

PART III

21 - PHYSICS

(Answer ALL questions)

56. The minimum value of angular momentum by coupling three angular momenta 1, $\frac{3}{2}$ and $\frac{5}{2}$ is
- 5
 - $\frac{1}{2}$
 - 0
 - 1
57. The direction of vector in space is specified by
- One angle
 - Two angle
 - Three angle
 - No angle
58. The resultant of two forces of equal magnitudes is also equal to the magnitude of the forces. The angle between the two forces is
- 30
 - 60
 - 90
 - 120
59. If a car is moving forward, what is the direction of the moment of the moment caused by the rotation of the tires?
- It is heading inwards, i.e. the direction is towards inside of the car
 - It is heading outwards, i.e. the direction is towards outside of the car
 - It is heading forward, i.e. the direction is towards the forward direction of the motion of the car
 - It is heading backward, i.e. the direction is towards the back side of the motion of the car
60. For a body moving in a circular path, the work done by the centripetal force is
- Negative
 - Positive
 - Constant
 - Zero
61. Which of the following is not a conservative force?
- Elastic force
 - Gravitational force
 - Force of friction
 - Electrostatic force
62. Calorie is defined as the amount of heat required to raise the temperature of 1g of water by 1°C and it is defined under which of the following conditions?
- From 14.5°C to 15.5°C at 760mm of Hg
 - From 98.5°C to 99.5°C at 760mm of Hg
 - From 13.5°C to 14.5°C at 76mm of Hg
 - From 3.5°C to 4.5°C at 76mm of Hg
63. Specific heat capacity of a substance is equal to
- the amount of heat required to raise the temperature of a 1 kg of a substance by 1 K
 - the amount of heat required to raise the temperature of a substance by 1 K
 - the amount of heat required to change the phase of a substance from solid to liquid without any change in temperature
 - the amount of heat required to change the phase of a substance from liquid to gas without any change in temperature

64. The rate equation used to describe the mechanism of convection is called Newton's law of cooling. So rate of heat flow by convection doesn't depend on
- Convective heat transfer coefficient
 - Surface area through which heat flows
 - Time
 - Temperature potential difference
65. A sound source with a frequency of 790Hz moves away from a stationary observer at a rate of 15m/s. What frequency does the observer hear? The speed of sound is 340m/s.
- 655 Hz
 - 757 Hz
 - 775 Hz
 - 826 Hz
66. A Michelson interferometer is illuminated with monochromatic light, when one of the mirrors is moved through a distance of $25.3 \mu\text{m}$, 92 fringes pass through the cross wires. The wavelength of the monochromatic light is
- 500nm
 - 550nm
 - 600nm
 - 650nm
67. Consider two wires X and Y. The radius of wire X is 3 times the radius of Y. If they are stretched by the same load then the stress on Y is
- Equal to that on X
 - Thrice that on X
 - Nine times that on X
 - Half that on X
68. With an increase in temperature, the viscosity of liquid and gas, respectively will
- Increase and increase
 - Increase and decrease
 - Decrease and increase
 - Decrease and decrease
69. Which of the following is not a scalar?
- Viscosity
 - Surface tension
 - Pressure
 - Stress
70. The wettability of a surface by a liquid depends primarily on
- Viscosity
 - Surface tension
 - Density
 - Angle of contact between the surface and the liquid
71. Let $2.4 \times 10^{-4} \text{ J}$ of work is done to increase the area of a film of soap bubble from 50 cm^2 to 100 cm^2 . Calculate the value of surface tension of soap solution.
- $2.4 \times 10^{-2} \text{ Nm}^{-1}$
 - $24 \times 10^{-2} \text{ Nm}^{-1}$
 - $24 \times 10^{-1} \text{ Nm}^{-1}$
 - $2.4 \times 10^{-3} \text{ Nm}^{-1}$
72. Which charge configuration produces a uniform electric field?
- point Charge
 - Infinite uniform line charge
 - Uniformly charged infinite plane
 - Uniformly charged spherical shell

73. A parallel plate capacitor stores a charge Q at a voltage V . Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?
- Capacitance
 - Charge
 - Voltage
 - Energy density
74. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 electrons from A to B is
- $8.80 \times 10^{-17} \text{ J}$
 - $-8.80 \times 10^{-17} \text{ J}$
 - $4.40 \times 10^{-17} \text{ J}$
 - $5.80 \times 10^{-17} \text{ J}$
75. Two identical conducting balls having positive charges q_1 and q_2 are separated by a center to center distance r . If they are made to touch each other and then separated to the same distance, the force between them will be
- less than before
 - same as before
 - more than before
 - zero
76. An electric dipole is placed at an alignment angle of 30° with an electric field of $2 \times 10^5 \text{ NC}^{-1}$. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is
- 4 mC
 - 8 mC
 - 5 mC
 - 7 mC
77. Calculate the number of electrons in one coulomb of negative charge
- 6.25×10^{18}
 - 6.25×10^{17}
 - 1.6×10^{-18}
 - 1.6×10^{-19}
78. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10Ω is
- 0.2Ω
 - 0.5Ω
 - 0.8Ω
 - 1.0Ω
79. Circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is
- 1.0 A.m^2
 - 1.2 A.m^2
 - 0.5 A.m^2
 - 0.8 A.m^2
80. When the current changes from +2A to -2A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is
- 0.2 H
 - 0.4 H
 - 0.8 H
 - 0.1 H
81. Among Si and GaAs,
- both are direct bandgap materials
 - both are indirect bandgap materials
 - Si is direct while GaAs is indirect
 - Si is indirect while GaAs is direct

82. Which of the following exhibits spontaneous magnetization?
- Paramagnetic material
 - Ferrimagnetic material
 - Diamagnetic material
 - Ferromagnetic material
83. Which phenomenon is best explained by the particle nature of light?
- The Doppler Effect
 - Polarization
 - The photoelectric effect
 - Interference
84. Which color of light has the greatest energy per photon?
- Blue
 - Green
 - Violet
 - Red
85. Proton has a mass,
- 1637 times of an electron
 - 1737 times of an electron
 - 1837 times of an electron
 - 1937 times of an electron
86. Weak nuclear forces act on _____
- Both hadrons and leptons
 - Hadrons only
 - All particles
 - All charged particles
87. A semiconductor is formed by _____ bonds.
- Covalent
 - Electrovalent
 - Co-ordinate
 - None of the above
88. Semiconductor has _____ temperature coefficient of resistance.
- Positive
 - Zero
 - Negative
 - None of the above
89. When a pure semiconductor is heated, its resistance _____
- Goes up
 - Goes down
 - Remains the same
 - None of the above
90. When a pentavalent impurity is added to a pure semiconductor, it becomes _____
- An insulator
 - An intrinsic semiconductor
 - p-type semiconductor
 - n-type semiconductor
91. Addition of pentavalent impurity to a semiconductor creates many _____
- Free electrons
 - Holes
 - Valence electrons
 - Bound electrons
92. A pn junction acts as a _____
- Controlled switch
 - Bidirectional switch
 - Unidirectional switch
 - None of the above
93. The emitter of a transistor is _____ doped
- lightly
 - heavily
 - moderately
 - none of the above

94. The input impedance of a transistor is _____
- high
 - low
 - very high
 - almost zero
95. A Zener diode is used as _____
- an amplifier
 - a voltage regulator
 - a rectifier
 - a multivibrator
96. An oscillator produces _____ oscillations
- Damped
 - Undamped
 - Modulated
 - None of the above
97. The inputs of a NAND gate are connected together. The resulting circuit is _____
- OR gate
 - AND gate
 - NOT gate
 - None of the above
98. The universal gate is _____
- NAND gate
 - OR gate
 - AND gate
 - None of the above
99. Which of the following theories cannot be explained by classical theory?
- Electron theory
 - Lorentz theory
 - Photo-electric effect
 - Classical free electron theory
100. Thermal conductivity is due to
- Photons only
 - phonons and free electrons
 - free electrons only
 - phonons only
101. What happens when a material is heated?
- magnetized
 - density increases
 - it expands
 - young's modulus increases
102. Which of the following is an effective coolant?
- Oil
 - Mercury
 - Water
 - Acids
103. A completely filled band is called
- Conduction band
 - Valence band
 - Forbidden band
 - Core band
104. Which one has the greatest energy gap?
- Semiconductor
 - Conductor
 - Metals
 - Insulators
105. How does ionic polarisation occur?
- Splitting of ions
 - Passing magnetic field
 - Displacement of cations and anions
 - Never occurs

106. When does a dielectric become a conductor?
- At avalanche breakdown
 - At high temperature
 - At dielectric breakdown
 - In the presence of magnetic field
107. Which of the following materials exhibit Ferro-electricity?
- Iron
 - Platinum
 - Hydrogen
 - Rochelle salt
108. The superconducting materials will be independent of which of the following?
- Magnetic field
 - Electric field
 - Magnetization
 - Temperature
109. The superconducting state is perfectly _____ in nature.
- Diamagnetic
 - Paramagnetic
 - Ferromagnetic
 - Ferrimagnetic
110. The binding energy for a Cooper pair is
- 10^{-2} eV
 - 10^{-4} eV
 - 10^{-6} eV
 - 10^{-8} eV
111. The magnetic lines of force cannot penetrate the body of a superconductor, a phenomenon is known as
- Isotopic effect
 - BCS theory
 - Meissner effect
 - London theory
112. Which of the following conductor has highest critical temperature?
- Aluminium
 - Zinc
 - Molybdenum
 - Tin
113. Coating the nano crystals with the ceramics is carried that leads to _____
- Corrosion
 - Corrosion resistant
 - Wear and tear
 - Soft
114. Which of the following are the most common coordination numbers for ceramic materials?
- 2 and 3
 - 6 and 12
 - 6, 8 and 12
 - 4, 6 and 8
115. Carbon nano tubes are also called as _____
- Bucky tubes
 - Bulky tubes
 - Bulk tubes
 - Buck balls