PHYSICS

1. The Coriolis force on a moving particle is

   (A) Perpendicular to ω and v
   (B) Parallel to ω and v
   (C) Parallel to ω and Perpendicular to v
   (D) Perpendicular to ω and Parallel to v

2. The output of the Ruby laser is

   (A) a pulsed wave
   (B) a continuous wave
   (C) a saw tooth wave
   (D) longitudinal wave

3. Second harmonic generation can occur in

   (A) Isotropic crystal
   (B) Crystals that lack inversion symmetry
   (C) Centro symmetric crystals
   (D) Crystals with inversion symmetry

4. The magnetic lines of force cannot penetrate the body of the superconductor. This phenomenon is known as

   (A) Isotope effect
   (B) Meissner effect
   (C) Josephson effect
   (D) Skin effect

5. Due to Doppler Effect, the shift in the wavelength observed is 0.1 A^o for a star producing an emission line at 6000A^o. The velocity of the recession of the star is then

   (A) 5 km/s
   (B) 2.5 km/s
   (C) 10 km/s
   (D) 20 km/s

6. The radius of the nucleus is the order of

(A) 10^{-10} m
(B) 10^{-19} m
(C) 10^{-15} m
(D) 10^{-6} m

7. Consider the nuclear reaction:

$_2He^4 + _ZX^A = _{Z+2}Y^{A+3} + W$

The W then denotes

(A) electron
(B) proton
(C) neutron
(D) positron

8. Which one of the following structures has the largest packing fraction?

(A) simple cubic
(B) body centered cubic
(C) face centered cubic
(D) all the above have the same packing fraction

9. Relaxation time of free electrons in a metal

(A) increases with temperature
(B) decreases with temperature
(C) is independent of temperature
(D) increases at low temperature but decreases at higher temperatures

10. Dulong and Petit's law breaks down seriously at

(A) room temperature
(B) low temperature
(C) high temperature
(D) triple point of water

11. The function of control rods in a nuclear reactor is to

(A) produce neutrons
(B) reduce the energy of the neutrons
(C) shield the reactor
(D) to absorb excess neutrons

12. The energy stored in a capacitor of 220 μF charged to 100 V is

(A) 10 ergs
(B) 1 J
(C) 1 erg
(D) 10 J

13. Differential form of Faraday's law is

(A) $\nabla \cdot E = 0$
(B) $\nabla \times E = 0$
(C) $\nabla \cdot E = \rho$
(D) $\nabla \times \vec{E} = -\frac{\partial B}{\partial t}$

14. A piezoelectric crystal can be used as a transducer for the measurement of

(A) Temperature
(B) Voltage
(C) Current
(D) Pressure

15. A molecule in the triplet state has a net electron spin of

(A) 3
(B) 1/2
(C) 1
(D) 0

16. Scintillation counter works on the principle of

(A) Compton effect
(B) photoelectric effect
(C) photo multiplication
(D) fluorescent effect

17. Which one of the following has a zero nuclear magnetic moment?

(A) ^{1}H
(B) ^{12}C
(C) ^{13}C
(D) ^{14}N

18. The H-R diagram of stars directly compares the following properties of stars

(A) Size and density
(B) Temperature and luminosity
(C) Density and luminosity
(D) Distance and temperature

19. One *parsec* is nearly equal to

(A) 0.32 light years
(B) 3.2 light years
(C) 32 light years
(D) 326 light years

20. If D is the diameter of the objective, then the angular resolution of a telescope is

(A) $\frac{1.22\lambda}{D}$

(B) $\frac{1.22D}{\lambda}$

(C) $\frac{D}{1.22\lambda}$

(D) $\frac{1.22D}{\sqrt{\lambda}}$

21. The van der Waals equation of state for a real gas is

(A) $\left(P + \frac{a}{V^2}\right)(V - b) = RT$

(B) $PV = RT$

(C) $\left(P - \frac{a}{V^2}\right)(V + b) = RT$

(D) $\left(P - \frac{a}{V^2}\right)(V - b) = RT$

22. A liquid crystal has

(A) both positional order and orientational order
(B) has neither positional order nor orientational order
(C) only orientational order and positional order is broken
(D) only positional order and orientational order is broken

23. The number of internal degrees of vibration that a linear molecule (with N number of atoms) can have is

(A) 3N
(B) 3N – 6
(C) 3N – 5
(D) 3N – 3

24. Which one of the following motions of CO_2 molecule is not IR inactive?

(A) Asymmetric stretching of O = C = O bonds
(B) Symmetric stretching of O ¿C¿O bonds
(C) Symmetric bending of O ¿C¿O bonds
(D) None of the above

25. Which one of the following relations represents Brewster's law (symbols have standard meaning)?

(A) $\mu = \frac{\sin i}{\sin r}$
(B) $I = I_O \cos^2 \theta$
(C) $\mu = \tan i$
(D) $2\mu t \cos r = n\lambda$

26. Chromatic aberration in a lens is a result of

(A) manufacturing defect
(B) unequal refraction of peripheral and central rays from the object
(C) dispersion
(D) material used

27. A diffusion pump

(A) can function starting from atmospheric pressure
(B) can function in series with an ion pump
(C) can function in isolation
(D) can function in series with a rotary pump

28. Pirani gauge for the measurement of low pressure is based on the principle of measurement of

(A) humidity of the medium
(B) electrical resistance of the medium
(C) thermal conductivity of the medium
(D) dielectric property of the medium

29. How is a J-K flip-flop made to toggle?

(A) J = 1, K = 1
(B) J = 1, K = 0
(C) J = 0, K = 1
(D) J = 0, K = 0

30. The binary number 110· 001 expressed in decimal number system is

(A) 6.3
(B) 6.125
(C) 6.001
(D) 0.625

31. The minimum potential difference between base and emitter required to switch silicon transistor ON is

(A) 1 V
(B) 3 V
(C) 5 V
(D) 4.2 V

32. If an AC voltmeter is connected between the neutral (N) and ground (E) pins of 220 V mains socket, it is likely to read

(A) a few volts
(B) 110 V
(C) 220 V
(D) will cause a short circuit

33. The resonant frequency of a circuit consisting of an inductor of inductance L and capacitor of capacitance C in series is

(A) $\sqrt{LC}$
(B) $\frac{1}{\sqrt{LC}}$
(C) $\sqrt{\frac{L}{C}}$
(D) $\sqrt{\frac{C}{L}}$

34. When the potential difference applied to the forward bias *pn*-junction is increased, the width of the depletion region

(A) increases
(B) decreases
(C) remains unchanged
(D) increases only on the *p*-side of the junction

35. The equation for thermionic current density in terms of work function of a metal is known as

(A) London equation
(B) Einstein equation
(C) Richardson-Dushman equation
(D) Drude-Lorentz equation

36. If the input wave form of an op-amp differentiator circuit is a triangular wave, then the output waveform will be

(A) Sine wave
(B) Triangular wave
(C) Square wave
(D) Spike

37. The circuit of an op-amp based first order low pass filter in the inverting amplifier configuration is similar to that of the circuit of

(A) a differentiator
(B) an integrator
(C) a comparator
(D) a differential amplifier

38. If the two inputs of an operational amplifier are short-circuited, then,

(A) the op-amp draws large current from power supply
(B) output voltage is zero
(C) output voltage oscillates between the positive and negative extremities
(D) output voltage latches to one of the extremities

39. Which one of the following substances has the highest thermal conductivity?

(A) Brass
(B) Steel
(C) Glass
(D) Copper

40. The total spin of a system consisting of two particles, each of which has spin ½, can have the values

(A) only 0
(B) only 1
(C) 0 and 1
(D) 0, 1 and 2

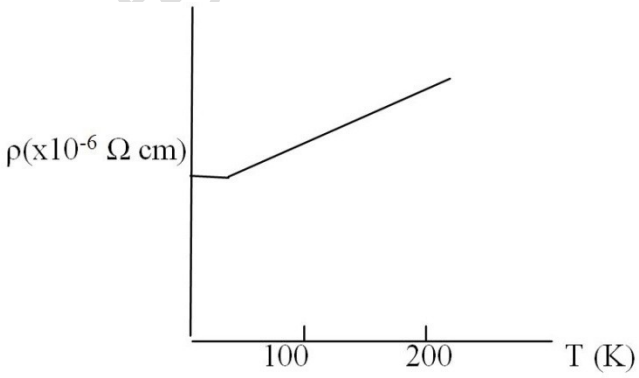
41. What kind of electromagnetic radiation has a wavelength of 10^{-10} m?

(A) radio waves
(B) visible light
(C) X-rays
(D) Gamma rays

42. The experimental method used most frequently for detecting magnetic structure of solids

(A) electron diffraction
(B) neutron diffraction
(C) X-ray diffraction
(D) light scattering

43. The temperature dependence of the electrical resistivity shown in the plot below refers to that of a



(A) Normal metal
(B) Ultra-pure metal
(C) Semiconductor
(D) Insulator

44. The Kelvin equivalent of Celsius-scale steam point of 100°C is

(A) 273.15 K
(B) 373.15 K
(C) 0 K
(D) 0.01 K

45. The process that occurs at constant pressure is

(A) adiabatic process
(B) isothermal process
(C) isobaric process
(D) isochoric process

46. What is the change in the internal energy in an isovolumetric process?

(A) 0
(B) Q
(C) Q + W
(D) W

47. Star A has twice the surface temperature of star B. Both can be assumed to have same radius and emissivity 1. The ratio of power output of star A to star B is

(A) 2:1
(B) 8:1
(C) 32:1
(D) 16:1

48. A system of gas possesses 2 degrees of freedom. The average kinetic energy of the system is

(A) $3/2\, k_B T$
(B) $1/2\, k_B T$
(C) $k_B T$
(D) $2\, k_B T$

49. The probability distribution function used in the kinetic theory of gases is

(A) Bernoulli distribution function
(B) Poisson distribution function
(C) Binomial distribution function
(D) Maxwell-Boltzmann distribution function

50. The entropy of the universe

(A) increases in all real processes
(B) decreases in all real processes
(C) increases in all reversible processes
(D) remains unchanged

51. A point source emits sound waves with an average power output of 80 W. The intensity 3 m from the source is

(A) 0.240 W/m^2
(B) 0.360 W/m^2
(C) 0.547 W/m^2
(D) 0.707 W/m^2

52. Superposition of two identical waves travelling in opposite direction results in

(A) constructive interference
(B) destructive interference
(C) standing wave
(D) diffraction pattern

53. In photoelectric effect, no electrons are emitted if

(A) the intensity of the incident light is below a cut-off value
(B) the frequency of the incident light is below a cut-off value
(C) the metal is heated
(D) the metal is cooled

54. Quantum tunnelling happens when the energy of the particle is

(A) greater than the barrier height
(B) lower than the barrier height
(C) equal to the barrier height
(D) zero

55. The potential energy of a magnetic dipole, at any angle θ relative to an external magnetic field is

(A) $-\mu B_{ext} \sin\theta$
(B) $-\mu B_{ext} \cos\theta$
(C) $\mu B_{ext} \cos\theta$
(D) $\mu B_{ext} \sin\theta$

56. The energy required to remove an electron from a given orbit to an infinite distance from the nucleus is called as

(A) ionisation potential
(B) excitation potential
(C) radiation potential
(D) resonance potential

57. According to wave mechanics, the orbital angular momentum of the electron is given by

(A) $P_l = \left[l(l+1) \right]^{-1/2} \hbar$
(B) $P_l = \left[l(l+1) \right]^{1/2} \hbar$
(C) $P_l = \left[l(l-1) \right]^{1/2} \hbar$
(D) $P_l = \left[l(-l+1) \right]^{1/2} \hbar$

58. The number of electrons that can be accommodated in a shell with a principal quantum number (n) is

(A) n
(B) $2n$
(C) $2n - 1$
(D) $2n^2$

59. The electric susceptibility of the dielectric material is

(A) $\chi_e = (\varepsilon_r - 1)$
(B) $\chi_e = (\varepsilon_0 - 1)$
(C) $\chi_e = (\varepsilon_0 - \varepsilon_r)$
(D) $\chi_e = (\varepsilon_r + 1)$

60. Methane molecule is an example for

(A) ionic polarization
(B) electronic polarization
(C) orientational polarization
(D) space-charge polarization

61. In a demagnetized ferromagnetic material, the magnetic domains are

(A) randomly oriented
(B) aligned parallel
(C) aligned perpendicularly
(D) aligned anti-parallel

62. In an iron cored coil, the iron core is removed so that the coil becomes an air cored coil. The inductance of the coil will

(A) increase
(B) decrease
(C) remain the same
(D) initially decrease and then increase

63. The excess of energy required to magnetize a specimen in a particular direction over that required to magnetize it along the easy direction is called

(A) anisotropy energy
(B) exchange energy
(C) magnetostrictive energy
(D) Bloch wall energy

64. Venturimeter works based on

(A) principle of Archimedes
(B) height of the liquid surface over the orifice
(C) Bernoulli's theorem
(D) equation of continuity

65. Raindrop falls near the surface of the earth with

(A) Terminal acceleration
(B) Terminal velocity
(C) Terminal retardation
(D) Varying velocity

66. If by applying a force the length of a body is changed, the corresponding stress is known as

(A) tensile stress
(B) bulk stress
(C) shearing stress
(D) compressive stress

67. Ignore the rotation of the earth. Which clock ticks more slowly?

(A) The one on the top of a mountain
(B) The one at the bottom of that same mountain
(C) They tick at the same rate
(D) Cannot be determined from the information given

68. As an object approaches the speed of light, its mass becomes

(A) zero
(B) double
(C) remains same
(D) infinite

69. The deviation of the charge distribution of the nucleus from the spherical symmetry can be estimated by measuring its

(A) electric charge
(B) electric dipole moment
(C) electric quadrupole moment
(D) magnetic dipole moment

70. Which of the following rays/waves are produced by nuclear reactions in the atom?

(A) Infrared rays
(B) Light waves
(C) X-rays
(D) Gamma rays

71. Elements having different atomic number and same atomic weight are called

(A) isotopes
(B) isobars
(C) isomers
(D) isotones

72. A Geiger-Muller tube is a

(A) gas ionization detector
(B) cloud chamber
(C) fluorescence detector
(D) spectrophotometer

73. A projectile fired from the ground follows a parabolic path. The speed of the projectile is …… at the top of its path.

(A) minimum
(B) maximum
(C) zero
(D) conserved

74. Sky looks blue because the sun light experiences

(A) Rayleigh Scattering
(B) Compton Scattering
(C) Tyndall Scattering
(D) Inelastic Scattering

75. Electroluminescence occurs in

(A) Electrical conductors
(B) Insulators
(C) p-n junction
(D) metals

76. Working principle of Pyrometer is based on

(A) Piezoelectric effect
(B) Photoconduction
(C) Thermal emission
(D) Kerr effect

77. Flow of electrons in crystalline solids is affected by the following

(A) Thermal vibrations
(B) Dopants
(C) Crystal defects
(D) All the above

78. Kilowatt hour (kWh) is the unit of

(A) electric power
(B) electric current
(C) electric charge
(D) electric energy

79. Two heating wire of equal length are first connected in series and then in parallel. The ratio of heat produced in the two cases is

(A) 2:1
(B) 1:2
(C) 4:1
(D) 1:4

80. A stick immersed in water appears broken due to

(A) reflection
(B) refraction
(C) total internal reflection
(D) dispersion

81. The final image produced by a simple microscope is

(A) real diminished and inverted
(B) real and erect
(C) virtual magnified and erect
(D) virtual and inverted

82. Twinkling of star is due to

(A) periodic bursts of light from the star
(B) variation in luminosity of stars
(C) partial absorption of light in the atmosphere
(D) refractive index fluctuations in the atmosphere

83. Sound travel in air as

(A) longitudinal waves
(B) transverse waves
(C) electromagnetic waves
(D) matter waves

84. In n- type semiconductors, the number of holes

(A) is equal to the number of electrons
(B) is greater than the number of electrons
(C) is less than the number of electrons
(D) depends on the dopant

85. An electric current of 10 A is same as

(A) $10\ JC^{-1}$
(B) $10\ VC^{-1}$
(C) $10\ Cs^{-1}$
(D) $10\ Ws^{-1}$

86. Without a change in mass, when the radius of earth shrinks, acceleration due to gravity at the pole and equator will

(A) decrease
(B) increase
(C) increase, decrease
(D) remains the same

87. Which of the following phenomena will not take place in acoustics in air medium?

(A) Reflection
(B) Polarization
(C) Interference
(D) Diffraction

88. Equation of motion of a person moving by his car is $x = 6t^2 + 4t + 3$, with x as distance travelled (meter) and t as time taken (seconds). The acceleration of the car after 30 seconds is

(A) $12\ ms^{-2}$
(B) $360\ ms^{-2}$
(C) $120\ ms^{-2}$
(D) $36\ ms^{-2}$

89. Cooking utensils are good examples of heat transfer by

(A) convection
(B) conduction
(C) radiation
(D) Both (A) and (B)

90. Two bodies of different temperature are mixed together in calorimeter. Which of the following is conserved?

(A) Total heat
(B) Internal energy
(C) Total internal energy

(D) Sum of temperature

91. A tangent galvanometer is connected directly to an ideal battery. If the number of turns in the coil is doubled, the deflection will be

(A) unchanged
(B) decreased
(C) increased
(D) at zero

92. Which of the following combination of inductance (L), Capacitance (C) and Resistance (R) gives dimensions of frequency?

(A) L/RC
(B) $1/RC$
(C) $1/LC$
(D) LC/R

93. A convex mirror gives an image which is

(A) virtual and erect
(B) real and erect
(C) real and invert
(D) virtual and inverted

94. For the given azimuthal quantum number $l = 3$, the total number of different possible values of magnetic azimuthal quantum number m_l is

(A) 7
(B) 5
(C) 3
(D) 9

95. When trivalent impurity is substituted for a silicon atom, it gives rise to

(A) intrinsic semiconductor
(B) wide bandgap semiconductor
(C) p–type semiconductor
(D) n–type semiconductor

96. Which of the following flip – flops do not have race problem?

(A) JK
(B) T
(C) D

(D) Master – Slave

97. How many possibilities will result in HIGH state of a 3 - input AND gate?

(A) 1
(B) 2
(C) 4
(D) 8

98. Which of the following codes is known as the 8241 code?

(A) ASCII
(B) Gray
(C) BCD
(D) Excess – 3

99. The total number of atom per unit cell in bcc lattice is

(A) 1
(B) 2
(C) 3
(D) 4

100. The particles responsible for the origin of the nuclear force are

(A) baryons
(B) photons
(C) leptons
(D) mesons

101. A pendulum of length *L* supporting mass m swings back and forth with time period *T*. When the mass is doubled, the new period is

(A) $4T$
(B) $2T$
(C) T
(D) $\frac{T}{2}$

102. Which of the following is sum of products form?

(A) (AB) (CD)
(B) (A + B) (C + D)
(C) AB + CD
(D) (A) B (CD)

103. Which of the following is paramagnetic?

(A) Iron
(B) Cobalt
(C) Nickel
(D) Copper

104. Which one of the following is not a transition element?

(A) Fe
(B) Na
(C) W
(D) Cu

105. If $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$, then the angle between $\vec{A}$and $\vec{B}$ is

(A) $\frac{\pi}{2}$

(B) $\frac{\pi}{3}$

(C) π

(D) $\frac{\pi}{4}$

106. The product of momentum of inertia and angular acceleration is

(A) force
(B) torque
(C) work
(D) angular momentum

107. Which of the following substances possesses the highest elasticity?

(A) Rubber
(B) Glass
(C) Steel
(D) Copper

108. The molar specific heat at constant pressure for a mono-atomic gas is

(A) $\frac{3}{2}R$

(B) $\frac{5}{2}R$

(C) $\frac{7}{2}R$

(D) $4R$

109. Which of the following law states that good absorbers of heat are good emitters?

(A) Stefan's law
(B) Kirchhoff's law
(C) Planck's law
(D) Wine's law

110. Out of Ag, Cu, Al, which one is highest thermal conductor?

(A) Ag
(B) Cu
(C) Al
(D) All have same thermal conductivity

111. A body at 1500 K emits maximum energy at a wavelength 20000 Å. If the sun emits the maximum energy at wavelength 5000 Å, then the temperature of the sun is

(A) 3000 K
(B) 6000 K
(C) 8000 K
(D) 1200 K

112. In the following, which one represents a plane progressive wave?

(A) $y = \frac{1}{a}\sin \omega t$

(B) $y ¿ a \sin\ (\omega t - kr ¿$

(C) $y = \frac{a}{\sqrt{r}}\sin (\omega t - kr ¿$

(D) $y = \frac{a}{r}\sin (\omega t - kr ¿$

113. A Sound wave travels from air to water. Which one of the following quantity remains invariant?

(A) Wavelength
(B) Intensity
(C) Frequency
(D) Velocity

114. The distance between a node and its nearest antinode in a stationary wave is

(A) λ

(B) $\frac{\lambda}{2}$

(C) $\frac{\lambda}{4}$

(D) 2λ

115. Three resistance each of 4 Ω are connected in the form of an equilateral triangle. The effective resistance between any two corners is

(A) $\left(\frac{3}{8}\right)\Omega$

(B) $\left(\frac{8}{3}\right)\Omega$

(C) 8 Ω

(D) 12 Ω

116. A potentiometer is superior to a voltmeter for measuring a potential because

(A) the voltmeter has high resistance
(B) the resistance of the potentiometer wire is quite low
(C) the potentiometer does not draw any current from the unknown source of emf to be measured
(D) the sensitivity of potentiometer is higher than that of the voltmeter

117. Magnetic lines of force produced by current following in a circular wire are

(A) parallel to the plane of the coil
(B) perpendicular to the plane of the coil everywhere
(C) perpendicular to the plane of the coil at the center
(D) perpendicular to the plane of the coil outside the coil

118. In Bohr's hydrogen atom model, the radius of the stationary orbit is directly proportional to

(A) n^{-1}
(B) n
(C) n^{-2}
(D) n^2

119. Which one of the series of hydrogen spectrum is in the visible region?

(A) Lyman series
(B) Balmer series
(C) Paschen series
(D) Brackett series

120. The control rod in a nuclear reactor is

(A) Uranium
(B) Cadmium
(C) Graphite
(D) Platinum

121. The expectation value of momentum p is

(A) $\int \psi^{¿} \psi \left(\frac{h}{i}\nabla\right) d\psi$

(B) $\int \frac{h}{i}\nabla(\psi ¿¿¿¿\psi) d\psi ¿¿$

(C) $\int \psi^{¿} \left(\frac{h}{i}\nabla\right) \psi\, d\psi$

(D) $\int \psi \left(\frac{h}{i}\nabla\right) \psi^{¿} d\psi$

122. A diode that has a negative resistance characteristic is the

(A) Schottky diode
(B) tunnel diode
(C) laser diode
(D) hot-carrier diode

123. Michelson and Morley experiment was conducted to know

(A) velocity of light
(B) absolute frame of reference
(C) speed of earth rotation
(D) permittivity of free space

124. The velocity at which the mass of a particle becomes 4 times of the rest mass will be

(A) $2.2 \times 10^8\,\mathrm{ms}^{-1}$
(B) $2.4 \times 10^8\,\mathrm{ms}^{-1}$
(C) $1.5 \times 10^8\,\mathrm{ms}^{-1}$

(D) $2.9 \times 10^8\,ms^{-1}$

125. Maximum kinetic energy of the photoelectrons emitting from a metal surface depends upon

(A) the intensity of the incident light
(B) the wavelength of the incident light
(C) the polarization of the incident light
(D) nature of the incident radiation

126. A stone is released from an elevator going up with an acceleration 'a'. Then the acceleration of the stone after the release is

(A) 'a' upward
(B) (g-a) upward
(C) (g-a) downward
(D) 'g' downward

127. When an object follows a curved path, the following quantities may remain constant during the motion

(A) Speed
(B) velocity and acceleration
(C) Magnitude of acceleration
(D) Both (A) and (C)

128. The displacement of a particle is given by $x = A(\vec{i}\cos\omega t + \vec{j}\sin\omega t)$. The motion of the particle is

(A) simple harmonic
(B) on a straight line
(C) on a circle
(D) with constant acceleration

129. Bernoulli theorem is based on conservation of

(A) momentum
(B) mass
(C) energy
(D) angular momentum

130. The refractive index of glass is 1.5. What is the speed of light in glass?

(A) $3 \times 10^8\ ms^{-1}$

(B) 2×10^8 ms^{-1}
(C) 1.5×10^8 ms^{-1}
(D) 1.0×10^8 ms^{-1}

131. The wave fronts of light coming from a distant source of unknown shape are nearly

(A) plane
(B) elliptical
(C) cylindrical
(D) spherical

132. A double convex lens has two surfaces of equal radius R and refractive index $m = 1.5$. Then its focal length is

(A) $f = R/2$
(B) $f = R$
(C) $f = -R$
(D) $f = 2R$

133. A source emits 45 J of energy in 15 s. When is the radiant flux of the source?

(A) 3 W
(B) 6 W
(C) 0.33 W
(D) 135 W

134. The trace of a 2 × 2 matrix is 4 and its determinant is 8, if one of the Eigen values is $2(1 + i)$, the other Eigen value is

(A) $2(1 - i)$
(B) $2(1 = i)$
(C) $(1 + 2i)$
(D) $(1 - 2i)$

135. The solution of the Boolean equation $Y = \overline{A+B} + \overline{AB}$ is

(A) 1
(B) $\overline{AB}$
(C) $\overline{A}\ \overline{B}$
(D) $\overline{A} + \overline{B}$

136. The number of crystal systems and the number of Bravais lattice's are respectively

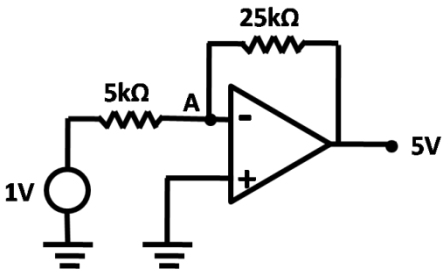
(A) 14 and 7
(B) 7 and 32

(C) 32 and 14
(D) 7 and 14

137. $\frac{dy}{dx} = \frac{-y}{x}$ is a differential equation of

(A) circle
(B) ellipse
(C) parabola
(D) hyperbola

138. In an ideal op amp given below the potential at node A is



(A) 1 V
(B) 0 V
(C) 5 V
(D) 25 V

139. Relativistic gravity is a warping of

(A) equivalence
(B) space
(C) time
(D) space-time

140. With the rise of temperature, the velocity of sound

(A) remains the same
(B) decreases
(C) increases
(D) is independent of temperature

141. Physical quantities in quantum mechanics are represented by Hermitian matrices because

(A) they are square matrices
(B) their diagonal elements are real
(C) their eigen values are real
(D) their determinants are real

142. In a silver atom, the outer most orbit is labelled as $5s^1$. If a beam of silver atoms are sent through an inhomogeneous magnetic field, then the beam

(A) is split into 5 beams
(B) is split into 4 beams
(C) is split into 2 beams
(D) does not split

143. Which of the following conditions would lead to non-stationary interference pattern?

(A) Sources are partially coherent
(B) Sources have different amplitudes
(C) Sources have different polarizations
(D) Sources have slightly different frequencies

144. The relation between Brewster's angle (θ_B) and Critical angle (θ_C**)** corresponding to external and internal reflection is

(A) $\theta_B + \theta_C = 90°$
(B) $\theta_B - \theta_C = 90°$
(C) $\theta_B = \theta_C$
(D) $\theta_B > \theta_C + 90°$

145. The mean free path of a gas molecule varies with temperature as

(A) T
(B) T^{-1}
(C) T^2
(D) does not depend on temperature

146. In producing cooling by adiabatic demagnetization we use

(A) Insulator
(B) Paramagnetic substance
(C) Diamagnetic substance
(D) Ferromagnetic substance

147. The band gap (Eg) value of Silicon (Si) at 300 K is

(A) 0.785 eV
(B) 0.815 eV
(C) 0.91 eV
(D) 1.1 eV

148. What is the working principle of light emitting diode?

(A) Light emitting diode works under forward bias with radiative transition
(B) Light emitting diode works under reverse bias with radiative transition
(C) Light emitting diode works under forward bias with non-radiative transition
(D) Light emitting diode works under reverse bias with non-radiative transition

149. Phase shift oscillator generates

(A) Square wave
(B) Triangle wave
(C) Sine wave
(D) Saw-tooth wave

150. The ratio between the thermal and electrical conductivities of all metals is

(A) a constant at all temperature
(B) inversely proportional to temperature
(C) proportional to temperature
(D) proportional to square of the temperature

ANSWER KEY

Subject Name: 613 PHYSICS

SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key
1	A	31	A	61	A	91	C	121	C
2	A	32	A	62	B	92	B	122	B
3	B	33	B	63	A	93	A	123	B
4	B	34	B	64	C	94	A	124	D
5	A	35	C	65	B	95	D	125	B
6	C	36	C	66	A	96	D	126	D
7	C	37	B	67	B	97	A	127	D
8	C	38	B	68	D	98	C	128	C
9	A	39	D	69	C	99	B	129	C
10	B	40	C	70	D	100	D	130	B
11	D	41	C	71	B	101	C	131	A
12	B	42	B	72	A	102	C	132	B
13	B	43	A	73	A	103	D	133	A
14	D	44	B	74	A	104	B	134	A
15	C	45	C	75	C	105	C	135	D
16	D	46	B	76	C	106	B	136	D
17	B	47	D	77	D	107	C	137	D
18	B	48	C	78	D	108	B	138	B
19	B	49	D	79	C	109	B	139	D
20	C	50	A	80	B	110	A	140	C
21	A	51	D	81	C	111	B	141	C
22	C	52	C	82	D	112	B	142	C
23	C	53	B	83	A	113	C	143	D
24	B	54	B	84	C	114	C	144	A
25	C	55	B	85	C	115	B	145	A
26	C	56	A	86	B	116	C	146	B
27	D	57	B	87	B	117	C	147	D
28	C	58	D	88	A	118	D	148	A
29	A	59	A	89	B	119	B	149	C
30	B	60	C	90	C	120	B	150	C