1 Sir Isaac Newton described light as:

- A Tiny particles
- B Waves
- C Wave-particles
- D Thermal waves
- E Gravitational waves

2 The particle theory of light can explain the following phenomena:

- A Dispersion
- B Reflection
- C Refraction
- D All of the above
- E None of the above

3 A light beam changes its direction when it strikes a boundary between air and water. Which of the following is responsible for this phenomenon?

A Diffraction

B Interference

C Reflection

D Refraction

E Polarization

4 When light crosses a boundary between air and water, the following quantity of light remains the same:

A Wavelength

B Speed

C Frequency

D None of the above

E All of the above

5 A beam of light has a wavelength of 600 nm in air. What is the frequency of the light ($c=3x10^8$ m/s)?

- A $5x10^{14}$ Hz
- B $2x10^{14}$ Hz
- C $3x10^{14}$ Hz
- D $6x10^{14}$ Hz
- E $8x10^{14}$ Hz

6 A light beam traveling in air with a wavelength of 500.0 nm falls on a glass block. What is the wavelength of the light beam in glass (n_{glass} = 1.500)?

A 500.0 nm

B 400.0 nm

C 666.7 nm

D 333.3 nm

E 900.0 nm

7 A light beam traveling in air with a wavelength of 650 nm falls on a glass block. What is the speed of the light beam in glass ($c = 3.0 \times 10^8$ m/s, $n_{glass} = 1.5$)?

- A 3.0×10^8 m/s
- B 2.0×10^8 m/s
- C 1.5×10^8 m/s
- D 1.0×10^8 m/s
- E 0.50×10^8 m/s

8 A light beam traveling in air with a wavelength of 600.0 nm falls on a glass block. What is the frequency of the light beam in glass ($c = 3x10^8$ m/s, $n_{glass} = 1.5$)?

A $5.0x10^{14}$ Hz

B $2.5x10^{14}$ Hz

C $3.0x10^{14}$ Hz

D $6.0x10^{14}$ Hz

E $2.0x10^{14}$ Hz

9 Light travels fastest in:

- A Glass
- B Diamond
- C Air
- D Vacuum
- E Water

10 Sun rays fall on a glass prism. Which of the following rays will be refracted the least?

- A Blue
- B Violet
- C Green
- D Yellow
- E Red

11 Which of the following theories can explain the bending of light behind obstacles forming a bright spot inside the shadow?

- A Particle theory of light
- B Wave theory of light
- C Kinetic theory
- D Special theory of relativity
- E Classical mechanics

12 The wave theory of light is associated with:

- A Isaac Newton
- B Albert Einstein
- C Max Planck
- D Christiaan Huygens
- E Robert Millikan

13 In Young's double-slit experiment, a series of bright and dark lines was observed. Which of the following principles is responsible for this phenomenon?

- A Polarization
- B Reflection
- C Dispersion
- D Interference
- E Refraction

14 A blue beam of light falls on two narrow slits producing an interference pattern on a screen. If instead of blue light, a red beam of light was used in the same experiment, which changes to the interference pattern can be observed?

A Interference fringes move closer to the central maximum.

B Interference fringes move further away from the central maximum.

C No change in interference.

D Bright fringes are replaced with dark fringes.

E The number of fringes increases.

15 In a Young's double-slit experiment, an interference pattern is observed on a screen. The apparatus is then submerged into water. What is the change in the interference pattern?

A No change in interference.

B The number of fringes increases.

C The fringes move closer to the central maximum.

D The fringes move further away from the central maximum.

E Bright fringes are replaced with dark fringes.

16 Two coherent light waves approaching a certain point on a screen produce a constructive interference pattern. The optical extra distance traveled by one of the waves is:

- A $\lambda/2$
- B $\lambda/3$
- C $3\lambda/2$
- D λ
- E $5\lambda/2$

17 In a Young's double-slit experiment the distance between the slits increases. What happens to the separation between the fringes?

A Increases.

B Decreases.

C Stays the same.

D Increases for the bright fringes and decreases for the dark fringes.

E Increases for the dark fringes and decreases for the bright fringes.

18 In a double-slit experiment, the distance between the slits is doubled. What happens to the separation between the two adjacent maxima?

A Doubles.

B Quadruples.

C Is cut in half.

D Is cut to a quarter.

E Stays the same.

19 A diffraction grating can be used to:

- A Analyze the intensity of a light beam.
- B Identify an element by its optical spectra.
- C Identify an element by its intensity.
- D Determine the speed of light.
- E All of the above.

20 A light beam spreads out when it travels through a narrow slit. Which of the following can explain this phenomenon?

- A Polarization
- B Reflection
- C Dispersion
- D Diffraction
- E Refraction

21 In a single-slit experiment, as a result of the interference of a laser beam, a student observes a set of red and dark concentric circles. When he increases the width of the slit, what happens to the interference pattern?

A The separation between the circles increases.

B The separation between the circles decreases.

C No change in interference pattern.

D The separation between the circles increases and then decreases.

E The separation between the circles decreases and then increases.

22 Colors in a soap bubble or in an oil slick on the road are caused by:

- A Diffraction
- B Polarization
- C Thin Film Interference
- D Light intensity change

23 Maxwell's Equations describe the integration of which two fundamental forces?

A Electricity and Magnetism

B Electricity and the Weak Nuclear force

C Magnetism and the Weak Nuclear force

D Magnetism and Gravity

E Electricity and the Strong Nuclear force

24 Allowing only the Electric Field component vibrating in one, specific plane of an electromagnetic wave through a special filter is called:

- A Diffraction
- B Polarization
- C Interference
- D Refraction
- E Reflection

25 Which of the following is the correct order of electromagnetic radiation with increasing frequency?

A Radio Waves, Visible Light, IR Radiation, UV Radiation, X-Rays, γ –Rays

B γ –Rays, Visible Light, IR Radiation, UV Radiation, X-Rays, Radio Waves

C Radio Waves, UV Radiation, Visible Light, IR Radiation, X-Rays, γ –Rays

D Radio Waves, Visible Light, X-Rays, IR Radiation, UV Radiation, γ –Rays

E Radio Waves, IR Radiation, Visible Light, UV Radiation, X-Rays, γ –Rays