-2} Am^2 and moment of inertia 11.5×10^{-6} kg m^2.It performs 10 complete oscillations in 6.70s,what is the magnitude of the magnetic field?
(A) 0.012 T
(B) 0.120 T
(C) 1.200 T
(D) 2.10 T

70. The distance for which ray optics is good approximation for an aperture 5 mm and wavelength 5000 A° is
(A) 18 meter
(B) 30 meter
(C) 38 meter
(D) 50 meter

71. A compound microscope has a magnification of 30. The focal length of the eyepiece is 5 cm. If the final

75. A concave mirror of focal length 'f' produces a real image n times the size of the object. The distance of the object from the mirror is
(A) (n-1) f
(B) (n +1) f
(C) (n +1) f / n
(D) (n -1)f / n

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image is formed at the least distance of distinct vision(25 cm) , the magnification produced by the objective is

(A) 10

(B) 7.5

(C) 5

(D) 15

72. Which of the following relation is called mirror equation?

(A) u/v + f/u = 1/f

(B) 1/v + 1/u = 1/f

(C) 1/f + u = 1/v

(D) uf + vf = uv

73. A stone of mass 0.05 Kg is thrown vertically upwards. What is the direction and magnitude of the net force on the stone during its upward motion?

(A) 0.49 N vertically downward direction

(B) 0.49 N vertically upwards direction

(C) 0.05 N vertically downwards direction

(D) 9.8 N vertically upwards direction

74. Two different coils have self - inductance L_1 = 8 mH, L_2 = 2mH, The current in one coil is increased at a constant rate. The current in the second coil is also increased at the same rate. At a certain instant of time, the power given to the two coils is the same. At that time the current, the induced voltage and the energy stored in the first coil are i_1, V_1, and W_1 respectively. Corresponding values for the second coil at the same instant are i_2, V_2, and W_2 respectively. Then

(A) $W_2/W_1 = 8$

(B) $W_2/W_1 = 1/8$

(C) $W_2/W_1 = 4$

(D) $W_2/W_1 = 1/4$

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