Physics PG (Final)

1. How much of energy is to be added to an ice cube of 200 grams at 0^oC to convert to water at same temperature?

   A. 6.69 kJ

   B. 66.9 kJ

   C. 6.69 kCal

   D. 66.9 kCal

2. The actual work done by a heat engine in one hour is 2.7×10^6 Joules, while the frictional losses in the engine are 6×10^5 Joules. The engine operates between temperature of 500 K and 1000 K. What is the overall efficiency of the engine?

   A. 50%

   B. 4.5%

   C. 41%

   D. 25%

3. Light of wavelength 497 nm appears to have a wavelength of 500.2 nm when it reaches earth from a distant star. What is the velocity of the star if the velocity of light is 3×10^8 m/s?

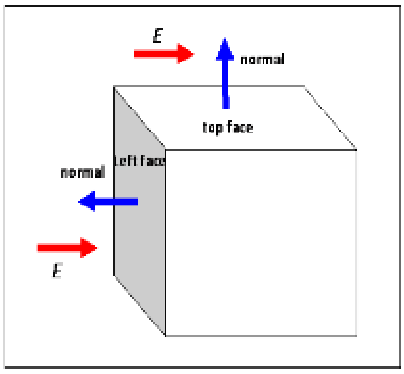
   A. 2×10^6 m/s

   B. 10^8 m/s

   C. 9.6×10^8 m/s

   D. 10^7 m/s

4. A cube of 1 cm side is placed in an electric field of 100 N/C. What will be the net flux through the cube if the electric field is perpendicular to the left face of the cube?



A. 0

B. 100 N/C

C. 50 N/C

D. 1 N/C

5. A total electric charge of 8 nC is distributed uniformly over the surface of a metal sphere of radius 27 cm. If the potential is zero at a point at infinity, what will be the potential at a point 8 cm from the centre of the sphere?

A. 266 volts

B. 138 volts

C. 100 volts

D. 500 volts

6. What must be the charge of a particle of mass 5 grams be for it to remain stationary when placed in a down ward directed electric field of magnitude 800 N/C?

A. 0.0000613 C

B. – 0.0000613 C

C. 0.0000160 C

D. – 0.0000160 C

7. Two long straight wires carrying a current **I** and separated by a distance **r** exert a force **F** on each other. If the current is increased to **4I** and the distance reduced to **r/6**, then the force between the wires will be

A. F

B. 1.5 F

C. 96 F

D. 576 F

8. A person stands 40 m from a flag pole. The angle at the top of the flag pole with the horizontal at eye is 25^{o}. What is the height of the flag pole, if the distance between the eye of the person to his feet is 1.8 m?

A. 20.4 m

B. 200.4 m

C. 40 m

D. 400 m

9. A capacitance of 0.4 μF is connected to an alternating emf of 100 Hz. What is the capacitive reactance?

A. 3981 Hernries

B. 3981 ohms

C. $\sqrt{3981}$ ohms

D. $\sqrt{3981}$ Henries

10. How many protons, neutrons and electrons are there in ^{3}He ?

A. 2, 1, 2

B. 3, 2, 2

C. 2, 3, 2

D. 3, 2, 3

11. The binding energy per nucleon for ^{238}U is about 7.6 MeV, while it is about 8.6 MeV for nuclei of half that mass. If a ^{238}U nucleus were to split into two equal size nuclei, about how much energy would be released in the process?

A. 476 MeV

B. 238 MeV

C. 119 MeV

D. 0 MeV

12. Three forces acting on a particle are given by $F_1 = 20\mathbf{i} - 36\mathbf{j} + 73\mathbf{k}$ N, $F_2 = -17\mathbf{i} + 21\mathbf{j} - 46\mathbf{k}$ N and $F_3 = -12\mathbf{k}$ N. What is the magnitude of the resultant force?

A. 21.4 N

B. 3 N

C. –3 N

D. –21.4 N

13. When a mass of 400 grams is hung at the end of a vertical spring, the spring stretches 30 cm. What is the spring constant of the spring?

A. 13.07 N.m

B. 13.07 N/m

C. 133.3 N.m

D. 133.3 N/m

14. A 20 g piece of aluminum $(c = 0.21\ cal/g.^{o}C)$ at 90°C is dropped into a cavity in a large block of ice at 0°C. How much ice does the aluminum melt?

A. 47 g

B. 0.47 g

C. 20 g

D. 4.7 g

15. Efficiency of a heat engine is defined as

A. ratio of heat input and work output

B. product of heat input and work output

C. ratio of work output and heat input

D. ratio of work input and heat output

16. A conductor has a resistance of 1 ohm if the current in it is 1 ampere for a potential difference of 1 volt. This is

A. Ohm's law

B. Gauss law

C. Coulumb's law

D. Lenz's law

17. A material evaporates when

A. its melting point is higher than room temperature

B. its vapor pressure is less than atmospheric pressure

C. its vapor pressure is higher than atmospheric pressure

D. its melting point is less than room temperature

18. On a rainy day, thin oil films on water show different colours, due to

A. dispersion

B. interference

C. polarization

D. diffraction

19. The Laplace transform of the function $e^{-\alpha t}$ has the form

A. $1/(s+\alpha)$

B. $1/s(s+\alpha)$

C. α/s

D. $(s+\alpha)$

20. What energy transformation takes place when ice is converted to water?

A. heat energy to latent heat

B. heat energy to potential energy

C. heat energy to kinetic energy

D. kinetic energy to heat energy

21. The high input impedance of field effect transistor (FET) amplifier is due to

A. the pinch-off voltage

B. its very low gate current

C. the source and drain being far apart

D. the geometry of the FET

22. Match List I with List II

List I	List II
a. Electric field E	1. Amp/meter^2
b. Magnetic flux density B	2. Coulomb/meter^2
c. Current density J	3. Amp/meter
d. Magnetic field strength H	4. Volts/meter
	5. Tesla

A. a-5 b-4 c-1 d-2

B. a-4 b-3 c-2 d-1

C. a-1 b-4 c-2 d-5

D. a-4 b-5 c-1 d-3

23. An electron with a velocity v is injected into a uniform magnetic field B. The force on it is

A. perpendicular to the direction of motion of the electron

B. perpendicular to the direction of magnetic field

C. perpendicular to both the direction of motion of electron and magnetic field

D. parallel to the direction of magnetic field and motion of electron

24. Choose an answer which shows the electromagnetic waves in order of increasing energy

A. infrared, microwave, radio waves, γ rays

B. microwaves, infrared, visible, γ rays

C. γ rays, ultraviolet, visible, infrared

D. ultraviolet, visible, microwaves, infrared

25. In an electrochemical cell, the mass deposited on the electrodes is proportional to

A. potential difference between the electrodes and time of deposition

B. current flowing in the cell

C. product of voltage and current

D. the current and time of deposition

26. A uniform, 200N board of length L has two objects hanging from it: 300N at L/3 from one end and 400N at 3L/4 from the same end. What single additional force acting on the board will cause the board to be in equilibrium?

A. 900 N upward at 0.56L from the reference end

B. 900 N downward at 0.56L from the reference end

C. 500 N upward at 0.56L from the reference end

D. 500 N downward at 0.56L from the reference end

27. The wavelength of an electron accelerated with a potential of V is given by

A. $\sqrt{(150/V)}$

B. $\sqrt{150/(V)}$

C. $150/\sqrt{V}$

D. $\sqrt{(V/150)}$

28. Express $\sqrt{(0.000081)}$ in powers of 10

A. 9×10^{-2}

B. 9×10^{-3}

C. 9×10^{-4}

D. 9×10^{-5}

29. Entropy of a system is explained based on

A. First law of thermodynamics

B. Second Law of thermodynamics

C. Zeroth law of thermodynamics

D. Joules' law

30. Black holes are celestial bodies which have a strong

A. electric force

B. magnetic force

C. gravitational force

D. cosmic force

31. The reciprocal lattice of a simple cubic lattice is

A. cubic

B. monoclinic

C. triclinic

D. orthorhombic

32. For all metals, the ratio of the thermal conductivity to the electrical conductivity is directly proportional to

A. T

B. T^2

C. 1/T

D. $T^{1/2}$

33. A fielder in a cricket match throws a ball from the boundary line to the wicket keeper. The ball describes a parabolic path. Which of the following quantities remain constant, during the ball's motion in air (ignore air resistance)?

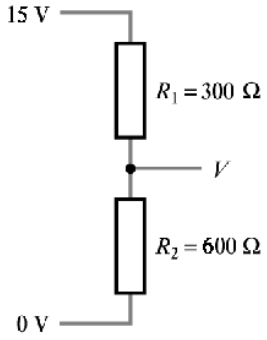
A. Kinetic energy

B. speed

C. horizontal component of velocity

D. vertical component of velocity

34. What will be the voltage at the output of the following circuit?



A) 6 volts

B) 10 volts

C) 60 volts

D) 20 volts

35. We desire to measure the current through and voltage across a resistor connected in a circuit. How should the ammeter and the voltmeter be connected?

A. Both are connected parallel with the resistor

B. Both are connected in series with the resistor

C. Ammeter is connected in series and voltmeter is connected parallel with the resistor

D. Ammeter is connected in parallel and voltmeter is connected in series with the resistor

36. A glass tube is bent into the form of a U. A 50 cm height of olive oil in one arm is found to balance 46 cm of water in the other. What is the density of olive oil?

A. 920 kg/m^3

B. 1080 kg/m^3

C. 0.920 kg/m^3

D. 1.092 kg/m^3

37. In a N type semiconductor, the Fermi level

A. is lower than the centre of the energy gap

B. is at the centre of the energy gap

C. is higher than the centre of the energy gap

D. can be any where depending on the doping concentration

38. For an electron transition from excited state to ground state which of the following is true?

A. its kinetic energy, potential energy and total energy decrease

B. its kinetic energy, potential energy and total energy increase

C. its kinetic energy increases: potential energy and total energy decreases

D. its kinetic energy decreases: potential energy increases and total energy remains same

39. The emitter region in the PNP transistor is more heavily doped than the base region so that

A. the flow across the base region will be mainly due to electrons

B. the flow across the base region will be mainly due to holes

C. recombination will be increased in the base region

D. base current will be high

40. The truth table given below is for (A and B are inputs, Y is output)

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

A. NAND gate

B. XOR gate

C. AND gate

D. NOR gate

41. The exponential function $q = q_0 e^{-t/RC}$ describes

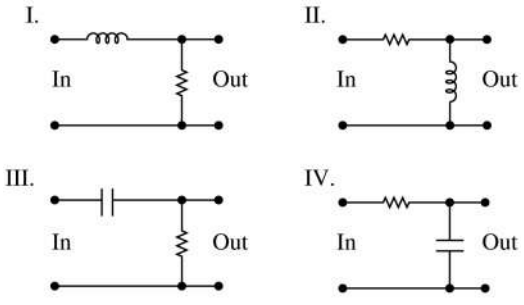
A. capacitor charging and discharging

B. capacitor discharging

C. capacitor charging

D. inductor current build up

42. Which two of the following circuits are high pass filters?



A. I and II

B. I and III

C. I and IV

D. II and III

43. Which two values are plotted in a B-H curve?

A. Reluctance and Flux density

B. Permeability and Reluctance

C. Magnetizing force and Permeability

D. Flux density and Magnetizing force

44. The binary number 110000111101 corresponds to the hexa decimal number

A. CFD

B. D3C

C. DBF

D. C3D

45. If $x = \sqrt{-1}$, then the value of x^x is

A. $e^{-\pi/2}$

B. $e^{\pi/2}$

C. x

D. 1

46. If the four lenses shown below are made of the same material, which lens has the shortest positive focal length?

A B C D

47. Van de Graff generators are useful for

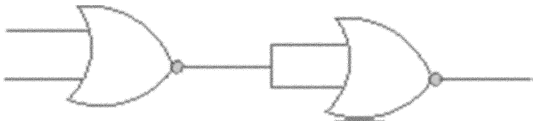
A. low voltage and high current applications

B. high voltage and low current applications

C. low voltage and low current applications

D. high voltage and high current applications

48. Identify the logic operation performed by the circuit given here



A. NOT

B. NAND

C. OR

D. NOR

49. In the production of X rays, the term “bremsstrahlung” refers to which of the following?

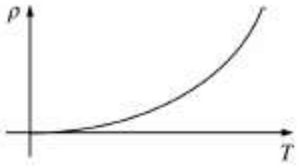
A. The cut-off wavelength, *lmin* , of the X-ray tube

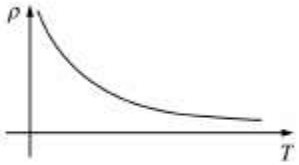
B. The discrete X-ray lines emitted when an electron in an outer orbit fills a vacancy in an inner orbit of the atoms in the target metal of the X-ray tube

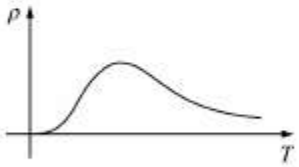
C. The smooth, continuous X-ray spectra produced by high-energy blackbody radiation from the X-ray tube

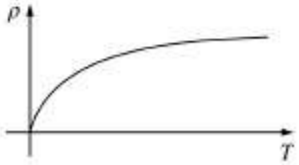
D. The smooth, continuous X-ray spectra produced by rapidly decelerating electrons in the target metal of the X-ray tube

50. Which of the following best represents the temperature dependence of the resistivity of an undoped semiconductor?

A.


B.


C.


D.


51. A particle of mass M is moving with constant velocity parallel to x-axis. Its angular momentum with respect to origin

A. is zero

B. remains constant

C. goes on increasing

D. goes on decreasing

52. A freshly prepared radioactive source of half life 2 h emits radiation of intensity which is 64 times the permissible safe level. The minimum time after which it would be possible to work with this source safely is

A. 6 h

B. 12 h

C. 24 h

D. 48 h

53. Which of the following best expresses the scientific definition of experimental precision?

A. the agreement among several measurements that have been made in the same way

B. the number of decimal points used to record a measurement

C. the closeness of a measurement to the accepted value for a specific physical quantity

D. the ratio of the median value of a set of measurements to the number of measurement

54. Which statement best explains how a microwave oven heats food?

A. Electromagnetic radiation excites electron transitions in hydrogen atoms. This energy is transmitted to the rest of the food by re-radiation.

B. Electromagnetic radiation excites the nuclei of hydrogen atoms by nuclear magnetic resonance. This energy is transmitted to the rest of the food by conduction.

C. Electromagnetic radiation increases the translational energy of water molecules. This energy is transmitted to the rest of the food by convection.

D. Electromagnetic radiation excites rotational levels of water molecules. This energy is transmitted to the rest of the food by conduction

55. Which of the following statements best describes the difference between the Bohr model and the contemporary model of the atom?

A. The Bohr model assumes a neutral nucleus whereas the contemporary model assumes that electrons orbit around a positive nucleus.

B. The Bohr model assumes a continuous range for the orbital radius whereas the contemporary model assumes discrete, nonradiating radii.

C. The Bohr model assumes that photons are emitted from the nucleus whereas the contemporary model assumes they arise from electron transitions.

D. The Bohr model assumes well-defined orbital paths for electrons whereas the contemporary model assumes a spatial probability distribution

56. If two waves of intensities I and 4I superpose, then the maximum and minimum intensities are

A. 5I and 3I

B. 9I and I

C. 9I and 3I

D. 9I and 4I

57. Young's double slit experiment is carried out by using green, red and blue light, one colour at a time. The fringe widths recorded are β_G, β_R and β_B respectively. Then

A. $\beta_G > \beta_R > \beta_B$

B. $\beta_G < \beta_R > \beta_B$

C. $\beta_R > \beta_G > \beta_B$

D. $\beta_G < \beta_B > \beta_R$

58. An AC voltage source of variable angular frequency ω and fixed amplitude V0 is connected to series with a capacitance C and an electric bulb of resistance R (inductance zero). When ω is increased

A. the bulb glows dimmer

B. the bulb glows without change

C. the bulb glows brighter

D. total impedance of the circuit increases

59. Induced electric currents can be explained using which of the following laws?

A. Gauss's Law

B. Ampere's Law

C. Faraday's Law

D. Ohm's Law

60. The potential drop between the terminals of a battery is equal to the battery's EMF when

A. no current is drawn from the battery

B. a very large current is drawn from the battery

C. the internal resistance of the battery is very large

D. the resistance in the external circuit is small

61. The first law of thermodynamics is concerned with the conservation of

A. energy

B. momentum

C. charge

D. matter

62. A rise in temperature of 20 Kelvin degrees is equal to a rise of

A. 36 degrees Celsius

B. 20 degrees Celsius

C. 68 degrees Celsius

D. 293 degrees Celsius

63. The photomultiplier tube in the scintillation counter multiplies

A. scintillations

B. electrons

C. ions

D. photons

64. The Modulus of Elasticity for a material refers to

A. the ability of a material to resist corrosion

B. the ratio of stress over strain

C. the maximum load over the cross sectional area

D. None of the above

65. As a pendulum swings from its highest to its lowest point, it has the lowest acceleration when it is:

A. at its lowest point

B. at its highest point

C. at a point 1/3 the distance from the top of its swing

D. at a point 1/2 the distance from the top of its swing

66. The spin angular momentum of an electron is

A. $\frac{1}{2}$h

B. $\frac{\sqrt{3}}{2}$h

C. $\sqrt{3}$h

D. zero

67. The electric field **E** inside a thin spherical shell carrying a surface charge density σ is equal to

A. σ/ε_0

B. zero

C. infinite

D. $\sigma/2\varepsilon_0$

68. An ideal current source has

A. zero internal resistance

B. infinite internal resistance

C. a load-dependent voltage

D. a load-dependent current

69. The first scientist to receive two Nobel prizes in the same field was

A. Linus Pauling

B. Marie Curie

C. John Bardeen

D. Frederick Sanger

70. $[M^{-1}L^{-2}T^{2}Q^{2}]$ is dimensional formula of

A. capacitance

B. resistance

C. inductance

D. magnetic field

71. Which of the following materials has the lowest energy gap between the valence band and the conduction band?

A. diamond

B. silicon

C. germanium

D. Indium antimonide (InSb)

72. If P, V and E denotes the momentum, velocity and K.E. of a particle then

A. $P = \frac{dE}{dt}$

B. $P = \frac{dV}{dV}$

C. $P = \frac{dE}{dV}$

D. $P = \frac{d^2E}{dt^2}$

73. Pyrometers are devices by which one measures

A. solar constant

B. low temperature

C. very high temperature

D. None of the above

74. The Compton shift is a function of the angle of the scattering photon. It does not depend on the wavelength of the incident photon. The maximum possible shift in Compton wavelength is at an angle

A. 0^o

B. 90^o

C. 180^o

D. None of the above

75. A black body at a temperature of 1646 K has the wavelength corresponding to maximum emission equal to 1.68 micron. Find the temperature of the moon if the maximum emission is 14 micron.

A. 200K

B. 196.28K

C. 197.52K

D. None of the above

76. Persons sitting in an artificial satellite circling around the earth have

A. zero mass

B. zero weight

C. infinite weight

D. infinite mass

77. Which of the following increases Brownian's motion?

A. Increase in the density of the medium suspending the particles

B. Increase of viscosity of the medium

C. Increase of temperature

D. None of the above

78. Hooke's law in differential form is written as

A. $\frac{dx}{dt}+\frac{k}{m}x=0$

B. $\frac{d^2x}{dt^2}+\frac{k}{m}x=0$

C. $\frac{d^2x}{dt^2}-\frac{k}{m}x=0$

D. $\frac{d^2x}{dt^2}+\frac{k}{m}x^2=0$

79. Bernoulli's theorem is based on

A. conservation of momentum

B. conservation of energy

C. mass-energy equivalence

D. conservation of mass

80. A piece of ice is floating in jar containing water. When the ice melts, the level of water

A. rises

B. falls

C. remains unchanged

D. rise or falls depends on the size of piece

81. A spherical body falls freely in a viscous liquid at room temperature. If the temperature of the liquid is raised by 20°C, the terminal velocity of the body

A. increases

B. decreases

C. remains unchanged

D. indeterminate

82. If a particle, moving in a magnetic field, increases its velocity then its radius of the magnetic field circle will

A. remain constant

B. decrease

C. increase

D. zero

83. If a hole is drilled along the diameter of the earth and a stone is dropped into it. The stone

A. reaches the centre of the earth and stops

B. reaches the opposite end and stops

C. executes S.H.M about the centre of the earth

D. reaches the opposite side and escapes earth

84. Two weightless springs have force constants k_1 and k_2 and connected in series. The combination is loaded with m, the period of oscillation is

A. $T = 2\pi\sqrt{\dfrac{m}{k_1 + k_2}}$

B. $T = 2\pi\sqrt{m\left(\dfrac{1}{k_1} + \dfrac{1}{k_2}\right)}$

C. $T = 2\pi\sqrt{\dfrac{mk_1k_2}{k_1 + k_2}}$

D. None of the above

85. Lissajou's figure obtained by combining $x = A\sin\omega t$ and $y = A\sin(\omega t + \pi/4)$ will be

A. an ellipse

B. a circle

C. a straight line

D. a parabola

86. A mass of 1 kg is suspended from a spring and has a time period T on the surface of earth. The period at the centre of the Earth is

A. zero

B. T

C. 2T

D. infinite

87. Below its critical temperature T_c, a superconducting material acts as a perfect

A. paramagnet

B. diamagnet

C. ferromagnet

D. antiferromagnet

88. Permanent magnets are made of steel because steel has

A. Low retentivity and low coercive field

B. High retentivity and high coercive field

C. Low retentivity and high coercive field

D. High retentivity and low coercive field

89. Two springs of spring constants 1500 N/m and 3000 N/m are stretched by same force. Their potential energies are in the ratios

A. 4 : 1

B. 1 : 4

C. 2 : 1

D. 1 : 2

90. If a star emitting orange light moves away from the earth, its colour will

A. appear red

B. appear yellow

C. remain the same

D. turns gradually blue

91. When sound travels from air to water the quantity that remains unchanged is

A. speed

B. frequency

C. intensity

D. wavelength

92. Which waves are used in sonography?

A. Microwaves

B. Infra-red waves

C. Sound waves

D. Ultrasonic waves

93. The electron in the silver atom is in the state $^2s_{1/2}$. The Lande splitting factor of the electron is

A. ½

B. 2

C. 2.5

D. None of the above

94. In Carnot's engine at the end of the cycle, the temperature of the working substance is

A. less than initial temperature

B. greater than initial temperature

C. equal to initial temperature

D. None of the above

95. The internal energy of the ideal gas does not change during

A. isothermal process

B. isocharic process

C. isobaric process

D. adiabatic process

96. A bimetallic strip consists of brass and iron. When it is heated it bends into an arc with the brass on the convex and iron on the concave side of the arc. This happens because

A. density of brass is more than that of the iron

B. brass has higher specific heat capacity than iron

C. brass has higher coefficient of linear expansion than iron

D. None of the above

97. The internal energy of an ideal gas depends upon

A. Pressure

B. Temperature

C. Volume

D. Temperature and volume

98. For television broadcasting, the frequency employed is normally

A. 30-300MHz

B. 30-300Ghz

C. 30-300kHz

D. 30-300hz

99. Heat cannot be wholly converted into work. This law was enunciated by

A. Kelvin and Planck

B. Clausius

C. Einstein

D. Joule and Thomson

100. The source and sink temperature of a Carnot engine are 400k and 300k respectively. What is the efficiency?

A. 100%

B. 75%

C. 33.3%

D. 25%

101. A body in a room cools from $85^{o}C$ to $80^{o}C$ in 9 minutes. The time taken to cool from $80^{o}C$ to $75^{o}C$ is

A. 9 minutes

B. less than 9 minutes

C. more than 9 minutes

D. either less or more than five minutes

102. The coefficient of reflectivity of perfectly black body is

A. zero

B. infinity

C. unity

D. 0.5

103. Metals are good conductors of heat because they have

A. small intermolecular distance

B. free electrons

C. no ions

D. crystalline structure

104. If the temperature of sun is doubled then

A. emission of energy will be doubled

B. emission of energy will become four times

C. mostly ultra-violet radiations will be emitted

D. mostly infra-red radiations will be emitted

105. When a mass undergoes S.H.M. there is always a constant ratio between its displacement and

A. Acceleration

B. Velocity

C. Mass

D. Period

106. Interference of sound can be demonstrated by

A. Organ pipe

B. A stethoscope

C. Tuning fork

D. Quinckes tube

107. Angular momentum is

A. a scalar

B. a polar vector

C. a scalar as well as vector

D. an axial vector

108. Longitudinal waves are generated in steel rod by rubbing it at one end. The wavelength depends upon

A. Young's modulus of steel

B. length of rod

C. frequency of stroking

D. density of steel

109. Cathode rays enter an electric field normal to lines of force, their path is a

A. straight line

B. ellipse

C. circle

D. parabola

110. The ratio of the magnetic moment to the angular momentum

A. e/m

B. e/2m

C. m/2e

D. None of the above

111. Which of the following is not an exact differential?

A. dQ (Q=heat absorbed)

B. dU (U=internal energy)

C. dS (S=entropy)

D. dF (F=free energy)

112. The area under the temperature-entropy curve for any thermodynamic process represents

A. Efficiency

B. Irreversibility

C. Work done

D. Heat absorbed or rejected

113. If L has the dimensions of length; V that of potential and ε_0 is the permittivity of free space then quantity $\varepsilon_0 LV$ have the dimensions of:

A. Current

B. Resistance

C. Charge

D. Voltage

114. The angle between $\hat{i}+\hat{j}+\hat{k}$ and $2\hat{i}+2\hat{j}+2\hat{k}$ is

A. 90^o

B. 60^o

C. 30^o

D. 0^o

115. When a carpet is beaten by a stick, the dust particles drop down according to

A. Newton's 1st law of motion

B. Newton's 2nd law of motion

C. Newton's 3rd law of motion

D. None of the above

116. What remains constant when earth revolves round the sun?

A. Linear K.E.

B. Angular K.E.

C. Linear momentum

D. Angular momentum

117. To an astronaut in the spaceship, the sky appears pitch dark. This is due to

A. absence of atmosphere in neighborhood

B. light from sky is absorbed by medium surrounding him

C. the fact that at height, the sky radiations are only infrared and ultraviolet

D. the fact that human eye becomes blind from blue colour

118. Brownian motion has played a convincing role in establishing

A. kinetic theory of gases

B. mechanical equivalence of heat

C. elastic nature of molecular collisions

D. None of the above

119. When the temperature increases, the angle of contact of liquid will

A. increase

B. decrease

C. remain unchanged

D. first decrease and then decrease

120. The wavelength of light coming from a star shifts towards the violet end of the spectrum. This shows that star is

A. receding from the earth

B. approaching the earth

C. neither approaching nor receding from the earth

D. sometimes approaching and sometimes receding from the earth

121. Ultrasonics are used for stirring liquid solutions in order to produce

A. soundless stirring

B. perfectly homogeneous solution

C. chemical reactions in them

D. none of the above

122. For production of beats the two sources must have

A. different frequencies and same amplitude

B. different frequencies

C. different frequencies same amplitude and same phase

D. different frequencies and same phase.

123. Compressed air coming out of punctured football becomes cooler because of

A. adiabatic expansion
B. Joule Thomson effect
C. isothermal expansion
D. energy dissipation

124. To keep correct time, watches are fitted with a balance wheel made of

A. Platinum
B. Tungsten
C. Invar
D. Stainless steel

125. The internal energy of a perfect gas does not change during

A. adiabatic process
B. isothermal process
C. isobaric process
D. isochoric process

126. A perfectly black body is one whose emissive power is

A. zero
B. unity
C. maximum
D. minimum

127. The running of fan makes us comfortable during summer, because it

A. decreases the temperature of air
B. increases the thermal conductivity of air
C. increases the rate of evaporation of perspiration
D. cuts off the thermal radiation reaching us

128. With sound waves one cannot observe the phenomenon of

A. Refraction

B. Diffraction

C. Interference

D. Polarization

129. Ultrasonic waves are produced by utilizing

A. Coulomb's Law

B. Peltier Effect

C. Piezoelectric Effect

D. Doppler's Principle

130. The absolute temperature of a perfectly black body is doubled. The heat radiated from it will become how many times

A. 4 times

B. 8 times

C. 16 times

D. 32 times

131. The velocities of gas molecules are V, 2V, 3V, 4V and 5V. What is the rms speed of these gas molecules?

A. 3V

B. 11V

C. $(11)^{1/2}$V

D. $3^{1/2}$V

132. Choose the correct statement among the following:

A. Pressure of the gas is equal to the total kinetic energy of the molecules in a unit volume of the gas

B. The average kinetic energy of the gas molecules is proportional to the absolute temperature of the gas

C. The average kinetic energy of the gas molecules is proportional to root of the absolute temperature of the gas

D. The product of pressure and volume of a gas is always constant

133. Centripetal acceleration is given by

A. (Tangential speed) / (radius of circular path)

B. (Tangential speed) (radius of circular path)

C. $(\text{Tangential speed})^2$ / (radius of circular path)

D. $(\text{Tangential speed})^2$ (radius of circular path)

134. A super conductor is one which

A. carries large current when high voltage is applied

B. carries large current when very low voltage is applied

C. carries large current when very low voltage is applied at absolute zero temperature

D. carries low current when low voltage is applied

135. White noise is that signal whose frequency spectrum

A. extends over infinite range

B. has flat spectral density

C. has spectral density varying as 1/f

D. has limited number of frequency components

136. If young's experiment is preformed using two separate identical sources of light instead of using two slits and one bulb

A. the fringes will be brighter

B. no fringes will appear

C. the fringes will be darker

D. the contrast between dark and bright fringes increases

137. The ground state electron configuration for phosphorus, which has 15 electrons, is

A. 1*s*2 2*s*2 2*p*6 3*s*1 3*p*4

B. 1*s*2 2*s*2 2*p*6 3*s*2 3*p*3

C. 1*s*2 2*s*2 2*p*6 3*s*2 3*d*3

D. 1*s*2 2*s*2 2*p*6 3*s*1 3*d*4

138. Which one of the following is the name of a device used to measure voltage without drawing ANY current from the circuit being measured?

A. a wattmeter

B. a galvanometer

C. an ammeter

D. a potentiometer

139. In a full wave rectifier without a filter, the ripple factor is

A. 0.482

B. 1.21

C. 2.05

D. 1.79

140. Which of the following statements is **not** correct about a voltage follower circuit?

A. it has high input impedance

B. it has low input impedance

C. it is a unity gain amplifier

D. it has low output impedance

141. Which of the following numbers is given to four significant figures?

A. 0.00020

B. 0.0020

C. 2.000

D. 2000

142. Dopant atoms, when added to an intrinsic semiconductor,

A. introduce quantum states that are close to the edges of the forbidden band

B. introduce quantum states that are near the center of the forbidden band

C. increase the energy of electrons in the valence band

D. increase the energy of electrons in the conduction band

143. Of these properties of a wave, the one that is independent of the others is its

A. amplitude

B. wavelength

C. speed

D. frequency

144. We desire to measure the current through and the voltage across a resistor connected in a circuit. How should an ammeter and a voltmeter be connected to the resistor?

A. Both are connected in parallel with the resistor

B. Both are connected in series with the resistor

C. The ammeter is connected in series and the voltmeter is connected in parallel with the resistor

D. The ammeter is connected in parallel and the voltmeter is connected in series with the resistor

145. In SI system, unit of radioactivity is

A. Becquerel

B. Curie

C. Rutherford

D. None of the above

146. A passenger in a moving train tosses a coin. If the coin falls behind him, the train must be moving with

A. an acceleration

B. retardation

C. uniform speed

D. any of these

147. The wave function of a system obeying Fermi-Dirac statistics is

A. symmetric

B. anti-symmetric

C. pseudo-symmetric

D. None of the above

148. In Searle's method for finding conductivity, the temperature gradient along the bar is

A. greater near the hot end

B. greater near the cold end

C. the same at all points

D. increases as we go from hot end to the cold end

149. Decibel is

A. a musical instrument

B. a musical note

C. a measure of sound level

D. the wavelength of noise

150. For a gas $\frac{R}{C_V} = 0.67$ this gas is made up of molecules which are

A. Polyatomic

B. Monatomic

C. Diatomic

D. Mixture of diatomic and polyatomic molecules.

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