BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Bachelor of Technology in Computer Science & Engineering
Course Name – Engineering Physics II
Course Code - PH201
(Semester II)

Time allotted : 1 Hrs.25 Min.   **Full Marks : 70**

[The figure in the margin indicates full marks.]

Group-A
(Multiple Choice Type Question)   1 x 70=70

Choose the correct alternative from the following :

(1) For small value of damping constant, the quality factor
  a) decreases
  b) increases
  c) remains constant
  d) none of these

(2) Example of weakly damped harmonic oscillator is
  a) dead-bead galvanometer
  b) tangent galvanometer
  c) ballistic galvanometer
  d) none of these

(3) Two vibrating systems are said to be in resonance if
  a) their amplitudes are equal
  b) their frequencies are equal
  c) they are in same phase
  d) none of these

(4) A process during which the pressure remains constantis
  a) isometric process
  b) isothermal process
  c) isochoric process
  d) isochoric process

(5) The example of Boson is
  a) electron
  b) proton
  c) ideal gas molecules
  d) photon

(6) The number of possible arrangements of three Boltzons in three cell is
  a) 1
  b) 3
  c) 9
  d) 27

(7) The first law of thermodynamics is conservation of
  a) momentum
  b) energy
  c) both energy & momentum
  d) both energy & momentum

(8) A perfect black body
  a) absorbs all the incident radiation
  b) allow all the incident radiation to pass through it
  c) allow all the incident radiation to pass through it
  d) has its surface coated with lamp black or graphite

(9) The core of an optical fiber has a
  a) lower refracted index than air
  b) lower refractive index than the cladding

c) higher refractive index than the cladding   d) samerefractive index with the cladding

(10) Population inversion in preparing laser beam can be achieved

a) when one of the excited states is less populated than the ground state
b) when one of the excited states is more populated than the ground state
c) when the population of one excited state and the ground state are equal
d) none of these

(11) Negative feedback increases the performance parameters except

a) gain
b) input impedance
c) noise distortion
d) 3 db frequency

(12) The pinch-off voltage is equal to

a) drain-to-source voltage
b) gate-to-source voltage
c) gate-to-source cut-off voltage
d) gate voltage

(13) If the velocity of a particle executing SHM is maximum, then displacement will be

a) maximum
b) minimum
c) less than zero
d) greater than zero

(14) The SI unit of the force constant of a spring is

a) Nm
b) Nm^{-2}
c) Nm^{-1}
d) N

(15) If a particle is executing SHM with frequency v then its potential energy is

a) remains constant over time
b) oscillating with v^2
c) oscillating with $v/2$
d) oscillating with $2v$

(16) If 'ω_0' is the angular frequency of a body and 'k' is the damping constant, then its quality factor is

a) ω_0/k
b) $2\omega_0/k$
c) $\omega_0/2k$
d) None of these

(17) A particle of mass 'm_0' moves with speed 0.8c, where 'c' is the speed of light in vacuum. The relativistic kinetic energy of the particle is nearly

a) $1.66m_0c^2$
b) m_0c^2
c) $0.32m_0c^2$
d) $0.66m_0c^2$

(18) A particle of mass 10 gm lies in a potential field $V = 50 x^2 + 100$. The value of frequency of oscillations is

a) 5 Hz
b) $5/\pi$ Hz
c) $10\pi/3$ Hz
d) None of these

(19) The mathematical formula for Fermi energy at 0 K is

a) $\dfrac{\hbar^2}{8\pi V}\left(\dfrac{3N}{2m}\right)^{\frac{2}{3}}$

b) $\dfrac{\hbar^2}{2m}\left(\dfrac{3N}{8\pi V}\right)^{\frac{2}{3}}$

c) $\dfrac{\hbar^3}{2m}\left(\dfrac{3N}{8\pi V}\right)^{\frac{2}{3}}$

d) $\dfrac{\hbar^2}{2m}\left(\dfrac{3N}{8\pi V}\right)^{\frac{3}{2}}$

(20) The concept of matter wave was suggested by

a) Heisenberg
b) de Broglie
c) Schrodinger
d) Laplace

(21) The time period of a simple pendulum of infinite length is given by

a) finite
b) zero
c) infinite
d) none of these

(22) For a particle executing a SHM, the phase difference between displacement and velocity is

a) π
b) 0
c) $\dfrac{\pi}{2}$
d) $-\dfrac{\pi}{2}$

(23) The square of the magnitude of the wave function is called

a) current density

b) probability density

c) zero density

d) volume density

(24) The total probability of finding the particle in space must be

a) zero

b) unity

c) infinity

d) double

(25) The velocity of a particle executing SHM minimum at a point where displacement is

a) zero

b) maximum

c) midway between zero and maximum

d) none of these

(26) In case of critical damping, the motion of a system is

a) oscillatory

b) vibratory

c) harmonic

d) non-oscillatory

(27) The sum of all the microscopic form of energy is called

a) total energy

b) phase energy

c) system energy

d) internal energy

(28) Electron is a

a) Fermions

b) Boson

c) Boltzon

d) None of these

(29) The maximum energy that can be occupied by an electron is at

a) Fermi energy

b) Bohr energy

c) chemical potential

d) none of these

(30) The rest mass of photon is

a) zero

b) same as that of proton

c) infinity

d) none of these

(31) Six distinguishable particles are to be distributed into three cells. Find the number of different combinations of particles that can produce the distribution (4,1,1)

a) 1

b) 12

c) 20

d) 30

(32) When applied to solar radiation, Planck's law reduces to Wien's law in the

a) ultraviolet region

b) microwave region

c) infrared region

d) visible region

(33) MB statistics

a) obeys Pauli's exclusion principle

b) does not obeys Pauli's exclusion principle

c) Hund's principle

d) none of these

(34) Max Planck's great discovery was radiation energy is emitted in packets that he called

a) photons

b) gamma rays

c) quanta

d) wave functions

(35) In the Heisenberg uncertainty principle, which two measurable properties of a particle cannot be observed precisely at the same time?

a) spin and color

b) energy and torque

c) position and momentum

d) size and speed

(36) In Relativistic case, as the velocity of the particle approaches the speed of light, the Kinetic energy approaches

a) Zero

b) kinetic Energy as in Non-Relativistic case

c) rest Energy

d) infinite

(37) Energy released by a radiating surface is not continuous but is in the form of successive and separate packets of energy called

a) Photons

b) Protons

c) electrons
d) neutrons

(38) The emissivity can be defined as the ratio of

a) emissive power of real body to the emissive powe r of black body
b) emissive power of black body to the emissive po wer of real body

c) reflectivity of real body to emissive power of blac k body
d) reflectivity of black body to emissive power of re al body

(39) The energy of a particle moving in a one dimensional potential box is

a) Directly Proportional to the quantum number
b) Inversely Proportional to the quantum number

c) Directly Proportional to the square of the quantu m number
d) Inversely Proportional to the square of the quantu m number

(40) Which among the following are responsible for generating attenuation of an optical power in fibe r

a) Absorption
b) Scattering

c) Waveguide effect
d) All of these

(41) In the structure of fiber optic cable refractive index of core is always --------- the refractive index of cladding

a) less than
b) equal to

c) greater than
d) None of these

(42) Total internal reflection of light will take place if a ray of light is incident from

a) air to water
b) air to glass

c) water to glass
d) glass to water

(43) Optical fibre is related to

a) field of communication
b) light

c) agriculture
d) none of these

(44) A ray of light in a dense medium of refractive index 1.4 approaches the boundary between the gi ven medium and air at an anghe of $\theta = \sin^{-1}(0.8)$, then the ray will be

a) totally absorbed
b) internally reflected

c) emerging at an angle greater than $\sin^{-1}(0.8)$
d) showing an arbitrary behavior

(45) When light is reflected from glass at the polarizing angle,

a) the reflected and refracted rays are parallel
b) the reflected and refracted rays are perpendicular

c) the electric vector is perpendicular to the reflectin g plane
d) None of these

(46) When angle of incidence is greater than Brewster's angle, the reflected ray suffers a phase chang e of

a) π
b) $\dfrac{\pi}{2}$

c) 0
d) 2π

(47) The numerical aperture of an optical fibre whose core and cladding are made of materials of refra ctive index 1.6 and 1.5 respectively is

a) 0.55677
b) 55.77

c) 0.2458
d) 0.647852

(48) A step-index fibre has a numerical aperture of 0.26, a core refractive index of 1.5 and a core dia meter of 100 micrometer. Calculate the acceptance angle.

a) 1.47°
b) 15.07°

c) 2.18°
d) 24.15°

(49) When a beam of light enters one medium from another, the quantity which will not change

a) direction
b) speed

c) frequency
d) wavelength

(50) Which among the following is/are responsible for generating attenuation of an optical power in fi

ber

a) absorption
b) scattering

c) waveguide effect
d) all of these

(51) In He-Ne laser neon atoms get energy

a) on collision with He atoms
b) from chemical reactions

c) from electrical pumping
d) from optical pumping

(52) In lasing action, the spontaneous emission does not depend on

a) the number of atoms present in the excited state
b) the intensity of the incident light

c) both intensity and number of atoms
d) none of these

(53) In a ruby laser, population inversion is achieved by

a) optical pumping
b) inelastic atom-atom collision

c) chemical reaction
d) applying strong electric field

(54) The color of the laser output in ruby laser is

a) violet
b) blue

c) red
d) green

(55) For laser action to occur, the medium used must have at least

a) 4 energy levels
b) 2 energy levels

c) 3 energy levels
d) 5 energy levels

(56) The ratio of He to Ne in a He-Ne laser is of the order of

a) 1:15
b) 1:1

c) 1:10
d) 5:1

(57) Emission of photons due to transition of an electron from a higher to a lower energy state caused by external energy is known as

a) stimulated absorption
b) amplified emission

c) stimulated emission
d) spontaneous emission

(58)

An amplifier has gain of -1000 and feedback of β = -0.1. If it had a gain change of 20 % due to t will be the change in gain of the feedback amplifier?

a) 0.01
b) 0.02

c) 0.005
d) 0.002

(59) In a common emitter amplifier, the unbiased emitter resistance provides

a) voltage series feedback
b) voltage shunt feedback

c) current series feedback
d) current shunt feedback

(60) The advantages of negative feedback amplifier are

a) high input impedance
b) increase in gain stability

c) low output impedance
d) all of these

(61) A transconductance amplifier has

a) high input impedance and high output impedance
b) high input impedance and low output impedance

c) low input impedance and low output impedance
d) low input impedance and high input impedance

(62) The material that has the piezoelectric effect

a) quartz
b) Rochelle salt

c) tourmaline
d) all of these

(63) For a Wein bridge oscillator, the frequency f is given by

a)
b)

$$\frac{1}{2\pi\sqrt{RC}}$$ $$\frac{1}{\sqrt{2}\pi RC}$$

c) $$\frac{1}{2\pi RC}$$

d) $$\frac{2\pi}{RC}$$

(64) With zero volt on both inputs, an op-amp ideally should have an output voltage equal to

    a) Positive supply voltage   b) Negative supply voltage

    c) Zero   d) CMRR

(65) The common mode rejection ratio (CMRR) of a differential amplifier (where Ad = differential gain , Ac = common mode gain) is defined as

    a) Ad/Ac   b) (Ad- Ac)/ Ad

    c) 2 log 10 Ad/ Ac   d) 2 log e Ad/ Ac

(66) FET is advantageous over BJT because it is

    a) thermally more stable   b) it use one p-n junction

    c) it is a voltage controlled device   d) none of these

(67) A FET operates on

    a) majority carriers only   b) minority carriers

    c) positive and negative ions   d) positively charged ions

(68) When a JFET operates above pinch-off voltage,

    a) drain current remains constant   b) drain current increases rapidly

    c) drain current decreases gradually   d) depletion region becomes zero

(69) The differential gain of OPAMP is

    a) very high   b) very low

    c) dependent on input voltage   d) none of these

(70) The quality factor Q for an L-C-R circuit is

a) $$\frac{\omega R}{L}$$

b) $$\frac{\omega}{LR}$$

c) $$\frac{\omega L}{R}$$

d) $$\frac{R}{\omega L}$$