1

SUBJECT	TIME
PHYSICS	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	009281

DO's :

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 MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED/SPOILED.**
2. Until the 3rd Bell is rung at 10.40 a.m.:
   - Do not remove the seal / staple 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

INSTRUCTIONS TO CANDIDATES

1. This question booklet contains 60 questions and each question will have four different options / choices.
2. After the 3rd Bell is rung at 10.40 a.m., remove the seal / staple present on the right hand side of this question booklet 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 options / choices given under each question.
   - **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 SHEET IS SHOWN BELOW :

4. Please note that even a minute unintended ink dot on the OMR 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 AND 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 and retaining the top sheet (KEA 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.

P

1. The number of significant figures in the numbers 4.8000×10^4 and 48000.50 are respectively

(1) 5 and 7 (2) 2 and 7

(3) 2 and 6 (4) 5 and 6

2. β-decay means emission of electron from

(1) a stable nucleus (2) outermost electron orbit

(3) radioactive nucleus (4) innermost electron orbit

3. An electric heater rated 220 V and 550 W is connected to A.C. mains. The current drawn by it is

(1) 2.5 A (2) 0.4 A

(3) 1.25 A (4) 0.8 A

4. A body of mass 'm' moving along a straight line covers half the distance with a speed of 2 ms^{-1}. The remaining half of the distance is covered in two equal time intervals with a speed of 3 ms^{-1} and 5 ms^{-1} respectively. The average speed of the particle for the entire journey is

(1) $\frac{8}{3}$ ms^{-1} (2) $\frac{4}{3}$ ms^{-1}

(3) $\frac{16}{3}$ ms^{-1} (4) $\frac{3}{8}$ ms^{-1}

5. The moment of inertia of a circular ring of radius 'r' and mass 'M' about diameter is

(1) $\frac{Mr^2}{4}$ (2) $\frac{Mr^2}{2}$

(3) $\frac{Mr^2}{12}$ (4) $\frac{2}{5}Mr^2$

6. A body of mass 0.05 kg is observed to fall with an acceleration of 9.5 ms^{-2}. The opposing force of air on the body is _____ ($g = 9.8$ ms^{-2}).

(1) 0.15 N (2) 0.030 N

(3) Zero (4) 0.015 N

Space For Rough Work

7. The colloidal solution in which both the dispersed phase and dispersion medium are liquids called

(1) gels (2) foams

(3) liquid crystals (4) emulsions

8. In fog, photographs of the objects taken with infra-red radiations are more clear than those obtained during visible light because

(1) scattering of I-R light is more than visible light

(2) the intensity of I-R light from the object is less

(3) scattering of I-R light is less than visible light

(4) I-R radiation has lesser wavelength than visible radiation

9. Three concurrent co-planar forces 1 N, 2 N and 3 N acting along different directions on a body

(1) can keep the body in equilibrium if 1 N and 2 N act at right angles.

(2) cannot keep the body in equilibrium.

(3) can keep the body in equilibrium if 1 N and 3 N act at an acute angle.

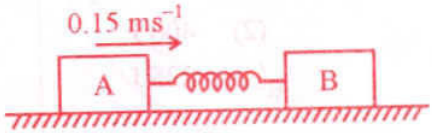
(4) can keep the body in equilibrium if 2 N and 3 N act at right angles.

10. Sound waves transfer

(1) energy (2) momentum

(3) both energy and momentum (4) only energy not momentum

11.



Two rectangular blocks A and B of masses 2 kg and 3 kg respectively are connected by a spring of spring constant 10.8 Nm^{-1} are placed on a frictionless horizontal surface. The block 'A' was given an initial velocity of 0.15 ms^{-1} in the direction shown in the figure. The maximum compression of the spring during the motion is

(1) 0.02 m (2) 0.05 m

(3) 0.03 m (4) 0.01 m

Space For Rough Work

12. G.P. Thomson experimentally confirmed the existence of matter waves by the phenomena

(1) refraction (2) polarisation

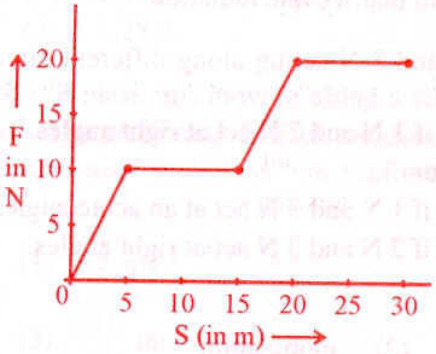
(3) scattering (4) diffraction

13. The resistance of a wire at 300 K is found to be 0.3 Ω. If the temperature co-efficient of resistance of wire is $1.5 \times 10^{-3}\ K^{-1}$, the temperature at which the resistance becomes 0.6 Ω is

(1) 345 K (2) 993 K

(3) 690 K (4) 720 K

14.



The work done by a force acting on a body is as shown in the graph. The total work done in covering an initial distance of 20 m is

(1) 200 J (2) 400 J

(3) 175 J (4) 225 J

15. Two luminous point sources separated by a certain distance are at 10 km from an observer. If the aperture of his eye is 2.5×10^{-3} m and the wavelength of light used is 500 nm, the distance of separation between the point sources are just seen to be resolved is

(1) 24.4 m (2) 2.44 m

(3) 1.22 m (4) 12.2 m

Space For Rough Work

16. A door of 1.6 m wide requires a force of 1 N to be applied at the free end to open or close it. The force that is required at a point 0.4 m distant from the hinges for opening or closing the door is

(1) 3.6 N
(2) 2.4 N
(3) 4 N
(4) 1.2 N

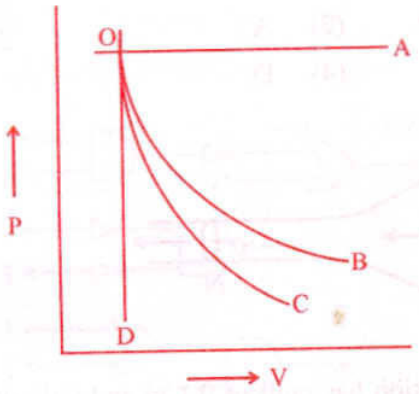
17. 0.1 m^3 of water at 80 °C is mixed with 0.3 m^3 of water at 60 °C. The final temperature of the mixture is

(1) 70 °C
(2) 60 °C
(3) 75 °C
(4) 65 °C

18. The spectral series of the hydrogen atom that lies in the visible region of the electromagnetic spectrum

(1) Balmer
(2) Lyman
(3) Brackett
(4) Paschen

19.



A graph of pressure versus volume for an ideal gas for different processes is as shown. In the graph curve OC represents

(1) isothermal process
(2) isobaric process
(3) adiabatic process
(4) isochoric process

Space For Rough Work

20. Which of the following statement does **not** hold good for thermal radiation ?

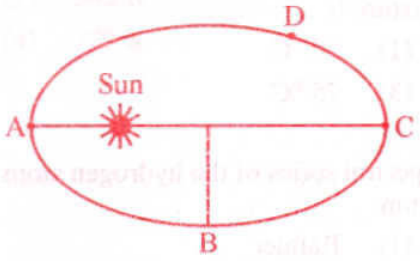
(1) The frequency changes when it travels from one medium to another.

(2) The speed changes when it travels from one medium to another.

(3) They travel in straight line in a given medium.

(4) The wavelength changes when it travels from one medium to another.

21.

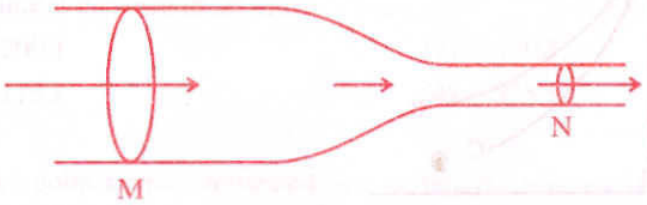


A planet revolves round the Sun in an elliptical orbit. The linear speed of the planet will be maximum at

(1) B (2) A

(3) C (4) D

22.



Horizontal tube of non-uniform cross-section has radii of 0.1 m and 0.05 m respectively at M and N. For a streamline flow of liquid the rate of liquid flow is

(1) greater at M than at N (2) greater at N than at M

(3) same at M and N (4) continuously changes with time

Space For Rough Work

23. A resistor and a capacitor are connected in series with an a.c. source. If the potential drop across the capacitor is 5 V and that across resistor is 12 V, the applied voltage is

(1) 17 V (2) 5 V

(3) 12 V (4) 13 V

24. The amount of heat energy radiated by a metal at temperature 'T' is 'E'. When the temperature is increased to 3T, energy radiated is

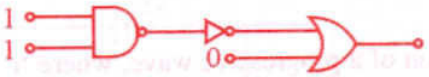
(1) 9 E (2) 3 E

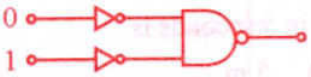
(3) 27 E (4) 81 E

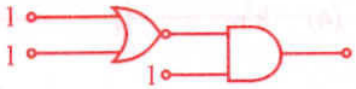
25. The angle of minimum deviation for an incident light ray on an equilateral prism is equal to its refracting angle. The refractive index of its material is

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

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

26. (A) 

(B) 

(C) 

In the following combination of logic gates, the outputs of A, B and C are respectively

(1) 0, 1, 0 (2) 1, 1, 0

(3) 1, 0, 1 (4) 0, 1, 1

Space For Rough Work

27. A stationary point source of sound emits sound uniformly in all directions in a non-absorbing medium. Two points P and Q are at a distance of 4 m and 9 m respectively from the source. The ratio of amplitudes of the waves at P & Q is

(1) $\frac{4}{9}$ (2) $\frac{2}{3}$

(3) $\frac{9}{4}$ (4) $\frac{3}{2}$

28. A galvanometer of resistance 240 Ω allows only 4% of the main current after connecting a shunt resistance. The value of the shunt resistance is

(1) 20 Ω (2) 8 Ω

(3) 5 Ω (4) 10 Ω

29. The phenomena in which proton flips is

(1) lasers (2) radioactivity

(3) nuclear fusion (4) nuclear magnetic resonance

30. $y = 3 \sin \pi\left(\frac{t}{2} - \frac{x}{4}\right)$ represents an equation of a progressive wave, where 't' is in second and 'x' is in metre. The distance travelled by the wave in 5 seconds is

(1) 10 m (2) 5 m

(3) 32 m (4) 8 m

31. According to the quark model, it is possible to build all the hadrons using

(1) 3 quarks and 2 antiquarks (2) 3 quarks and 3 antiquarks

(3) 2 quarks and 2 antiquarks (4) 2 quarks and 3 antiquarks

Space For Rough Work

32. An α-particle of mass 6.4×10^{-27} kg and charge 3.2×10^{-19} C is situated in a uniform electric field of 1.6×10^{5} V m^{-1}. The velocity of the particle at the end of 2×10^{-2} m path when it starts from rest is

(1) 8×10^{5} ms^{-1} (2) 16×10^{5} ms^{-1}

(3) $4\sqrt{2} \times 10^{5}$ ms^{-1} (4) $2\sqrt{3} \times 10^{5}$ ms^{-1}

33. A cylindrical tube open at both the ends has a fundamental frequency of 390 Hz in air. If $1/4^{th}$ of the tube is immersed vertically in water the fundamental frequency of air column is

(1) 130 Hz (2) 390 Hz

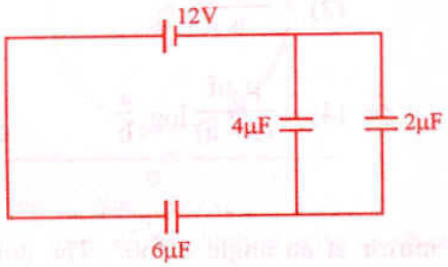
(3) 520 Hz (4) 260 Hz

34. The surface temperature of the stars is determined using

(1) Wein's displacement law (2) Rayleigh-Jeans law

(3) Kirchoff's law (4) Planck's law

35.



The charge deposited on 4 μF capacitor in the circuit is

(1) 12×10^{-6} C (2) 24×10^{-6} C

(3) 36×10^{-6} C (4) 6×10^{-6} C

Space For Rough Work

36. A parallel beam of light is incident on a converging lens parallel to its principal axis. As one moves away from the lens on the other side of the principal axis, the intensity of light

(1) continuously increases

(2) continuously decreases

(3) first increases and then decreases

(4) first decreases and then increases

37. Continuous emission spectrum is produced by

(1) Mercury vapour lamp (2) Sodium vapour lamp

(3) The Sun (4) Incandescent electric lamp

38. A coil of 'n' number of turns is wound tightly in the form of a spiral with inner and outer radii 'a' and 'b' respectively. When a current of strength I is passed through the coil, the magnetic field at its centre is

(1) $\frac{\mu_0 nI}{2(b-a)}$ (2) $\frac{2\mu_0 nI}{b}$

(3) $\frac{\mu_0 nI}{2(b-a)} \log_e \frac{b}{a}$ (4) $\frac{\mu_0 nI}{(b-a)} \log_e \frac{a}{b}$

39. A ray of light is incident on a plane mirror at an angle of 60°. The angle of deviation produced by the mirror is

(1) 30° (2) 60°

(3) 90° (4) 120°

Space For Rough Work

40. The electric potential at any point x, y, z in metres is given by $V = 3x^2$. The electric field at a point (2 m, 0, 1 m) is

(1) -6 V m^{-1} (2) 6 V m^{-1}

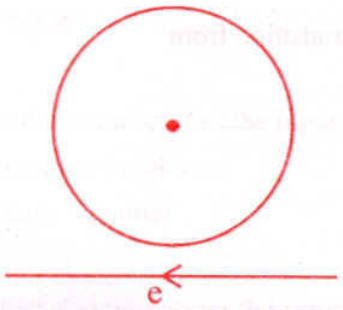
(3) -12 V m^{-1} (4) 12 V m^{-1}

41. Young's double slit experiment gives interference fringes of width 0.3 mm. A thin glass plate made of material of refractive index 1.5 is kept in the path of light from one of the slits, then the fringe width becomes

(1) 0.3 mm (2) 0.45 mm

(3) 0.15 mm (4) zero

42.



Near a circular loop of conducting wire as shown in the figure an electron moves along a straight line. The direction of the induced current if any in the loop is

(1) clockwise (2) anticlockwise

(3) zero (4) variable

Space For Rough Work

43. Hydrogen atom from excited state comes to the ground state by emitting a photon of wavelength λ. If R is the Rydberg constant, the principal quantum number 'n' of the excited state is

(1) $\sqrt{\frac{\lambda}{\lambda R - 1}}$ (2) $\sqrt{\frac{\lambda R^2}{\lambda R - 1}}$

(3) $\sqrt{\frac{\lambda R}{\lambda - 1}}$ (4) $\sqrt{\frac{\lambda R}{\lambda R - 1}}$

44. The magnetic dipole moment of a current loop is independent of

(1) number of turns

(2) area of the loop

(3) current in the loop

(4) magnetic field in which it is lying

45. In ruby laser, the stimulated emission is due to transition from

(1) any higher state to lower state

(2) metastable state to ground state

(3) any higher state to ground state

(4) metastable state to any lower state

46. A direct current I flows along the length of an infinitely long straight thin walled pipe, then the magnetic field

(1) is zero only along the axis of the pipe

(2) is zero at any point inside the pipe

(3) is maximum at the centre and minimum at the edges

(4) is uniform throughout the pipe but not zero

Space For Rough Work

47. A convex lens made of glass has focal length 0.15 m in air. If the refractive index of glass is $^3/_2$ and that of water is $^4/_3$, the focal length of lens when immersed in water is

(1) 0.15 m (2) 0.30 m

(3) 0.6 m (4) 0.45 m

48. Two sources are said to be coherent if they produce waves

(1) of equal wavelength

(2) of equal speed

(3) having same shape of wave front

(4) having a constant phase difference

49. Three resistors 1 Ω, 2 Ω, and 3 Ω are connected to form a triangle. Across 3 Ω resistor a 3 V battery is connected. The current through 3 Ω resistor is

(1) 1 A (2) 2 A

(3) 1.5 A (4) 0.75 A

50. In a common emitter amplifier the input signal is applied across

(1) emitter – collector (2) collector – base

(3) base – emitter (4) anywhere

51. In a radioactive disintegration, the ratio of initial number of atoms to the number of atoms present at an instant of time equal to its mean life is

(1) $\frac{1}{e}$ (2) e

(3) e^2 (4) $\frac{1}{e^2}$

Space For Rough Work

52. A ray of light is incident on a surface of glass slab at an angle 45°. If the lateral shift produced per unit thickness is $\frac{1}{\sqrt{3}}$ m, the angle of refraction produced is

(1) $\tan^{-1}\left(1-\sqrt{\frac{2}{3}}\right)$ (2) $\sin^{-1}\left(1-\sqrt{\frac{2}{3}}\right)$

(3) $\tan^{-1}\left(\sqrt{\frac{2}{\sqrt{3}-1}}\right)$ (4) $\tan^{-1}\left(\frac{\sqrt{3}}{2}\right)$

53. Ferromagnetic materials used in a transformer must have

(1) high permeability and low hysterisis loss

(2) high permeability and high hysterisis loss

(3) low permeability and low hysterisis loss

(4) low permeability and high hysterisis loss

54. According to Newton's Corpuscular Theory, the speed of light is

(1) lesser in rarer medium (2) lesser in denser medium

(3) independent of the medium (4) same in all the media

55. For the constructive interference the path difference between the two interfering waves must be equal to

(1) $2n\pi$ (2) $n\lambda$

(3) $(2n+1)\frac{\lambda}{2}$ (4) $(2n+1)\lambda$

Space For Rough Work

56. The accurate measurement of emf can be obtained using

(1) Voltmeter (2) Voltameter

(3) Potentiometer (4) Multimeter

57. The kinetic energy of an electron gets tripled, then the de-Broglie wavelength associated with it changes by a factor

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

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

58. Which of the following is not a thermodynamic co-ordinate ?

(1) Pressure (P) (2) Volume (V)

(3) Temperature (T) (4) Gas constant (R)

59. Two solid pieces, one of steel and the other of aluminium when immersed completely in water have equal weights. When the solid pieces are weighed in air

(1) steel piece will weigh more

(2) they have the same weight

(3) aluminium piece will weigh more

(4) the weight of aluminium is half the weight of steel

60. The amount of energy released when one microgram of matter is annihilated is

(1) 9×10^{10} kWh (2) 3×10^{10} kWh

(3) 0.5×10^{5} kWh (4) 0.25×10^{5} kWh

Space For Rough Work