

MIZORAM PUBLIC SERVICE
COMMISSION

*Technical Competitive Examinations for
Recruitment to the post of
Inspector of Legal Metrology
under Food, Civil Supplies & Consumer
Affairs Department*

Time Allowed : 2 hours
Full Marks : 150

Physics Paper-I

INVIGILATOR

CENTRE SUPERINTENDENT

Date of Exam. : 26/03/2010

Instructions to candidates:

- Enter your Roll No. in the box provided on the front page.
- Attempt all the questions.
- Each question is followed by probable answers. Choose the appropriate answer and mark it by putting '✓' mark on the corresponding box.
- If more than one answer boxes are marked for a question, the answer will be treated as wrong.
- On completion, you are to submit the booklet to the Invigilator.

Code Number :
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Marks Obtained :

Examiner

Scrutiniser

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1. According to special theory of relativity a particle cannot travel with the speed of light because its
 - (a) velocity will soon be infinite
 - (b) mass will be infinite
 - (c) mass will reduced to zero
 - (d) None of the above

2. If the Galilean transformations were correct then the aberration angle would be given by
 - (a) $\tan \theta = v/c$
 - (b) $\sin \theta = v/c$
 - (c) $\cos \theta = v/c$
 - (d) None of these

3. Photographs of rapid moving distant objects will
 - (a) not show Lorentz contraction
 - (b) show Lorentz contraction
 - (c) (a) and (b)
 - (d) None of these

4. A small sphere of radius R in its proper frame is moving with half the velocity of light, when viewed by an observer in a laboratory frame it looks like
 - (a) a sphere
 - (b) ellipsoid
 - (c) paraboloida
 - (d) hyperboloid

- 5 In the above equation, if instead of being viewed it is photographed, then the shape would be
 - (a) spherical
 - (b) ellipsoidal
 - (c) paraboloidal
 - (d) hyperboloidal

6. The perpendicular component of acceleration as compared to the parallel component is
 - (a) less
 - (b) more
 - (c) less than by a factor v/c
 - (d) more than by a factor v/c

7. The total kinetic energy of a system of particles about an arbitrary origin is equal to the K.E. of its centre of mass plus the K.E. of
 - (a) nothing extra
 - (b) any particle system in an inertial
 - (c) the system w.r.t. its centre of mass
 - (d) the inertial frame of reference

8. A passenger in a supersonic jet-liner tosses a coin vertically upwards the coin will fall
 - (a) behind him
 - (b) in front of him
 - (c) right of his hands
 - (d) he is unable to toss the coin

9. Kepler's second law regarding constancy of areal velocity of a planet is a consequence of the law of conservation of
 - (a) energy
 - (b) angular momentum
 - (c) linear momentum
 - (d) angular momentum

10. Weightlessness experienced, while orbiting the earth in a spaceship, is the result of

- (a) inertia (b) acceleration
(c) zero gravity (d) centre of gravity

11. Height of geostationary satellite above the earth is approximately

- (a) 3,600 km (b) 42,000 km
(c) 30,000 km (d) 36,000 km

12. Orbital velocity of a satellite revolving round the earth is independent of the

- (a) mass of the earth (b) mass of the satellite
(c) radius of the earth (d) radius of the orbit

13. A physical system is invariant under rotation about a fixed axis. Then the following quantity is conserved

- (a) Total linear momentum
(b) Linear momentum along the axis of rotation
(c) Total angular momentum
(d) Angular momentum along the axis of rotation

14. Coriolis force is a

- (a) pseudo-force that is to be added to the applied force in a rotating frame
(b) pseudo-force that is to be added to the applied force when the system is rotating
(c) force that counter-balances centrifugal force
(d) force that arises whenever there is centrifugal force

15. For Rutherford scattering, the

- (a) total scattering cross section is πa^2
(b) differential cross section is independent of azimuthal angle
(c) differential cross-section is finite only at $\alpha = \text{zero}$ ($\alpha = \text{scattering angle}$)
(d) differential cross-section are finite only at $\alpha = \text{zero}$ and p

16. For a rigid sphere of radius a the scattering cross-section is given by

- (a) $2 \pi a^2$ (b) $3 \pi a^2$
(c) $4 \pi a^2$ (d) πa^2

17. Theory of relativity shows that Newtonian mechanics is true

- (a) approximately for all velocities (b) approximately for low velocities
(c) approximately for high velocities (d) wholly

18. Lorentz transformation assumes

- (a) space and time are both relative (b) space is relative but time is absolute .
(c) space is absolute but time is relative .. (d) space and time are both absolute

19. An inertial frame

- (a) is accelerated
(b) is decelerated
(c) is moving with uniform velocity or at rest
(d) may be accelerated, decelerated or moving with constant velocity

20. Michelson Morley experiment proved that

- (a) earth is an inertial
(b) a non-inertial frame
(c) there is no preferred frame like other
(d) speed of light is same in all inertial frames

21. In Galilean transformations, time interval is

- (a) different for different frames (b) vectors
(c) relative (d) same for all frames

22. Lorentz transformation holds for

- (a) non-relativistic velocities only
(b) relativistic velocities only
(c) relativistic and non-relativistic velocities
(d) photons only

23. Two satellites of the same mass are orbiting round the earth at height of R and $4R$ above the earth's surface: R being the radius of the earth. Their kinetic energies are in the ratio of

- (a) 4:1 (b) 3:2
(c) 4:3 (d) 5:2

24. The angular momentum of the earth revolving round the sun is proportional to R^n where R is the distance between the earth and the sun. The value of n is

- (a) 0.5 (b) 1.0
(c) 1.5 (d) 2.0

25. A rocket is fired from the earth to the moon. The distance between the earth and the moon is r and the mass of the earth is 81 times the mass of the moon. The gravitational force on the rocket will be zero, when its distance from the moon is
- (a) $r/20$ (b) $r/15$
(c) $r/10$ (d) $r/5$
26. An artificial satellite moving in a circular orbit around the earth has a total (kinetic + potential) energy E_0 . Its potential energy is
- (a) $-E_0$ (b) $1.5 E_0$
(c) $2E_0$ (d) E_0
27. Consider a system of two identical particles. One of the particles is at rest and the other has an acceleration \vec{a} . The centre of mass has acceleration
- (a) zero (b) $\frac{1}{2} \vec{a}$
(c) \vec{a} (d) $2\vec{a}$
28. The centre of mass of a system of particles does not depend on
- (a) masses of the particles
(b) forces on the particles
(c) position of the particles
(d) relative distances between the particles
29. When a mass is rotating in a plane about a fixed point, its angular momentum is directed along
- (a) the radius
(b) the tangent to the orbit
(c) the axis of rotation
(d) the line at an angle of 45° to the plane of rotation
30. Generally the mass of a fly wheel is concentrated on its rim. Why?
- (a) To increase the moment of inertia (b) To decrease the moment of inertia
(c) To obtain stable equilibrium (d) To obtain a strong wheel
31. A rocket works on the principle of conservation of
- (a) mass (b) kinetic energy
(c) linear momentum (d) angular momentum

32. A geostationary satellite is orbiting the earth at a height of $6R$ above the surface of the earth; R being the radius of the earth. What will be the time period of another satellite at a height $2.5R$ from the surface of the earth?
- (a) $6\sqrt{2}$ hours (b) $6\sqrt{2.5}$ hours
(c) $6\sqrt{3}$ hours (d) 12 hours
33. A satellite is launched into a circular orbit of radius R around the earth. A second satellite is launched into an orbit of radius $1.01R$. The period of the second satellite is longer than that of the first by approximately
- (a) 0.5% (b) 1.0%
(c) 1.5% (d) 3.0%
34. A body is projected vertically upward from the surface of the earth with a velocity equal to half the escape velocity. If R is the radius of the earth, the maximum height attained by the body is
- (a) $\frac{R}{6}$ (b) $\frac{R}{3}$
(c) $\frac{2R}{3}$ (d) R
35. The time of revolution of a satellite is T . Its kinetic energy is proportional to
- (a) T^{-1} (b) T^{-2}
(c) T^{-3} (d) $T^{-\frac{2}{3}}$
36. According to Classical theory, the path of the electron in the Rutherford atom model will be
- (a) circular (b) straight line
(c) parabolic (d) spiral
37. Einstein's mass energy relation is given by
- (a) $E = mc^2$ (b) $E = \frac{1}{2}mc^2$
(c) $E = \frac{p^2}{2m}$ (d) $E = mc$
38. A moving bullet hits a solid target resting on a frictionless surface and gets embedded in it. What is conserved in this process?
- (a) Momentum and kinetic energy (b) Kinetic energy alone
(c) Momentum alone (d) Neither momentum nor kinetic energy
39. In an inelastic collision of two bodies, which of the following do not change after the collision?
- (a) Total kinetic energy (b) Total linear momentum
(c) Total energy (d) Both (b) and (c)

40. If A is the areal velocity of a planet of mass M , its angular momentum is

- (a) M (b) $2MA$
(c) A^2M (d) AM^2

41. According to which theorem, the sum of pressure head, velocity head and gravitational head is constant?

- (a) Archimedes' principle (b) Pascal's law
(c) Bernoulli's theorem (d) Torricelli's law

42. Pressure applied to a gas varies inversely as volume, this is known as

- (a) Charle's law (b) Stefan's law
(c) Boyle's law (d) Kirchoff's law

43. A horizontal stream of air is blown over one of the pans of trader's balance. The pan will

- (a) remain unaffected (b) go down
(c) go up (d) be rotated

44. Water is flowing through a horizontal pipe line having a constriction. Then

- (a) pressure will be the same throughout the length of the pipe
(b) pressure will be greater at the constriction
(c) pressure will be greater in the wider portion
(d) None of these

45. Which of the following statement is wrong about the satellite of earth?

- (a) It is freely falling (b) It is not accelerated
(c) It has constant speed (d) It is weightless

46. Where is the intensity of the gravitational field of the earth maximum?

- (a) Centre of the earth (b) Equator
(c) Poles (d) Same everywhere

47. The gravity is measured in

- (a) N (b) kg
(c) $N Kg^{-1}$ (d) $NKg^{-2}m^{-2}$

48. In the case of stream line flow, the loss of energy is

- (a) minimum (b) maximum
(c) zero (d) None of the above

49. The lift in an aero plane is based on

- (a) law of gravitation (b) theorem of continuity
(c) Pascal's law (d) Bernoulli's theorem

50. A gale blows over a house. The force due to gale on the roof is

- (a) in the downward direction (b) in the upward direction
(c) in the horizontal direction (d) zero

51. Suppose temperature of the sun goes down by a factor of two, then the total power emitted by the sun will go down by a factor of

- (a) 2 (b) 4
(c) 8 (d) 16

52. 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)

53. The internal energy of a perfect gas is

- (a) partly kinetic and partly potential
(b) wholly potential
(c) wholly kinetic
(d) depends on the ratio of two specific heats

54. The internal energy of a real gas is independent of

- (a) temperature (b) pressure
(c) volume (d) None of these

55. Which of the following law of thermodynamics leads to the inference that it is not possible to convert whole of the heat into work continuously?

- (a) Zeroth (b) First
(c) Second (d) Third

56. If the temperature of the source is increased, the efficiency of the Carnot's engine

- (a) increases
(b) decreases
(c) remains constant
(d) first increases and then remains constant

57. In an isothermal expansion, the pressure is determined by

- (a) temperature only (b) compressibility only
(c) both temperature and compressibility (d) None of these

58. A temperature of a gas measured below 0°C is 200K. The exact temperature of the gas is

- (a) +73°C (b) 0°C
(c) -73°C (d) 273K

59. The change in entropy is

- (a) positive in a reversible change (b) negative in an irreversible change
(c) negative in a reversible change (d) positive in an irreversible change

60. The Clausius–Clapeyron equation indicates that an increase in pressure increases the melting point, in case of

- (a) all substances
(b) substances which expand on solidification
(c) substances which contract on solidification
(d) substances which neither expand nor contract on solidification

61. The Maxwell velocity distribution is valid for a classical gas

- (a) in equilibrium irrespective of the nature of particle interaction
(b) strictly under contact interaction amongst particles
(c) under a steady flow of particles
(d) only in the absence of interparticle interaction

62. According to Debye’s theory of specific heat at high temperature specific heat is proportional to

- (a) T (b) T^2
(c) T^3 (d) Independent of T

63. Wien’s displacement law fails at

- (a) low temperature (b) high temperature
(c) short wavelength (d) long wavelength

64. The solar constant of a planet is S . The surface temperature of the sun is T K. The sun subtends as angle α at the planet. Then

- (a) $S \propto T^4$ (b) $S \propto T^2$
(c) $S \propto \alpha^3$ (d) $S \propto \alpha$

65. A star emits a black body radiation of 6000 K. The wavelength of maximum emission intensity per unit wavelength will be in the range of
- (a) 5000 Å (b) 6000 Å
(c) 7000 Å (d) 8000 Å
66. Which of the following is not Maxwell's thermodynamic relation?
- (a) $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$ (b) $\left(\frac{\partial S}{\partial P}\right)_T = -\left(\frac{\partial V}{\partial T}\right)_P$
(c) $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$ (d) $\left(\frac{\partial P}{\partial V}\right)_T = \left(\frac{\partial S}{\partial T}\right)_V$
67. When applied to solar radiation, Planck's law reduces to Wien's law in the
- (a) ultraviolet region (b) microwave region
(c) infrared region (d) visible region
68. The equation of state for n moles of an ideal gas is $PV=nRT$, where R is a constant. The S.I. unit for R is
- (a) J K^{-1} per molecules (b) $\text{J Kg}^{-1}\text{K}^{-1}$
(c) $\text{J K}^{-1} \text{mol}^{-1}$ (d) $\text{J K}^{-1}\text{g}^{-1}$
69. Which of the following phenomena gives evidence of the molecular structure of matter?
- (a) Brownian motion (b) Diffusion
(c) Evaporation (d) All the above
70. Planck's constant can be directly measured using
- (a) Millikan's oil drop experiment (b) Photoelectric effect experiment
(c) A.C Josephson effect experiment (d) Michelson-Morley experiment
71. Avogadro number is the number of molecules in
- (a) one litre of gas at N.T.P. (b) one mole of a gas
(c) one gram of a gas (d) one kilogram of a gas
72. In which process, the PV-diagram is a straight line parallel to volume axis?
- (a) Isothermal (b) Isobaric
(c) Irreversible (d) Adiabatic
73. Internal energy of a gas decreases, when
- (a) it absorbs heat (b) the change is cyclic
(c) the change is adiabatic expansion (d) None of the above

74. The difference between C_p and C_v

- (a) is equal to R
- (b) is equal to $2R$
- (c) is equal to $R/2$
- (d) depends upon the atomicity of the gas molecules

75. The process of production of heat by friction is

- (a) an adiabatic change
- (b) an isothermal change
- (c) a reversible change
- (d) an irreversible change

76. A refrigerator is

- (a) an electric motor
- (b) a heat engine
- (c) a heat engine working back
- (d) an air cooler

77. Wien's law states that

- (a) $T + \lambda_m = \text{constant}$
- (b) $\lambda_m T = \text{constant}$
- (c) $\lambda_m / T = \text{constant}$
- (d) $T^4 / \lambda_m = \text{constant}$

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

- (a) decreases the temperature of air
- (b) increases the thermal conductivity of air
- (c) increase the rate of evaporation of perspiration
- (d) cuts off the thermal radiation reaching us

79. A thermo flask is polished well

- (a) to make it attractive
- (b) for shining
- (c) to absorb all radiation from outside ...
- (d) to reflect all radiation from outside

80. Cloudy nights are usually warmer than clear ones, because clouds

- (a) do not radiate heat
- (b) do not absorb heat
- (c) have low thermal conductivity
- (d) have high thermal conductivity

81. At what temperature do the Celsius and Fahrenheit scales give the same reading?

- (a) 80°F
- (b) -40°C
- (c) 0°C
- (d) 40°R

82. The temperature of the sun (5000°C) is measured with
- (a) Platinum resistance thermometer (b) Gas thermometer
(c) Pyrometer (d) Vapour pressure thermometer
83. At 0K which of the following properties of a gas will be zero?
- (a) Kinetic energy (b) Potential energy
(c) Mass (d) Density
84. The air of the atmosphere becomes cold at higher altitudes, because of
- (a) decrease in density (b) expansion of the air
(c) variation in pressure (d) the height above the surface of earth.
85. Joule's mechanical equivalent of heat relates heat energy to
- (a) kinetic energy (b) potential energy
(c) internal energy (d) None of these
86. The degree of freedom of a triatomic gas is
- (a) 1 (b) 2
(c) 6 (d) 8
87. A black body when hot, emits heat radiation of
- (a) infrared wavelengths (b) ultraviolet wavelengths
(c) all wavelengths (d) a particular wavelength
88. The unit of Stefan's constant in S I are
- (a) $\text{J s}^{-1} \text{m}^{-2} \text{K}^{-4}$ (b) $\text{W s}^{-1} \text{m}^{-2} \text{K}$
(c) $\text{J m}^{-2} \text{K}^{-4}$ (d) $\text{W m}^{-2} \text{K}^{-4}$
89. If the temperature of the sun is doubled, the rate of energy received on earth will be increased by a factor of roughly
- (a) 2 (b) 4
(c) 8 (d) 16
90. Which of the following Maxwell's equation leads to Clausius-Clapeyron equation.
- (a) $\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial V}\right)_T$ (b) $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$
(c) $\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$ (d) $\left(\frac{\partial V}{\partial T}\right)_P = -\left(\frac{\partial S}{\partial P}\right)_T$

91. The mean free path λ of a gas molecule as given by Maxwell is related to its radius a , as

(a) $\lambda = \frac{1}{\sqrt{2} \cdot 4\pi a^2 n}$ (b) $\lambda = \frac{1}{\sqrt{2} \cdot \pi a^2 n}$

(c) $\lambda = \frac{1}{\sqrt{2} \cdot 2\pi^2 a^2 n}$ (d) $\lambda = \frac{1}{\sqrt{2} \cdot 2\pi a^2 n}$

92. The average value of v_x in Maxwellian distribution is given as

(a) 0 (b) $\frac{1}{2\alpha}$

(c) $\frac{kT}{m}$ (d) $\sqrt{\frac{kT}{m}}$

93. The hidden heat which vaporises water at its boiling point is called

(a) latent heat (b) thermal heat

(c) heat of vaporisation (d) quantity of heat

94. The snow on the mountain does not melt all at once when it is heated by the sun because

(a) it becomes very hard

(b) it reflects most of the heat from the sun

(c) it has a low specific heat capacity

(d) it has a high latent heat of fusion

95. Two lumps of ice join together when pressed. Which one of the following will appropriately account for this?

(a) Ice lump have a natural affinity for each other

(b) The latent heat of fusion of ice is high

(c) The melting point of ice decreases with increase in pressure

(d) The melting point of ice increases with increase in pressure

96. In a given process on an ideal gas, $dW = 0$ and $dQ < 0$. Then for the gas

(a) the temperature will decrease (b) the volume will increase

(c) the pressure will remain constant (d) the temperature will increase

97. The mean free path of a molecule of a gas depends

(a) Only on its diameter (d)

(b) Only on the number density (n) of the molecules

(c) On both d and n

(d) Neither on d nor on n

98. The dimensions of the coefficient of thermal conductivity are

- (a) $ML^{-1}T^{-2}K^{-1}$ (b) $ML^{-2}T^{-3}K^{-1}$
(c) $ML^{-1}T^{-1}K^{-1}$ (d) $MLT^{-3}K^{-1}$

99. An ideal black body at room temperature is thrown into a furnace. It is observed that

- (a) initially it is the darkest body and at later times the brightest
(b) it is the darkest body at all times
(c) it cannot be distinguished at all times
(d) initially it is the darkest body and at later times it cannot be distinguished

100. Which of the following devices is used to detect thermal radiation?

- (a) Constant volume air thermometer (b) Platinum resistance thermometer
(c) Thermostat (d) Thermopile

101. A particle is moving in a circle with uniform speed. Its motion is

- (a) periodic and simple harmonic (b) periodic but not simple harmonic
(c) aperiodic (d) None of the above

102. Which one of the following relationships between the acceleration a and displacement y of a particle represents simple harmonic motion?

- (a) $a = 0.5y$ (b) $a = 400y^2$
(c) $a = -20y$ (d) $a = -3y^2$

103. Which of the following quantity is always positive in a S.H.M.?

- (a) $\vec{F} \cdot \vec{a}$ (b) $\vec{v} \cdot \vec{r}$
(c) $\vec{a} \cdot \vec{r}$ (d) $\vec{F} \cdot \vec{r}$

104. Resonance is a special case of

- (a) forced vibrations (b) natural vibrations
(c) damped vibrations (d) undamped vibrations

105. Which of the following is correct?

- (a) Both sound and light waves in air are longitudinal
(b) Both sound and light waves in air are transverse
(c) Sound waves in air are transverse and light waves are longitudinal
(d) Sound waves in air are longitudinal and light waves are transverse

106. The velocity of sound in air is independent of change in

- (a) pressure (b) density
(c) temperature (d) humidity

107. What type of vibrations are produced in a sitar wire?

- (a) Progressive transverse (b) Progressive longitudinal
(c) Stationary transverse (d) Stationary longitudinal

108. Two sound waves having a phase difference of 60° have path difference

- (a) 2λ (b) $\frac{\lambda}{2}$
(c) $\frac{\lambda}{6}$ (d) $\frac{\lambda}{3}$

109. Standing waves can be produced

- (a) on a string clamped at both the ends
(b) on a string clamped at one end and free at the other
(c) when two identical waves with a phase difference of π are moving in the same direction .
(d) None of the above

110. An empty vessel is filled with water, its frequency

- (a) increases (b) decreases
(c) remains the same (d) None of these

111. Energy is not carried by

- (a) transverse progressive wave (b) longitudinal progressive wave
(c) stationary wave (d) electromagnetic wave

112. If vibrations of a string are to increased by a factor of 2, then tension in the string must be made

- (a) half (b) twice
(c) four times (d) eight times

113. Whenever a wave enters from one medium to another, its

- (a) frequency changes (b) frequency does not change
(c) velocity changes (d) wavelength remains constant

114. Ultrasonic waves are used for stirring liquid solutions, because
- (a) they do not produce noise during the operation
 - (b) they are easy to produce
 - (c) they can produce perfectly homogeneous solutions
 - (d) they do not produce chemical reaction in the solution
115. Which one of the following phenomena is not explained by Huygen's construction of wave front?
- (a) Refraction
 - (b) Reflection
 - (c) Diffraction
 - (d) Origin of spectra
116. Interference was observed in interference chamber when air was present. Now, the chamber is evacuated, if the same light is used, a careful observer will see
- (a) no interference
 - (b) interference with white bands
 - (c) interference with dark bands
 - (d) interference in which width of the fringe will be slightly increased
117. In a Fresnel biprism experiment, the two positions of lens give separation between the slits as 16 cm and 9 cm respectively. What is the actual distance of separation?
- (a) 12.5 cm
 - (b) 12 cm
 - (c) 13 cm
 - (d) 14 cm
118. Which one of the following statements is true?
- (a) Both light and sound waves can travel in vacuum
 - (b) Both light and sound waves in air are transverse
 - (c) The sound waves in air are longitudinal, while the light waves are transverse
 - (d) Both light and sound waves in air are longitudinal
119. According to Huygen's principle, light is a form of
- (a) particle
 - (b) rays
 - (c) wave
 - (d) None of these
120. Light propagates rectilinearly, because of its
- (a) frequency
 - (b) wavelength
 - (c) velocity
 - (d) wave nature
121. Light appears to travel in a straight line, because
- (a) its velocity is very large
 - (b) it is not absorbed by surrounding
 - (c) its wavelength is very small
 - (d) it is not reflected by surrounding

122. What happens, if the monochromatic light used in Young's double slit experiment is replaced by white light?
- (a) No fringes are observed
 - (b) All bright fringes become white
 - (c) All bright fringes have colours between violet and red
 - (d) Only the central fringe is white and all the other fringes are coloured
123. When a compact disc is illuminated by a source of white light, coloured lines are observed. This is due to
- (a) dispersion (b) diffraction
 - (c) interference (d) polarization
124. When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is
- (a) polarized (b) of longer wavelength
 - (c) of shorter wavelength (d) of high intensity
125. Golden view of sea shell is due to
- (a) diffraction (b) dispersion
 - (c) polarization (d) reflection
126. In case of linearly polarized light, the magnitude of the electric field vector
- (a) is parallel to the direction of propagation
 - (b) does not change with time
 - (c) increases and decreases linearly with time
 - (d) varies periodically with time
127. In an elliptically polarized light, the amplitude of vibrations
- (a) changes in magnitude (b) changes in direction
 - (c) remains constant (d) both (a) and (b).
128. Which of the following produces a plane wave front?
- (a) Point source (b) Line source
 - (c) Extended source (d) None of the above

129. A single slit diffraction pattern is obtained using a beam of red light. What happens, if the red light is replaced by blue light?

- (a) There is no change in the diffraction pattern
- (b) Diffraction fringes become narrow and crowded together
- (c) Diffraction fringes become broader and farther apart
- (d) Diffraction pattern disappears

130. The final image produced by a simple microscope is

- (a) real and erect
- (b) real and inverted
- (c) virtual and erect
- (d) virtual and inverted

131. A reflecting telescope utilizes

- (a) a concave mirror
- (b) a convex mirror
- (c) a prism
- (d) a plano convex lens

132. A telescope is on the moon. If a tiny drop of ink falls on its objective, then

- (a) moon will appear black
- (b) field of view will be dark
- (c) there will be a dark spot in the field of view
- (d) brightness of the image will be slightly reduced

133. For observing a cricket match, binocular is preferred to terrestrial telescope for the reason that

- (a) the binocular is very easy to handle
- (b) the binocular provides three dimensional vision
- (c) the binocular produces image free of chromatic aberration
- (d) the binocular produces erect image

134. Laser beam is highly coherent so it can be used in

- (a) interference
- (b) diffraction
- (c) polarization
- (d) Rutherford scattering

135. A laser beam is monochromatic. It means that it has

- (a) single frequency
- (b) wide width
- (c) narrow width
- (d) several colour

136. A laser beam consists of

- (a) light material particles
- (b) electrons
- (c) highly coherent photons
- (d) cosmic rays

137. In Rayleigh scattering, the degree of scattering is proportional to fourth power of wavelength, but the size of the scattering medium's particles should be such that

- (a) size of particles is at least four times the wavelength used
- (b) size of particles is $1/4^{\text{th}}$ the wavelength of light
- (c) size of particles should be less than the wavelength of light used
- (d) size should be equal to wavelength

138. Deviation produced in a grating is independent of

- (a) wavelength of light
- (b) grating constant or element
- (c) refractive index of grating material
- (d) None of these

139. Phase difference between two successive Fresnel's Half Period Zones (H.P.Z.) is

- (a) Zero
- (b) $\pi/2$
- (c) π
- (d) 2π

140. The dispersive power of a grating is directly proportional to

- (a) wavelength
- (b) separation of lines
- (c) frequency of light used
- (d) is independent of light used

141. In Rayleigh scattering, the amount of scattered light is proportional to

- (a) $\frac{1}{\lambda}$
- (b) $\frac{1}{\lambda^2}$
- (c) $\frac{1}{\lambda^3}$
- (d) $\frac{1}{\lambda^4}$

142. As the wavelength used decreases the resolving power of the grating

- (a) increases
- (b) decreases
- (c) remains independent of the wave length
- (d) may increase or decrease

143. As a consequence of Brewster's law for polarization, it follows that the angle of polarization depends upon

- (a) the wavelength of light employed
- (b) plane of polarization's orientation
- (c) the amplitude of light employed
- (d) None of these

144. The spectrum obtained with a grating is called

- (a) grating spectrum
- (b) normal spectrum
- (c) anomalous spectrum
- (d) impure spectrum

145. The phenomenon of diffraction was discovered by

- (a) Huygen (b) Grimaldi
(c) Fresnel (d) Fraunhofer

146. In an interference pattern, points of minimum intensity are perfectly dark, and in a diffraction pattern, points of minimum intensity are

- (a) also perfectly dark (b) uniformly distributed
(c) not perfectly dark (d) None of these

147. As the diameter of the objective lens of a telescope increases, the resolution of the telescope

- (a) decreases
(b) increases
(c) remains the same
(d) depends on the focal length of the lens

148. LASER is a device for

- (a) producing a beam of white light
(b) producing a beam of monochromatic and coherent light
(c) producing a beam of high intensity incoherent light
(d) producing a beam of highly penetrating X-rays

149. Which of the following phenomena is responsible for the production of shadow?

- (a) Interference of light (b) Diffraction of light
(c) Polarization of light (d) Rectilinear propagation of light

150. Sound wave generally show diffraction effects, the reason is that

- (a) nature of sound wave is different from light waves
(b) wave length of sound wave is large
(c) sound is a transverse wave as well as longitudinal disturbance
(d) wavelength of sound wave is very small