MULTIPLE CHOICE QUESTIONS

1. What is the geometric shape of the wavefront that originates when a plane wave passes through a convex lens?
   a. **Converging spherical** b. Diverging spherical c. Plane d. None of the above

2. How can the fringe width increase in Young's double-slit experiment?
   a. By decreasing the width of the slit
   b. By reducing the separation of slits
   c. By reducing the wavelength of the slits
   d. By decreasing the distance between slits and the screen

3. What is the locus of all particles in a medium vibrating in the same phase called?
   a. Fringe b. Wavelet **c. Wavefront** d. None of the above

4. Which of the following factors does the intensity of light depend on?
   a. Frequency b. Wavelength **c. Amplitude** c. Velocity

5. Which of the following light phenomena confirms the transverse nature of light?
   a. Refraction of light b. Diffraction of light
   c. Dispersion of light **d. Polarization of light**

6. Polaroid glasses are used in sunglasses because
   a. They are cheaper
   b. They have a good colour
   c. They look fashionable
   d. They reduce the light intensity to half on account of polarization

7. Two light sources are said to be coherent when both the sources of light emit light of
   a. The same amplitude and phase
   b. The same intensity and wavelength
   c. The same speed
   d. The same wavelength and constant phase difference

8. Which of the following is an application of the Doppler Effect?
   a. Doppler Radius b. Doppler Spectrometer
   c. Doppler Velocimeter **d. All of the above**

9. Who discovered Poisson's bright spot?
   a. Fresnel b. Rayleigh c. Fraunhofer **d. Poisson**

10. Which of the following is conserved when light waves interfere?
    a. Intensity b. Amplitude c. Phase **d. None of the above**

11. Huygen's wave theory of light can not explain
(a) Photoelectric effect (b) interference (c) diffraction (d) polarisation

12. Wave optics is valid when characteristic dimensions are
(a) of the order of 1 mm.
(b) of the same order as the wavelength of light.
(c) much smaller than the wavelength of light
(d) much larger than the wave length of light

13. Interference pattern is obtained on a screen due to two identical coherent sources of monochromatic light. The intensity of the central bright fringe is I. When one of the sources is blocked, its intensity becomes I_0. The intensity in two situations is related as:
(a) $I = 2I_0$ (b) $I = I_0$ **(c) $I = 4I_0$** (d) $I = 3I_0$

14. In Young's Double Slit experiment using sodium light (λ = 5898 Å), 92 fringes are seen. If green colour (5461 Å) is used, how many fringes will be seen?
(a) 62 **(b) 99** (c) 67 (d) 85

15. Young's experiment established that:
(a) light consists of waves. (b) light consists of particles.
(c) light consists of both waves and particles. (d) none of these.

16. The condition for observing Fraunhoffer diffraction from a single slit is that the light wavefront incident on the slit should be:
(a) spherical (b) cylindrical **(c) plane** (d) none of these

17. Two coherent monochromatic light beams of intensities I and 4I are superimposed. The maximum and minimum possible intensities in the resulting beam are
(a) 9I and I (b) 5I and I (c) 9I and 3I (d) 5I and 3I

18. Two waves, orginating from sources S_1 and S_2 having zero phase difference and commonwave length λ, will show completely destructive interferene at a point Pif is
(a) $\frac{11}{2}\lambda$ (b) 2λ (c) 5λ (d) $\frac{3}{4}\lambda$

19. The principle of super position in wave motion tells that in a motion in which two or more waves are simultaneously producing their displacement in a particle, then the resultant:
(a) amplitude is the sum of the individual amplitudes.
(b) amplitude is the difference of the individual amplitudes.
(c) displacement is the vector sum of the individual displacements.
(d) none of these.

20. A diffraction pattern is obtained by using a beam of red light. What will happen if the red light is replaced by the blue light.
(a) No change will take place.
(b) Bands become broader and farther apart.
(c) Bands disappear
(d) Diffraction bands become narrower and crowded.

21. Interference takes place due to
(a) Amplitude change
(b) Velocity change

(c) Intensity
(d) Phase difference.

22. One important similarity between sound and light waves is that both:
(a) can pass through even in the absence of any medium.
(b) can show interference effects.
(c) are transverse waves.
(d) travel at the same speed in air.

23. Two waves of the same frequency and same intensity are super impossed in the same phase. The intensity of the resultant wave at the Central point will be
(a) equal to that of the individual wave.
(b) 3 times that of individual wave.
(c) 2 times that of individual wave.
(d) 4 times that of individual wave.

FILL IN THE BLANKS

1. The linearly polarised waves are all …… waves. **(transverse)**

2. If an unpolarised light wave is incident a polaroid then the light wave will get linearly polarised with the electric vector oscillating along a direction perpendicular to the aligned molecules. This direction is known as the ……. of the polaroid**.(pass-axis)**

3. …… can be used to control the intensity, in sunglasses, windowpanes. **(Polaroids)**

4. Width of the central diffraction maximum on immersing the apparatus in a denser medium of refrictive index μ becomes …….. its width in air and wavelength becomes ……**(**$\frac{1}{\mu}$, $\frac{1}{\mu}$**)**

5. The dark lines in solar spectrum are called …….. lines**.(Fraunhoffer)**

6. The refractive index is equal to the tangent of the angle of polarisation. It is called …….. law.**(Brewster's)**

7. The wave theory of light in its original form was first postulated by ……**(Christian Huygens)**

8. In propagation of light waves, the angle between the plane of vibration and the plane of polarization is ……**(90^0)**

9. Light waves spreading from two sources produce interference only if they have ……**(Same frequency and constant phase difference)**

10. Fringe width of the fringes is …….. when the apparatus is immersed in water**.(decreased)**

5 MARKS QUESTIONS:

1. Using Huygens wave theory of light, show that the angle of incidence is equal to angle of reflection in case of reflection of a plane wave by a plane surface.

2. Arrive at Snell's law, using Huygen's principle for refraction of a plane wave.
3. In young double slit experiment show that dark and bright fringes are equally spaced.
4. Discuss the interference pattern produced by the superposition of two waves.