

Seat No.

Total No. of Pages : 21

P.G. Entrance Examination, 2024**Subject : Physics****Subject Code : 58718**

Day and Date : Saturday, 18-05-2024**Total Marks : 100****Time : 03:30 pm to 05:00 pm**

Instructions :

- 1) All questions are compulsory.
 - 2) Each question carries 1 mark.
 - 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
 - 4) Follow the instructions given on OMR sheet.
 - 5) Rough work shall be done on the sheet provided at the end of question paper.
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- 1) The nanotube is an example of structure
 - a) 0D
 - b) 1D
 - c) 2D
 - d) 3D
- 2) Kundt's tube method is used to
 - a) produce ultrasonic waves
 - b) detect the ultrasonic waves
 - c) produce infrasonic waves
 - d) detect the plane wave
- 3) waves are used to detect depth of sea.
 - a) plane waves
 - b) stationary waves
 - c) standing waves
 - d) ultrasonic waves
- 4) is an axial point having unit positive angular magnification
 - a) Nodal points
 - b) principal points
 - c) focal points
 - d) cardinal points

- 5) Biomass is useful to produce
- a) transportation fuels b) electricity
- c) thermal energy d) All of these
- 6) The de-Broglie hypothesis is associated with
- a) Wave nature of electrons only
- b) Wave nature of α -particles only
- c) wave nature of radiations
- d) wave nature of all material particles
- 7) Electrons are emitted from a metal surface when light falling on it has a minimum.....
- a) Energy b) wavelength
- c) velocity d) charge
- 8) The kinetic energy of an electron in atom is
- a) Half of its potential energy
- b) Twice its potential energy
- c) Equal to its potential energy
- d) Trice its potential energy
- 9) What is the smallest possible uncertainty in the position of an electron moving with velocity 10^6 m/s ?
- a) 1.5 \AA b) 0.58 \AA
- c) 0.2 \AA d) $0.5 \times 10^{-8} \text{ m}$.

- 10) Find the value of $\frac{\sqrt{-1/2}}{\sqrt{1/2}}$
- | | |
|--------|---------|
| a) 2 | b) -2 |
| c) 1/2 | d) -1/2 |
- 11) Beta function is
- | | |
|--------------|---------------|
| a) symmetric | b) asymmetric |
| c) periodic | d) a periodic |
- 12) For the equation $x^2y'' + y \sin x = 0$ is point.
- | | |
|--------------------------------|------------------------------|
| a) ordinary point | b) regular singularity point |
| c) irregular singularity point | d) essential singular point |
- 13) The method of separation of variables converts the given partial differential equation into differential equation.
- | | |
|---------------------|------------------|
| a) partial ordinary | b) ordinary |
| c) partial | d) none of these |
- 14) The wave equation is of the form of.....
- | | |
|--|--|
| a) $\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$ | |
| b) $\frac{\partial^2 u}{\partial x^2} = c \frac{\partial^2 u}{\partial y^2}$ | |
| c) $\frac{\partial^2 u}{\partial x^2} = \frac{1}{C^2} \frac{\partial^2 u}{\partial y^2}$ | |
| d) $\frac{\partial^2 u}{\partial x^2} = \frac{1}{C^2} \frac{\partial^2 u}{\partial y^2}$ | |

15) Partial differential equation consist of.....

- a) only one dependent variable
- b) at least two independent variables
- c) two dependent variables
- d) both a & b

16) Order and degree of differential equation is $\frac{d^2y}{dx^2} = \left[y + \left(\frac{dy}{dx} \right)^2 \right]^{1/4}$

- a) 4, 2
- b) 2, 4
- c) 1, 2
- d) 1, 4

17) $x + iy$ is a

- a) Cartesian form of complex number
- b) Polar form of complex number
- c) exponential form of complex number
- d) linear form of complex number

18) If $i = \sqrt{-1}$, then the value of i^7 is

- a) 1
- b) -1
- c) 0
- d) 2

19) What is the value of beta function $\beta(z, 1)$?

- a) $1/z+1$
- b) $1/z$
- c) $1/z(z+1)$
- d) none of these

- 20) The packing fraction for FCC crystal structure is
- a) 0.52
 - b) 0.74
 - c) 0.68
 - d) 0.25
- 21) In case of insulator width of hand is wide.
- a) Conduction
 - b) valance
 - c) forbidden
 - d) both a & c
- 22) Which of the material does not have permant magnetic dipole?
- a) Paramagnetic
 - b) Diamagnetic
 - c) ferrimagnetic
 - d) antiferromagnetic
- 23) The limitations on the motion of a system are called as.....
- a) constraints
 - b) conditions
 - c) extinction
 - d) positions
- 24) The body co-ordinate system is a frame of reference.
- a) inertial
 - b) non-inertial
 - c) inertial as well as non-intertial
 - d) none of these

- 25) In case of modified Hamilton's principle
- a) the path refers to configuration space
 - b) the path refers to phase space
 - c) the path refers to position space
 - d) the refers to both phase space and position space
- 26) How many degree's of freedom a rigid body possess ----
- a) 3
 - b) 6
 - c) 9
 - d) infinite
- 27) The principle of virtual work deals only with the case of
- a) Kinematics
 - b) statics
 - c) dynamics
 - d) both b &c
- 28) The relation between linear momentum P and angular momentum L for a particle is
- a) $P = r \times L$
 - b) $L = r \times P$
 - c) $P = L \times r$
 - d) $L = P \times r$
- 29) Analytically Hamilton's principle can be represented as
- a) $\int_{t_1}^{t_2} L dt \neq \text{extremum}$
 - b) $-\int_{t_1}^{t_2} L dt \neq \text{extremum}$
 - c) $-\int_{t_1}^{t_2} L dt = \text{extremum}$
 - d) $\int_{t_1}^{t_2} L dt = \text{mean}$

- 30) The equation $E = mc^2$ is valid for energy
- a) Potential
 - b) Kinetic
 - c) Nuclear
 - d) All types of
- 31) Special theory of relativity deals with frame of reference
- a) Universal
 - b) non-inertial
 - c) inertial
 - d) both (b) & (c)
- 32) The path of charged particle moving in an uniform electric field E is
- a) circle
 - b) parabola
 - c) cycloid
 - d) straight line
- 33) interaction is weak interaction which is responsible for the fine structure of excited states of one electron atom.
- a) electron-electron
 - b) electron-proton
 - c) spin-orbit
 - d) proton-proton
- 34) Vector atom model is based on the concept of space quantization and concept of
- a) Vector algebra
 - b) Bohr's Atom
 - c) Spinning electron
 - d) Revolving electron

- 35) The Zeeman effect is not used in
- a) optical amplifiers b) MRI scan
c) NMR d) Laser cooling
- 36) The electronic spectra falls in region
- a) UV-visible b) IR-microwave
c) IR & visible d) UV & IR
- 37) Ionization energy of hydrogen atom is.....
- a) 0.52eV b) 13.6 eV
c) -13.6 eV d)-0.52 eV
- 38) In H₂ molecule the bond is purely
- a) ionic b) metallic
c) covalent d) spectral
- 39) The lattice is the reciprocal of its own reciprocal lattice
- a) Indirect b) direct
c) positive d) negative
- 40) At the boundaries of first Brillouin Zone, group velocity becomes
- a) infinity b) one
c) less than one d) zero

- 41) In case of insulator width of band is wide.
- a) Conduction
 - b) valance
 - c) forbidden
 - d) both a & c
- 42) In ferromagnetic material susceptibility is
- a) Very large & positive
 - b) Very large & negative
 - c) Very small & positive
 - d) Very small & negative
- 43) Raman effect is due to
- a) interference of light
 - b) polarization of light
 - c) diffraction of light
 - d) scattering of light
- 44) The selection rule for doublet is
- a) $\Delta L = 0$
 - b) $\Delta L = \pm 1$
 - C) $\Delta L = \pm Z$
 - d) $\Delta L = \pm \infty$
- 45) Anomalous Zeeman pattern is converted to normal Zeeman pattern when Lande's g factor is
- a) 1.2
 - b) 1
 - c) 1.5
 - d) 1.7

- 46) The diameter of Mars is Km
- a) 7832 b) 5832
- c) 6832 d) 3832
- 47) Which of the following is not a fermion?
- a) Electron b) Muon
- c) Neutrons d) Photon
- 48) Cyclotron consist of
- a) two dees b) only one dee
- c) three dees d) both (b) & (c)
- 49) The principle of phase stability is incorporated in
- a) cyclotron
- b) betatron
- c) snychrocycltron
- d) proton synchrotron
- 50) Betatron mainly accelerates
- a) proton b) electron
- c) neutrons d) mesons
- 51) Radius of nucleus is roughly proportional to of mass number
- a) square b) cube root
- c) square root d) none of these

52) The discovery of electron was made by

- a) Thomas
- b) Rutherford
- c) Dirac
- d) Kepler

53) Which of the following is also called as biogas

- a) biomethane
- b) biodiesel
- c) biobutanol
- d) bioethanol

54) The transition temperature of mercury is

- a) 1.14 K
- b) 9.22 K
- c) 4.12 K
- d) 1 K

55) In case of nanomaterials, surface to volume ratio is

- a) small
- b) large
- c) infinite
- d) unit

56) The most suitable wind speed for wind turbine generator unit is

- a) 10 m/s
- b) 5 m/s
- c) 15 m/s
- d) 20 m/s

57) 1 a. m. u. =

- a) 931 eV
- b) 931 BeV
- c) 931 KeV
- d) 931 MeV

- 58) Following elementary particle is not a leptons,
- a) Electron
 - b) muon
 - c) neutrino
 - d) neutron
- 59) If the frequency of the oscillator potential to the dees of a cyclotron is 8 Mhz, what must be the magnetic flux density B to accelerate alpha particles?
- a) 0.304 Wb/m^2
 - b) 1.04 Wb/m^2
 - c) 3.304 Wb/m^2
 - d) 1.304 Wb/m^2
- 60) Leptons respond to interaction
- a) strong
 - b) weak
 - c) weak and electromagnetic
 - d) normal
- 61) The S.I. unit of solar constant is
- a) W/m
 - b) W^2/m
 - c) W/m^2
 - d) no unit
- 62) According to schrodinger a particle is equivalent to
- a) single wave
 - b) wave packet
 - c) light wave
 - d) cannot behave as light wave

- 63) Matter waves are
- a) longitudinal
 - b) electromagnetic
 - c) always travel with speed of light
 - d) show diffraction
- 64) According to Bhor's principle the relation between main quantum number n and radius of orbit is
- a) $r \propto 1/n$
 - b) $r \propto n$
 - c) $r \propto n^2$
 - d) $r \propto 1/n^2$
- 65) The output of the NOR gate is high only when all the inputs are
- a) high
 - b) low
 - c) high & low
 - d) none of these
- 66) Full adder is a logic circuit that can add bits at a time.
- a) 2
 - b) 3
 - c) 4
 - d) 1
- 67) Oscillator is an electronic circuit which converts at high frequency.
- a) ac energy into dc energy
 - b) dc energy into dc energy
 - c) ac energy into ac energy
 - d) dc energy into ac energy

- 68) Soft superconductors observers
- a) Meissner effect
 - b) Compton effect
 - c) Zeemn effect
 - d) Seebeck effect
- 69) Superconductor is also called as
- a) perfect conductor
 - b) bad conductor
 - c) semiconductor
 - d) insulator
- 70) The size of quantum dot is about
- a) 10 nm
 - b) 100 nm
 - c) 10000 nm
 - d) 1 m
- 71) In oscillator, the feedback factor β is $1/29$.
- a) colpitt's
 - b) crystal
 - c) wein bridge
 - d) phase shift
- 72) fip-flop is a refinement of R-S flip-flop.
- a) J-K
 - b) D
 - c) T
 - d) All
- 73) IC-555 timer consist of comparators
- a) only one
 - b) two
 - c) three
 - d) four

- 74) In IC-555, pin no 2 is referred as
- a) trigger input
 - b) inverting input
 - c) non inverting input
 - d) none of these
- 75) The wavelength λ associated with a particle mass of m moving with velocity 'v' is given by
- a) $\lambda = h/mv$
 - b) $\lambda = mv/h$
 - c) $\lambda = hv/m$
 - d) $\lambda = m/hv$
- 76) For free particle potential energy is
- a) constant
 - b) infinity
 - c) zero
 - d) one
- 77) Reverberation time in a hall should be
- a) small
 - b) large
 - c) zero
 - d) optimum
- 78) The undesired sound other than that of speaker is called
- a) musical notes
 - b) musical scale
 - c) extraneous sound
 - d) noise
- 79) The principle of superposition is possible
- a) only in case of ordinary differential equations
 - b) only in case of non homogenous linear equations
 - c) only in case of homogenous linear equations
 - d) only in case of non linear equations

- 80) During reversible cyclic process the change in entropy is.....
- a) zero
 - b) positive
 - c) negative
 - d) one
- 81) The force of attraction between any two masses is directly proportional to the product their masses and inversely proportional to the square of distance between them is the statement of
- a) Newton's first law
 - b) Newton's second law
 - c) Newton's third law
 - d) Newton's law of gravitation
- 82) The radius vector drawn from the sun to the planet sweeps out equal areas in equal time is the statement of
- a) Kepler's first law
 - b) Kepler's second law
 - c) Kepler's third law
 - d) Newton's law of gravitation
- 83) GPS satellites are powered by
- a) electrical energy
 - b) solar energy
 - c) mechanical energy
 - d) chemical energy

- 84) The dimension of strain is
- a) $[L^1 M^{-1} T^{-2}]$ b) $[L^2 M^{-1} T^{-2}]$
c) $[L^1 M^{-1} T^{-2}]$ d) none of these
- 85) The S. I. unit of magnetic induction is
- a) Gauss
b) weber
c) Tesla
d) Henry
- 86) Closed path in any network is called a
- a) node b) mesh
c) loop d) branch
- 87) Which one of the following is ferromagnetic material.....
- a) iron b) NaCl
c) water d) sodium.
- 88) In the conversion of Thevenin's form to Norton's form $R_{th} = \dots\dots\dots$
- a) I_N b) I_{th}
c) V_{th} d) R_N
- 89) According to Ohm's law
- a) $V = I/R$ b) $V = IR$
c) $V = I/R$ d) $I = VR$

- 90) Owen's bridge is used to measure
- a) resistance
 - b) capacitance
 - c) inductance
 - d) reactance
- 91) gate is called as inverter.
- a) OR
 - b) AND
 - c) NOT
 - d) EX-OR
- 92) is a logic circuit that adds two binary digit at a time.
- a) full adder
 - b) half adder
 - c) flip flop
 - d) gates
- 93) The inner wall of front face of CRT is coated with a material.
- a) carbon
 - b) phosphor
 - c) calcium
 - d) fluorescent
- 94) An ideal op-amp has band width.
- a) low
 - b) infinite
 - c) zero
 - d) moderate
- 95) The number of point group and lattice structure in three dimensions are
- a) 7,14
 - b) 14,32
 - c) 32,14
 - d) 7,32

- 96) The interplanar distance for (221) plane in case of cubic lattice is
- a) $a/2$
 - b) $a/3$
 - c) $a/4$
 - d) $a/5$
- 97) Diffraction of X-rays from the crystal is the phenomenon of...
- a) scattering
 - b) reflection.
 - c) refraction
 - d) interference
- 98) Under superposition of two SHM's, resultant motion of the particle traces a curve called as
- a) binding energy curve
 - b) ellipsoidal curve
 - c) hyperbolic curve
 - d) Lissajous figures
- 99) Resolving power of grating is
- a) independent on grating element
 - b) dependent on order of spectrum
 - c) dependent on number of slits on grating
 - d) all of above
- 100) Enthalpy is nothing but
- a) intrinsic energy
 - b) free energy
 - c) entropy
 - d) total heat function



ROUGH WORK

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