ATOMIC ENERGY EDUCATION SOCIETY
Anushaktinagar, Mumbai-400 094

2015 – Open Candidates Examination

Post – PGT (Physics)

Date – 27-09-2015

Time – 1 Hour 30 Minutes

Maximum Marks – 50

Instructions

1. There are 50 Multiple Choice Questions (MCQ) in this paper. Each question carries 1 mark. There will be negative marking of 0.25 per wrong answer.
2. Answer should be darkened/marked in the OMR answer sheet only.
3. Use of any electronic gadget (e.g. calculator, mobile phone, etc.) is not permitted, in the examination hall.
4. In case a candidate has not signed the Attendance Sheet or the OMR Answer Sheet is not signed by the Invigilator, it will be dealt with as a case of unfair means.
5. On completion of the test, the candidates MUST HAND OVER THE OMR ANSWER SHEET AND QUESTION PAPER TO THE INVIGILATOR in the room/hall.
6. The candidates should ensure that the OMR answer sheet is not folded or damaged.

To be filled by the candidate
Name of the Candidate: _____
Roll Number: _____
OMR Number: _____

No of printed pages –9

1

2015-Open Candidates- PGT (Physics) – QP

Q.1) If a transparent parallel plate of thickness t and refractive index n is introduced perpendicularly in the light beam, the optical path is

(a) increased by $(n-1)t$

(b) decreased by nt

(c) decreased by $(n-1)t$

(d) increased by nt

Q.2) Internal energy of an ideal gas decreases by the same amount as the work done by the system.

(a) the process must be isothermal

(b) the process must be adiabatic

(c) the process must be isobaric

(d) the temperature of the system must increase

Q.3) In a resonance column experiment the first 3 resonant lengths are l_1, l_2 and l_3 respectively. The l_1: l_2: l_3 may be given as

(a) 1:2:3

(b) 2:3:5

(c) 1:3:5

(d) 3:4:6

Q.4) An intrinsic semiconductor at absolute zero of temperature behaves as

(a) an insulator

(b) a metallic conductor

(c) a superconductor

(d) a semiconductor

Q.5) The motion of planets in the solar system is an example of conservation of

(a) mass

(b) linear momentum

(c) angular momentum

(d) kinetic energy

Q.6) A 4μF capacitor is charged by a 200V supply. The energy stored in the electric field of the capacitor is

(a) 8×10^{-2} J

(b) 1.6×10^{9} J

(c) 8×10^{-4} J

(d) 1.6×10^{-1} J

Q.7) A thin concave and a thin convex lens are in contact. The ratio of the magnitude of power of two lenses is $\frac{2}{3}$ and the focal length of combination is 30 cm. The focal length of the convex lens is

(a) 10 cm

(b) 12cm

(c) 15cm

(d) 20cm

2

Q.8) The relation connecting magnetic susceptibility χ and relative permeability μ is
(a) $\chi = (\mu + 1)$
(b) $\chi = (\mu - 1)$
(c) $\chi = \mu^{-1}$
(d) $\chi = 3(\mu + 1)$

Q.9) Taking the significant figures into consideration, the product of 109.832 and 0.6107 should be written as
(a) 67.0744
(b) 67.1
(c) 67.07
(d) 67.074402

Q.10) One spring has force constant $200Nm^{-1}$, another has force constant $500Nm^{-1}$. If they are joined in series, the force constant will be nearest to
(a) $700Nm^{-1}$
(b) $300Nm^{-1}$
(c) $143Nm^{-1}$
(d) $100Nm^{-1}$

Q.11) Two plane mirrors are inclined at an angle of $60°$ to each other. A point object is placed in between them. The total number of images produced by both the mirrors is
(a) 2
(b) 4
(c) 5
(d) 6

Q.12) A 150 m long train is travelling from east to west at a speed of $20\ ms^{-1}$. A bird is flying from west to east at a speed of $5\ ms^{-1}$. How long will the bird take to cross the train?
(a) 6 s
(b) 8 s
(c) 10 s
(d) 12 s

Q.13) The masses of two particles having same kinetic energy are in the ratio of 2:1. Their de Broglie wavelengths are in the ratio
(a) 2 : 1
(b) 1 : 2
(c) $\sqrt{2} : 1$
(d) $1 : \sqrt{2}$

Q.14) A ball of mass m collides with a wall with speed v and rebounds on the same line with the same speed. If the mass of the wall is taken as infinite, the work done by the ball on the wall is
(a) 2mv
(b) $2mv^2$
(c) mv^2
(d) zero

3

Q.15) The mean kinetic energy of molecules in 1 mole of a monatomic ideal gas is equal to (k is Boltzmann constant)

(a) $\frac{1}{2} kT$

(b) kT

(c) $\frac{3}{2} kT$

(d) $3kT$

Q.16) The equation $y = 0.02 \sin (500\pi t) \cos (4.5) t$ represents

(a) progressive wave of frequency 250 Hz along x-axis

(b) a standing wave of wavelength 1.4m

(c) a transverse progressive wave of amplitude 0.02m

(d) progressive wave of speed approximately $350 ms^{-1}$

Q.17) If v_0 be the orbital velocity of a satellite in a circular orbit close to earth's surface and v_e is the escape velocity for the earth, the relation between the two is

(a) $v_e = \sqrt{2}\, v_0$

(b) $v_e = \sqrt{3}\, v_0$

(c) $v_0 = v_e$

(d) $v_e = 2v_0$

Q.18) The refractive index μ of a material varies with wavelength λ in the following manner (a and b are constants)?

(a) $\mu = a + \lambda b$

(b) $\mu = a + \frac{b}{\lambda}$

(c) $\mu = a + \frac{b}{\lambda^2}$

(d) $\mu = a + b\lambda^2$

Q.19) If vectors $\bar{a}$ and $\bar{b}$ are given as

$\bar{a} = 5\,\bar{i} + 6\,\bar{j} + 3\bar{k}$

$\bar{b} = 6\,\bar{i} - 2\,\bar{j} - 6\bar{k}$.

which of the following statements is correct?

(a) $\bar{a}$ and $\bar{b}$ are mutually perpendicular
(b) $\bar{a} \times \bar{b}$ is same as $\bar{b} \times \bar{a}$
(c) $|\bar{a} + \bar{b}| = a + b$
(d) $|\bar{a} \times \bar{b}|^2 = a^2 + b^2 + \bar{a} \cdot \bar{b}$

Q.20) Two photons are emitted in opposite directions by a source. The velocity of one photon relative to the other is

(a) c

(b) 2c

(c) $\sqrt{2}$ c

(d) zero

4

Q.21) In Young's double slit experiment, the fringe width with light of wavelength $\lambda = 600$ nm is 3 mm. The fringe width, when the λ of light is changed to 400 nm is

(a) 4 mm

(b) 3 mm

(c) 2 mm

(d) 1mm

Q.22) An electric field does not exist in the region,

(a) between the nucleus and the electron in an atom

(b) inside a current carrying conductor

(c) inside a plate of insulator held between the plates of a charged parallel plate capacitor

(d) inside a cavity of a charged conductor.

Q.23) A Table-Tennis ball floating on the top of a vertical water jet is a consequence of

(a) Stokes' Law

(b) Bernoulli's principle

(c) Pascal's Law

(d) the phenomenon of surface tension

Q.24) Balmer series in the spectrum of H – atom lies in

(a) Near Infrared region

(b) Far Infrared region

(c) Visible region

(d) UV region.

Q.25) The surface tension of soap solution is S. What is the work done in blowing a small bubble of radius r?

(a) $\pi r^2 S$

(b) $2\pi r^2 S$

(c) $4\pi r^2 S$

(d) $8\pi r^2 S$

Q.26) The average power dissipated in a pure capacitor in one complete cycle of AC is (V is the rms value of the AC voltage)

(a) zero

(b) CV

(c) $\frac{1}{2} CV^2$

(d) $\frac{1}{4} CV^2$

Q.27) Velocity of sound in a gas at a given temperature is 340 ms^{-1}.

If the pressure of gas is doubled isothermally, the speed of sound in this case is

(a) 170 ms^{-1}

(b) 340 ms^{-1}

(c) 680 ms^{-1}

(d) 1360 ms^{-1}

5

Q.28) An enclosure maintained at 1000K radiates the most at the wavelength λ_m. If temperature is raised to 2000K, the maximum emission of radiation will occur at the following wavelength

(a) $\frac{\lambda_m}{2}$

(b) $2\lambda_m$

(c) $16\lambda_m$

(d) $\frac{\lambda_m}{16}$

Q.29) In a charged parallel plate capacitor, the plates carry charges $\pm \sigma A$, where A= area of each plate. The oppositely charged parallel plates attract each other by a force F equal to

(a) $\frac{\sigma^2 A}{\epsilon_o}$

(b) $\frac{\sigma^2 A}{2\epsilon_o}$

(c) $\frac{(\sigma A)^2}{\epsilon_o}$

(d) $\frac{(\sigma A)^2}{4\pi\epsilon_o}$

Q.30) In a series LCR circuit, the rms voltage across R, L and C is 10V each. The rms value of applied emf is

(a) 10 V

(b) $10\sqrt{2}$ V

(c) $10\sqrt{3}$ V

(d) 20 V

Q.31) Magnifying power of an astronomical telescope for normal vision (in usual notations) is

(a) $-f_e/f_o$

(b) $-f_o/f_e$

(c) $-f_o \times f_e$

(d) $f_o + f_e$

Q.32) The maximum and minimum values of Poisson's ratio for a metal lie in the following limits

(a) -1 to $+1$

(b) -1 to 0

(c) 0 to 1

(d) 0 to 0.5

Q.33) A projectile projected at 30° with the horizontal achieves a horizontal range R. It can achieve the same horizontal range R if projected (with the same initial velocity) at the following angle α with the vertical

(a) 15°

(b) 22.5°

(c) 30°

(d) It cannot achieve the same horizontal range for any angle $\alpha < 60^\circ$ with the vertical.

Q.34) In an electromagnetic wave the $\vec{E}$ and $\vec{B}$ vectors at any instant of time have

(a) the same phase

(b) same amplitude

(c) phase difference π

(d) phase difference $\frac{\pi}{2}$

6

Q.35) A simple pendulum is attached to the ceiling of a lift. Its time period of oscillation when the lift is stationary is T. Its frequency of oscillations, when the lift falls freely is

(a) T

(b) $\frac{1}{T}$

(c) zero

(d) ∞

Q.36) A star converts all of its Helium into Oxygen nucleus. Find the amount of energy released per nucleus of oxygen. The masses of two Nuclei are as follows:

m(He) = 4.0026 u, m(O) = 15.9994 u

(a) 5.12 Mev

(b) 7 Mev

(c) 7.26 Mev

(d) 10.24 Mev

Q.37) Two satellites of masses 3M and M orbit the earth in the circular orbits of radii r and 3r respectively. The ratio of their orbital velocities is

(a) 1 : 1

(b) $\sqrt{3}$: 1

(c) 3 : 1

(d) 9 : 1

Q.38) The moment of inertia of a uniform disc about an axis perpendicular to the disc at its centre is $\frac{MR^2}{2}$, where M is the mass and R the radius of the disc. If the disc is rolling on the edge without slipping, on a straight line path, the ratio of rotational kinetic energy to the translational kinetic energy is

(a) 1

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

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

(d) $\frac{1}{8}$

Q.39) Wavelength K_α line of X- ray spectra varies with atomic number (Z) as

(a) $\lambda \propto Z$

(b) $\lambda \propto \sqrt{Z}$

(c) $\lambda \propto \frac{1}{Z^2}$

(d) $\lambda \propto \frac{1}{\sqrt{Z}}$

Q.40) The excess pressure inside a small soap bubble of radius r is proportional to

(a) r

(b) $\frac{1}{r}$

(c) $\frac{1}{r^2}$

(d) r^2

7

Q.41) An electron is travelling along X- direction. It encounters a magnetic field in the Y- direction. Its subsequent motion will be

(a) a circle in the XZ- plane

(b) a circle in the YZ- plane

(c) a circle in the XY-plane

(d) a straight line along X- direction.

Q.42) A particle moving along a circular path with uniform speed has a

(a) radial velocity and radial acceleration

(b) radial velocity and transverse acceleration

(c) transverse velocity and radial acceleration

(d) transverse velocity and transverse acceleration.

Q.43) In a region of space the electric field is given as $\vec{E} = 8\vec{i} + 4\vec{j} + 3\vec{k}$.

The electric flux through a surface area of 100 units in XY- plane is

(a) 300 units

(b) 400 units

(c) 800 units

(d) 1200 units

Q.44) Which of the following pair of physical quantities does not have the same dimensions?

(a) Electric flux, Electric dipole moment

(b) Pressure, Young's modulus

(c) Electromotive force, Potential difference

(d) Heat, Potential energy.

Q.45) When a magnetic material is subjected to an external magnetizing field, its ability to get magnetized is represented by

(a) magnetic permeability

(b) magnetic susceptibility

(c) magnetic viscosity

(d) magnetic resonance

Q.46) Which of the following represents an adiabatic process in an ideal gas(the symbol γ has its usual significance)

(a) $pV = $ constant

(b) $TV^\gamma = $ constant

(c) $pV^{\gamma-1} = $ constant

(d) $TV^{\gamma-1} = $ constant

8

Q.47) The amplitude of the bob of an oscillating simple pendulum decreases with time. The force F responsible for it depends on the velocity v of the bob as

(a) $F \propto v$

(b) $F \propto v^2$

(c) $F \propto \frac{1}{v}$

(d) $F \propto \frac{1}{v^2}$

Q.48) Two charges are kept in air, separated by a distance r. If they are kept in a dielectric medium of dielectric constant K, separated by the same distance, the force between them

(a) remains unchanged

(b) decreases K times

(c) increases K times

(d) increases K^2 times

Q.49) When a standing wave is formed, its frequency is

(a) same as that of individual waves

(b) twice that of individual waves

(c) half that of the individual waves

(d) $\sqrt{2}$ times that of the individual waves

Q.50) For a given bipolar junction transistor the value of β is 99.What is the corresponding value of α ? (symbols have their usual meanings)

(a) 0.01

(b) 1.01

(c) 1.99

(d) 0.99

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9

Open advertisement candidates exam-2015

PGT (PHYSICS)

ANSWERS KEY

1. A	26. A
2. B	27. B
3. C	28. A
4. A	29. B
5. C	30. A
6. A	31. B
7. A	32. D
8. B	33. C
9. C	34. A
10. C	35. C
11. C	36. D
12. A	37. B
13. D	38. B
14. D	39. C
15. C	40. B
16. B	41. A
17. A	42. C
18. C	43. A
19. A	44. A
20. A	45. B
21. C	46. D
22. D	47. A
23. B	48. B
24. C	49. A
25. D	50. B

NOTE: The Information provided here is only for reference. It may vary the Original