2014

SUBJECT : PHYSICS	DAY – 2
SESSION : MORNING	TIME : 10.30 A.M. TO 11.50 A.M.

MAXIMUM MARKS	TOTAL DURATION	MAXIMUM TIME FOR ANSWERING
60	80 MINUTES	70 MINUTES

MENTION YOUR CET NUMBER	QUESTION BOOKLET DETAILS	
	VERSION CODE	SERIAL NUMBER
	A - 1	548417

DOs :

1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the **2nd Bell i.e., after 10.30 a.m.**
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

DON'TS :

1. **THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.**
2. The **3rd Bell rings at 10.40 a.m., till then;**
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not look inside this question booklet.
   - Do not start answering on the OMR answer sheet.

SEAL

IMPORTANT INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the **3rd Bell is rung at 10.40 a.m.,** remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - **Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.**

Correct Method of shading the circle on the OMR answer sheet is as shown below :

4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the **last bell is rung at 11.50 a.m.,** stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the **OMR ANSWER SHEET** to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate's copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

1. A physical quantity Q is found to depend on observables x, y and z, obeying relation $Q = \frac{x^3y^2}{z}$. The percentage error in the measurements of x, y and z are 1%, 2% and 4% respectively. What is percentage error in the quantity Q ?

(1) 4 %
(2) 3 %
(3) 11 %
(4) 1 %

2. Which of the following is not a vector quantity ?

(1) Weight
(2) Nuclear spin
(3) Momentum
(4) Potential energy

3. A car moves from A to B with a speed of 30 kmph and from B to A with a speed of 20 kmph. What is the average speed of the car ?

(1) 25 kmph
(2) 24 kmph
(3) 50 kmph
(4) 10 kmph

4. A body starts from rest and moves with constant acceleration for t s. It travels a distance x_1 in first half of time and x_2 in next half of time, then

(1) $x_2 = x_1$
(2) $x_2 = 2x_1$
(3) $x_2 = 3x_1$
(4) $x_2 = 4x_1$

Space For Rough Work

5. A person is driving a vehicle at uniform speed of 5 ms^{-1} on a level curved track of radius 5 m. The coefficient of static friction between tyres and road is 0.1. Will the person slip while taking the turn with the same speed ? Take g = 10 ms^{-2}.

Choose the correct statement.

(1) A person will slip if $v^2 = 5\ ms^{-1}$ (2) A person will slip if $v^2 > 5\ ms^{-1}$

(3) A person will slip if $v^2 < 5\ ms^{-1}$ (4) A person will not slip if $v^2 > 10\ ms^{-1}$

6. A stone is thrown vertically at a speed of 30 ms^{-1} making an angle of 45° with the horizontal. What is the maximum height reached by the stone ? Take g = 10 ms^{-2}.

(1) 30 m (2) 22.5 m

(3) 15 m (4) 10 m

7. A force $\vec{F} = 5\hat{i} + 2\hat{j} - 5\hat{k}$ acts on a particle whose position vector is $\vec{r} = \hat{i} - 2\hat{j} + \hat{k}$. What is the torque about the origin ?

(1) $8\hat{i} + 10\hat{j} + 12\hat{k}$ (2) $8\hat{i} + 10\hat{j} - 12\hat{k}$

(3) $8\hat{i} - 10\hat{j} - 8\hat{k}$ (4) $10\hat{i} - 10\hat{j} - \hat{k}$

8. What is a period of revolution of earth satellite ? Ignore the height of satellite above the surface of earth.

Given : (1) The value of gravitational acceleration g = 10 ms^{-2}.

(2) Radius of earth R_E = 6400 km. Take $\pi = 3.14$.

(1) 85 minutes (2) 156 minutes

(3) 83.73 minutes (4) 90 minutes

Space For Rough Work

9. A period of geostationary satellite is

(1) 24 h (2) 12 h

(3) 30 h (4) 48 h

10. What is the source temperature of the Carnot engine required to get 70% efficiency ? Given sink temperature = 27 °C

(1) 1000 °C (2) 90 °C

(3) 270 °C (4) 727 °C

11. A 10 kg metal block is attached to a spring of spring constant 1000 Nm^{-1}. A block is displaced from equilibrium position by 10 cm and released. The maximum acceleration of the block is

(1) 10 ms^{-2} (2) 100 ms^{-2}

(3) 200 ms^{-2} (4) 0.1 ms^{-2}

12. A metallic wire of 1 m length has a mass of 10×10^{-3} kg. If a tension of 100 N is applied to a wire, what is the speed of transverse wave ?

(1) 100 ms^{-1} (2) 10 ms^{-1}

(3) 200 ms^{-1} (4) 0.1 ms^{-1}

13. A train is approaching towards a platform with a speed of 10 ms^{-1} while blowing a whistle of frequency 340 Hz. What is the frequency of whistle heard by a stationary observer on the platform ? Given speed of sound = 340 ms^{-1}.

(1) 330 Hz (2) 350 Hz

(3) 340 Hz (4) 360 Hz

Space For Rough Work

14. A rotating wheel changes angular speed from 1800 rpm to 3000 rpm in 20 s. What is the angular acceleration assuming to be uniform ?

(1) 60π rad s^{-2} (2) 90π rad s^{-2}

(3) 2π rad s^{-2} (4) 40π rad s^{-2}

15. A flow of liquid is streamline if the Reynold number is

(1) less than 1000 (2) greater than 1000

(3) between 2000 to 3000 (4) between 4000 to 5000

16. A pipe of 30 cm long and open at both the ends produces harmonics. Which harmonic mode of pipe resonates a 1.1 kHz source ? Given speed of sound in air = 330 ms^{-1}.

(1) Fifth harmonic (2) Fourth harmonic

(3) Third harmonic (4) Second harmonic

17. In anomalous expansion of water, at what temperature, the density of water is maximum ?

(1) 4 °C (2) < 4 °C

(3) > 4 °C (4) 10 °C

18. An aeroplane executes a horizontal loop at a speed of 720 kmph with its wings banked at 45°. What is the radius of the loop ? Take g = 10 ms^{-2}.

(1) 4 km (2) 4.5 km

(3) 7.2 km (4) 2 km

Space For Rough Work

19. A body having a moment of inertia about its axis of rotation equal to 3 kg-m^2 is rotating with angular velocity of 3 rad s^{-1}. Kinetic energy of this rotating body is same as that of a body of mass 27 kg moving with velocity v. The value of v is

(1) 1 ms^{-1} (2) 0.5 ms^{-1}

(3) 2 ms^{-1} (4) 1.5 ms^{-1}

20. A cycle tyre bursts suddenly. What is the type of this process ?

(1) Isothermal (2) Adiabatic

(3) Isochoric (4) Isobaric

21. An object is placed at 20 cm in front of a concave mirror produces three times magnified real image. What is focal length of the concave mirror ?

(1) 15 cm (2) 6.6 cm

(3) 10 cm (4) 7.5 cm

22. A focal length of a lens is 10 cm. What is power of a lens in dioptre ?

(1) 0.1 D (2) 10 D

(3) 15 D (4) 20 D

Space For Rough Work

23. A microscope is having objective of focal length 1 cm and eyepiece of focal length 6 cm. If tube length is 30 cm and image is formed at the least distance of distinct vision, what is the magnification produced by the microscope ? Take D = 25 cm.

(1) 6 (2) 150

(3) 25 (4) 125

24. A fringe width of a certain interference pattern is $\beta = 0.002$ cm. What is the distance of 5^{th} dark fringe from centre ?

(1) 1×10^{-2} cm (2) 11×10^{-2} cm

(3) 1.1×10^{-2} cm (4) 3.28×10^{6} cm

25. Diameter of the objective of a telescope is 200 cm. What is the resolving power of a telescope ? Take wavelength of light = 5000 Å.

(1) 6.56×10^{6} (2) 3.28×10^{5}

(3) 1×10^{6} (4) 3.28×10^{6}

26. A polarized light of intensity I_o is passed through another polarizer whose pass axis makes an angle of 60° with the pass axis of the former. What is the intensity of emergent polarized light from second polarizer ?

(1) $I = I_o$ (2) $I = I_o/6$

(3) $I = I_o/5$ (4) $I_o/4$

Space For Rough Work

27. What is the de Broglie wavelength of the electron accelerated through a potential difference of 100 Volt ?

(1) 12.27 Å (2) 1.227 Å

(3) 0.1227 Å (4) 0.001227 Å

28. The maximum kinetic energy of the photoelectrons depends only on

(1) potential (2) frequency

(3) incident angle (4) pressure

29. Which of the following spectral series of hydrogen atom is lying in visible range of electromagnetic wave ?

(1) Paschen series (2) Pfund series

(3) Lyman series (4) Balmer series

30. What is the energy of the electron revolving in third orbit expressed in eV ?

(1) 1.51 eV (2) 3.4 eV

(3) 4.53 eV (4) 4 eV

31. The relation between half life (T) and decay constant (λ) is

(1) $\lambda T = 1$ (2) $\lambda T = \frac{1}{2}$

(3) $\lambda T = \log_e 2$ (4) $\lambda = \log 2T$

Space For Rough Work

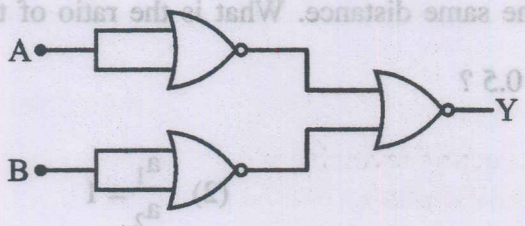
32. A force between two protons is same as the force between proton and neutron. The nature of the force is

(1) Weak nuclear force
(2) Strong nuclear force
(3) Electrical force
(4) Gravitational force

33. In n type semiconductor, electrons are majority charge carriers but it does not show any negative charge. The reason is

(1) electrons are stationary
(2) electrons neutralize with holes
(3) mobility of electrons is extremely small
(4) atom is electrically neutral

34. For the given digital circuit, write the truth table and identify the logic gate it represents :



(1) OR-Gate
(2) NOR-Gate
(3) NAND-Gate
(4) AND-Gate

35. If α-current gain of a transistor is 0.98. What is the value of β-current gain of the transistor ?

(1) 0.49
(2) 49
(3) 4.9
(4) 5

Space For Rough Work

36. A tuned amplifier circuit is used to generate a carrier frequency of 2 MHz for the amplitude modulation. The value of $\sqrt{LC}$ is

(1) $\frac{1}{2\pi \times 10^6}$ (2) $\frac{1}{2 \times 10^6}$

(3) $\frac{1}{3\pi \times 10^6}$ (4) $\frac{1}{4\pi \times 10^6}$

37. If a charge on the body is 1 nC, then how many electrons are present on the body ?

(1) 1.6×10^{19} (2) 6.25×10^{9}

(3) 6.25×10^{27} (4) 6.25×10^{28}

38. Two equal and opposite charges of masses m_1 and m_2 are accelerated in an uniform electric field through the same distance. What is the ratio of their accelerations if their ratio of masses is $\frac{m_1}{m_2} = 0.5$?

(1) $\frac{a_1}{a_2} = 0.5$ (2) $\frac{a_1}{a_2} = 1$

(3) $\frac{a_1}{a_2} = 2$ (4) $\frac{a_1}{a_2} = 3$

39. What is the nature of Gaussian surface involved in Gauss law of electrostatic ?

(1) Scalar (2) Electrical

(3) Magnetic (4) Vector

Space For Rough Work

40. What is the electric potential at a distance of 9 cm from 3 nC ?

(1) 270 V (2) 3 V

(3) 300 V (4) 30 V

41. A voltmeter reads 4 V when connected to a parallel plate capacitor with air as a dielectric. When a dielectric slab is introduced between plates for the same configuration, voltmeter reads 2 V. What is the dielectric constant of the material ?

(1) 0.5 (2) 2

(3) 8 (4) 10

42. A spherical conductor of radius 2 cm is uniformly charged with 3 nC. What is the electric field at a distance of 3 cm from the centre of the sphere ?

(1) 3×10^6 V m^{-1} (2) 3 V m^{-1}

(3) 3×10^4 V m^{-1} (4) 3×10^{-4} V m^{-1}

43. A carbon film resistor has colour code Green Black Violet Gold. The value of the resistor is

(1) 50 MΩ (2) 500 MΩ

(3) 500 ± 5% MΩ (4) 500 ± 10% MΩ

44. Two resistors of resistances 2 Ω and 6 Ω are connected in parallel. This combination is then connected to a battery of emf 2V and internal resistance 0.5 Ω. What is the current flowing through the battery ?

(1) 4 A (2) $\frac{4}{3}$ A

(3) $\frac{4}{17}$ A (4) 1 A

Space For Rough Work

45. The equivalent resistance of two resistors connected in series is 6 Ω and their parallel equivalent resistance is $\frac{4}{3}$ Ω. What are the values of resistances ?

(1) 4 Ω, 6 Ω (2) 8 Ω, 1 Ω

(3) 4 Ω, 2 Ω (4) 6 Ω, 2 Ω

46. In a potentiometer experiment of a cell of emf 1.25 V gives balancing length of 30 cm. If the cell is replaced by another cell, balancing length is found to be 40 cm. What is the emf of second cell ?

(1) $\simeq$ 1.57 V (2) $\simeq$ 1.67 V

(3) $\simeq$ 1.47 V (4) $\simeq$ 1.37 V

47. A charged particle experiences magnetic force in the presence of magnetic field. Which of the following statement is correct ?

(1) The particle is moving and magnetic field is perpendicular to the velocity.

(2) The particle is moving and magnetic field is parallel to velocity.

(3) The particle is stationary and magnetic field is perpendicular.

(4) The particle is stationary and magnetic field is parallel.

48. If a velocity has both perpendicular and parallel components while moving through a magnetic field, what is the path followed by a charged particle ?

(1) Circular (2) Elliptical

(3) Linear (4) Helical

Space For Rough Work

49. A solenoid has length 0.4 cm, radius 1 cm and 400 turns of wire. If a current of 5 A is passed through this solenoid, what is the magnetic field inside the solenoid ?

(1) 6.28×10^{-4} T (2) 6.28×10^{-3} T

(3) 6.28×10^{-7} T (4) 6.28×10^{-6} T

50. A gyromagnetic ratio of the electron revolving in a circular orbit of hydrogen atom is 8.8×10^{10} C kg^{-1}. What is the mass of the electron ? Given charge of the electron = 1.6×10^{-19} C.

(1) 1×10^{-29} kg (2) 0.1×10^{-29} kg

(3) 1.1×10^{-29} kg (4) $\frac{1}{11} \times 10^{-29}$ kg

51. What is the value of shunt resistance required to convert a galvanometer of resistance 100 Ω into an ammeter of range 1A ?

Given : Full scale deflection of the galvanometer is 5 mA.

(1) $\frac{5}{9.95}\Omega$ (2) $\frac{9.95}{5}\Omega$

(3) 0.5 Ω (4) 0.05 Ω

52. A circular coil of radius 10 cm and 100 turns carries a current 1A. What is the magnetic moment of the coil ?

(1) 3.142×10^4 A m^2 (2) 10^4 A m^2

(3) 3.142 A m^2 (4) 3 A m^2

Space For Rough Work

53. A susceptibility of a certain magnetic material is 400. What is the class of the magnetic material ?

(1) Diamagnetic (2) Paramagnetic

(3) Ferromagnetic (4) Ferroelectric

54. A solenoid of inductance 2H carries a current of 1 A. What is the magnetic energy stored in a solenoid ?

(1) 2 J (2) 1 J

(3) 4 J (4) 5 J

55. A multimeter reads a voltage of a certain A.C. source as 100 V. What is the peak value of voltage of A.C. source ?

(1) 200 V (2) 100 V

(3) 141.4 V (4) 400 V

56. A series LCR circuit contains inductance 5 mH, capacitance 2 μF and resistance 10 Ω. If a frequency A.C. source is varied, what is the frequency at which maximum power is dissipated ?

(1) $\frac{10^5}{\pi}$ Hz (2) $\frac{10^{-5}}{\pi}$ Hz

(3) $\frac{2}{\pi} \times 10^5$ Hz (4) $\frac{5}{\pi} \times 10^3$ Hz

Space For Rough Work

57. A step down transformer has 50 turns on secondary and 1000 turns on primary winding. If a transformer is connected to 220 V 1A A.C. source, what is output current of the transformer ?

(1) $\frac{1}{20}$ A (2) 20 A

(3) 100 A (4) 2 A

58. The average power dissipated in A.C. circuit is 2 watt. If a current flowing through a circuit is 2 A and impedance is 1 Ω, what is the power factor of the AC circuit ?

(1) 0.5 (2) 1

(3) 0 (4) $\frac{1}{\sqrt{2}}$

59. A plane electromagnetic wave of frequency 20 MHz travels through a space along x direction. If the electric field vector at a certain point in space is 6 V m^{-1}, what is the magnetic field vector at that point ?

(1) 2×10^{-8} T (2) $\frac{1}{2} \times 10^{-8}$ T

(3) 2T (4) $\frac{1}{2}$ T

60. Two capacitors of 10 PF and 20 PF are connected to 200 V and 100 V sources respectively. If they are connected by the wire, what is the common potential of the capacitors ?

(1) 133.3 volt (2) 150 volt

(3) 300 volt (4) 400 volt

Space For Rough Work

A-1

SEAL