PHYSICS

1. The Coriolis force on a moving particle is

|  |  |
| --- | --- |
| (A) | Perpendicular to ω and |
| (B) | Parallel to ω and |
| (C) | Parallel to ω and Perpendicular to |
| (D) | Perpendicular to ω and Parallel to |

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 Ao for a star producing an emission line at 6000Ao. 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:

2He4 **+** ZXA = Z**+**2YA**+**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) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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) | 1H |
| (B) | 12C |
| (C) | 13C |
| (D) | 14N |

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) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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

|  |  |
| --- | --- |
| (A) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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 CO2 molecule is not IR inactive?

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

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

|  |  |
| --- | --- |
| (A) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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 |

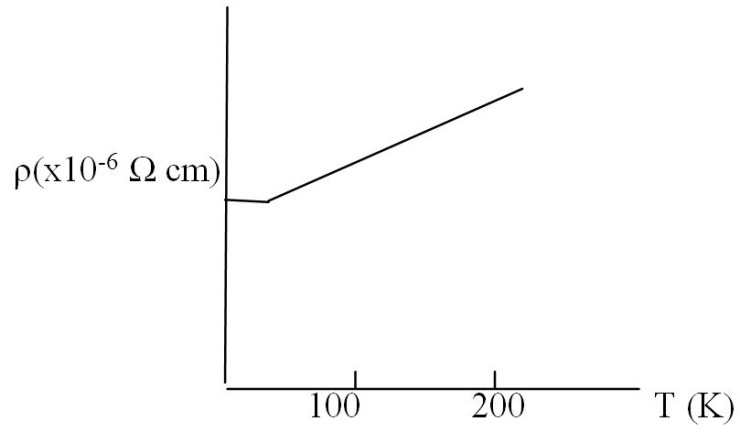
41. What kind of electromagnetic radiation has a wavelength of 10–10 m?

|  |  |
| --- | --- |
| (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) | kBT |
| (B) | kBT |
| (C) | kBT |
| (D) | 2 kBT |

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/m2 |
| (B) | 0.360 W/m2 |
| (C) | 0.547 W/m2 |
| (D) | 0.707 W/m2 |

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) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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

|  |  |
| --- | --- |
| (A) | *n* |
| (B) | 2*n* |
| (C) | 2*n* – 1 |
| (D) | 2*n*2 |

59. The electric susceptibility of the dielectric material is

|  |  |
| --- | --- |
| (A) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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* = 6*t*2 **+** 4*t* **+** 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) | 4*T* |
| (B) | 2*T* |
| (C) | *T* |
| (D) |  |

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 **×** = **×** , then the angle between and is

|  |  |
| --- | --- |
| (A) |  |
| (B) |  |
| (C) | π |
| (D) |  |

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) | *R* |
| (B) | *R* |
| (C) | *R* |
| (D) | 4 *R* |

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 5000Å, 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) |  |
| (B) | *y* |
| (C) |  |
| (D) |  |

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) |  |
| (C) |  |
| (D) | 2 𝜆 |

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) | Ω |
| (B) | Ω |
| (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) |  |
| (B) |  |
| (C) |  |
| (D) |  |

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 **×** 108 ms–1 |
| (B) | 2.4 **×** 108 ms–1 |
| (C) | 1.5 **×** 108 ms–1 |
| (D) | 2.9 **×** 108 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*( cos **+** sin ). 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 **×** 108 ms–1 |
| (B) | 2 **×** 108 ms–1 |
| (C) | 1.5 **×** 108 ms–1 |
| (D) | 1.0 **×** 108 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 =* 2*R* |

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 **+** 2*i*) |
| (D) | (1 – 2*i*) |

135. The solution of the Boolean equation Y = + is

|  |  |
| --- | --- |
| (A) | 1 |
| (B) |  |
| (C) |  |
| (D) | + |

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. 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 . 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 (θB) and Critical angle (θC**)** corresponding to external and internal reflection is

|  |  |
| --- | --- |
| (A) | θB + θC = 90° |
| (B) | θB – θC = 90° |
| (C) | θB = θC |
| (D) | θB ˃ θC + 90° |

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

|  |  |
| --- | --- |
| (A) | T |
| (B) | T–1 |
| (C) | T2 |
| (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 |

