Physics Grade 12 Unit 3

Wave Optics (19 Questions)

33. Two coherent waves from two slits travel to a distant screen to produce the second maximum interference pattern. The difference in the distance traveled by the waves is:

A)half wavelength.
C) one fourth wavelength
B) four wavelength
D) two wavelengths.

34. In a Young's double-slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen, the screen-to-slit distance D must be changed to:

A) 2D
C) $\sqrt{2}\,D$
B) $\frac{D}{2}$
D) $\frac{D}{\sqrt{2}}$

35. What is the minimum thickness of a soap-bubble film ($n=4/3$) that will result in constructive interference in the reflected light if the film is illuminated by light with wavelength 500nm in free space.

A) 187.5 nm
C) 275.5 nm
B) 93.75 nm
D) 125.5 nm

18. Which phenomenon is responsible for the colors seen on a thin oil film on the water surface?

(A) Diffraction
(C) Superposition
(B) Interference
(D) Refraction

41. 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 colors between violet and red.
(D) Only the central fringe is white, all other fringes are colored.

48. When a soap bubble is in air, it exhibits different colours under sunlight. The absence of a particular colour in a region is due to

(A) double refraction.
(B) straight line propagation of light.
(C) destructive interference of light of that colour in that region.
(D) constructive interference of light of that colour in that region.

36. In Young's double slit experiment both the separation between the slits and the distance between the slits and the screen are halved then, what is the frige width?

A. halved B. unchanged C. zero D. doubled

41. A thin film of oil (n=1.25) is located on a smooth wet floor. When viewed perpendicular to the floor, the film refects most strongly red light at 640 nm and reflects no blue light at 512 nm. How thick is the oil film?

A. 640 nm B. 612 nm C. 548 nm D. 512 nm

46. Refraction of a wave does NOT involve change in its

A. speed.
B. wavelength.
C. frequency.
D. speed and wavelength.

24. A viewing screen is separated from a double slit by 4.80 m. The distance between the two slits is 0.030 mm. Monochromatic light is directed toward the double slit and forms and interference pattern on the screen. The first dark fringe is 4.50 cm from the center line on the screen. What is the wavelength of the light?

A. 1250nm B. 1875nm C. 2500nm D. 5625nm

35. Two separate coherent sources produce waves whose wavelengths are 0.10m. Which statement is correct about points that are 3.2m away from one source?

A. Constructive interference occurs if the points are 3.0m from the other source.
B. Constructive interference occurs if the points are 3.05m from the other source.
C. Constructive interference occurs if the points are 2.95m from the other source.
D. Destructive interference occurs if the points are 3.2m from the other

43. Suppose that the index of refraction of a soap – bubble film is 1.25, what is the minimum thickness of the soap-bubble film that results in constructive interference in the reflected light if the film is illuminated with light whose wavelength in free space is $\lambda = 600nm$?

120nm B. 150nm C. 300nm D. 450nm

34. A wave traveling from a medium of index of refraction n_1 toward a medium of index of refraction n_2 undergoes partly transmission and partly reflection. If n_2 is greater than n_1 which one of the following statements is not correct?

A. The speed of the wave in the medium with reflective index n_1 is smaller than with n_2.
B. The incident and the reflected waves are in-phase.
C. The angel of reflection is the same as the angle off incidence.
D. The reflection angle is less than the incidence angel.

35. In Young's double –slit experiment interference pattern which one of the following activities move the successive bright fringes farther apart?

A. Decreasing the wave length of the light.
B. Decreasing the distance between the viewing screen and the double slit.
C. Increasing the slit spacing.
D. Decreasing the slit spacing.

37. When viewed in white light, soap bubbles show color because of:

(A) interference
(B) dispersion
(C) scattering
(D) diffraction

39. A 632.8 nm laser light produces an interference pattern on a screen of 4.0 m from a pair of slits. The slit space is equal to 0.2 mm. Calculate the fringe width.

(A) 6.33 mm (B) 25.3 mm (C) 12.7 mm (D) 15.3 cm

40. Why is an interference pattern **NOT** observed between the lights produced from a pair of car headlights?

(A) The light sources are not collimated.
(B) The light sources are not coherent.
(C) Interference is observed only in laboratory conditions.
(D) The spread of light as it travels out of the source.

34. In Young's double slit experiment, if the slit separation is 1.2mm and the average spacing of the bright fringes observed on a screen placed 4m away from the source is 2mm. What is the wavelength of the light source?

(A) 550nm (B) 600nm (C) 630nm (D) 750nm

35. The colors seen from soap bubbles and oil slicks are a manifestation of thin film interference. What is the cause of this interference?

(A) Interference from refraction of light
(B) Interference from reflection of light from the two surfaces of the film
(C) Interference from diffraction of light
(D) Interference from superposition of lights that are incident and reflected