INTERFERENCE AND DIFFRACTION

1) Wave nature of light is evidenced by

A) photoelectric effect **B)** interference **C)** black body radiation **D)** none

2) When a soap bubble is illuminated with white light, multiple colors appear. This is due to

A) diffraction **B)** polarization **C)** total internal reflection **D)** interference

3) Two light sources are said to be coherent waves if their light waves have

A) same frequency **B)** constant phase difference **C)** same wavelength **D)** all the above

4) Newton's rings experiment is an example for

A) division of amplitude **B)** division of wavefront **C)** both **A** and **B** **D)** none

5) In Newton's rings experiment, the condition for dark fringes in case of reflected light is

A) $2t = n\lambda$ **B)** $2t = (2n-1)\frac{\lambda}{2}$ **C)** $2t = (2n-1)\lambda$ **D)** none

6) The penetration of waves into the regions of the geometrical shadow is

A) interference **B)** diffraction **C)** polarization **D)** dispersion

7) In Fraunhofer diffraction, the wavefront undergoing diffraction has to be

A) spherical **B)** cylindrical **C)** elliptical **D)** plane

8) A diffraction grating has

A) large number of equidistant slits **B)** large number of random distant slits

C) only one slit **D)** none

9) In diffraction grating, the condition for principal maxima is

A) $(a+d)\sin\theta = n\lambda$ **B)** $d\sin\theta = n\lambda$ **C)** $\sin\theta = n\lambda$ **D)** $a\sin\theta = n\lambda$

10) Resolving power of grating is (*N* is the total number of lines on the grating)

A) directly proportional to *N* **B)** inversely proportional to *N* **C)** independent of *N* **D)** none

11) The expression for resolving power of a grating is

A) $\frac{n}{N}$ **B)** nN **C)** n^2N **D)** none

12) The ability of an instrument to separate the two distant point objects very close to each other is called as its

A) resolving power **B)** dispersive power **C)** magnifying power **D)** interference

13) The expression for resolving power of a telescope is

A) $\frac{\lambda}{1.22\,d}$ **B)** $\frac{d}{1.22\,\lambda}$ **C)** $\frac{d}{1.22\,d\lambda}$ **D)** $\frac{1.22\,\lambda}{d}$

14) The resolving power of the microscope becomes higher when

A) limit of resolution is large **B)** limit of resolution is small **C)** limit of resolution is 0 **D)** none

15) The wave front gives

A) Surface of the wave **B)** Locus of all the points having the same displacement
C) Locus of all the points having the same phase **D)** geometry of the wave

16) If 1000 is the resolving power of a grating in its first order, its resolving power in second order is given by

A) 500 **B)** 1000 **C)** 2000 **D)** None of these

17) The expression for fringe width of wedge shaped film β is

A) $\beta=\frac{\lambda}{\theta}$ **B)** $\beta=\frac{2\lambda}{\theta}$ **C)** $\beta=\lambda 2\theta$ **D)** $\beta=\frac{\lambda}{2\theta}$

18) In Newton's rings experiment, the diameter of dark ring is proportional to (*n* = natural number)

A) $\sqrt{n}$ **B)** n **C)** $\sqrt{(2n-1)}$ **D)** none

19) The class of diffraction in which lenses are required is

A) Fresnel **B)** Fraunhofer **C)** both **A** and **B** **D)** none

20) The expression for intensity of light in Fraunhofer diffraction at single slit is

A) $I_\theta=I_m\left[\frac{\sin\alpha}{\alpha}\right]$ **B)** $I_\theta=I_m^2\left[\frac{\sin\beta}{\beta}\right]$ **C)** $I_\theta=I_m\left[\frac{\sin\beta}{\beta}\right]^2$ **D)** none

21) Maximum number of orders possible with a grating is

A) directly proportional to wavelength **B)** directly proportional to grating element

C) independent of grating element **D)** inversely proportional to grating element

22) A grating has 5 cm of surface, ruled with 6000 lines/cm. What is the resolving power of grating in the first order ?

A) 1200 **B)** 12000 **C)** 30000 **D)** 3000

23) Wave theory was postulated by

A) Newton **B)** Huygens **C)** Focault **D)** Maxwell

24) The wave front gives

A) Surface of the wave **B)** Locus of all the points having the same displacement

C) Locus of all the points having the same phase **D)** geometry of the wave

25) The intensity of the light wave is given by

A) its electric vector **B)** the square of its electric vector

C) the magnetic vector **D)** the Poynting vector

26) Phase change occurs

A) When light wave progresses from one medium to other

B) When it undergoes reflection in a rarer medium against denser medium

C) When it undergoes reflection in a denser medium against a denser medium

D) When a wave encounters another wave.

27) The width of the single slit is halved in Fraunhofer diffraction. The first minimum

A) moves away from the center of the screen **B)** moves towards the centre of the screen.

C) moves to the center of the screen **D)** remains as the same position.

28) Diffraction was discovered by

A) Newton **B)** Huygens **C)** Grimaldi **D)** Fresnel

29) Which of the following is conserved when light waves interfere ?

A) Intensity **B)** Energy **C)** Amplitude **D)** None

30) What is the ratio of phase difference to the path difference between two light waves

A) $2\pi\lambda$ **B)** $\frac{2\pi}{\lambda}$ **C)** $\frac{\lambda}{2\pi}$ **D)** $\frac{1}{2\pi\lambda}$

31) To observe interference in thin films with light of wavelength λ , the thickness of the film *t*

A) $t \approx 100\,\lambda$ **B)** $t \approx 1000\,\lambda$ **C)** $t \approx \lambda$ **D)** no relation

32) Two waves having the intensities in the ratio of 9 : 1 produce interference. The ratio of maximum to minimum intensity is equal to

A) 10 : 8 **B)** 9 : 1 **C)** 4 : 1 **D)** 2 : 1

33) During the interference of light, energy is

A) created at maxima **B)** destroyed at minima **C)** not conserved **D)** redistributed

34) A thin film is observed in white light. The color of the film seen at a particular point depends upon the

A) width of source **B)** distance of source **C)** location of observer **D)** none of the above

35) Which of the following is essential for observing diffraction

A) a narrow slit **B**) two coherent sources **C)** a screen **D)** white light

36) Diffraction pattern cannot be observed with

A) two narrow slits **B)** large number of narrow slits **C)** one narrow slit **D)** one wide slit

37) Which property of light is confirmed by diffraction ?

A) wave nature **B)** transverse wave nature **C)** longitudinal wave nature **D)** quantum nature

38) For Fraunhofer diffraction, the first diffraction minima due to a single slit diffraction is at $\theta = 30^0$ for a light of 5000 A^0 wavelength. The width of the slit is

A) $5 \times 10^{-5} cm$ **B)** $10 \times 10^{-5} cm$ **C)** $2.5 \times 10^{-5} cm$ **D)** $1.255 \times 10^{-5} cm$

39) Blue light has been used to obtain the diffraction pattern of a narrow slit on a screen. Keeping the experimental set up unchanged, if blue light is replaced by red light, the diffraction pattern will be

A) wider B) narrower C) unchanged D) disappear

40) When white light is incident on a diffraction grating, the light that will be deviated most from the central image will be

A) yellow **B)** violet **C)** indigo **D)** red

ANSWERS

1) B 2) D 3) D 4) A 5) A 6) B 7) D 8) A 9) A 10) A 11) B 12) A 13) B

14) B 15) C 16) C 17) D 18) A 19) B 20) C 21) B 22) C 23) B 24) C 25) B 26) B

27) D 28) C 29) B 30) B 31) C 32) C 33) D 34) C 35) A 36) D 37) A 38) B 39) A

40) D