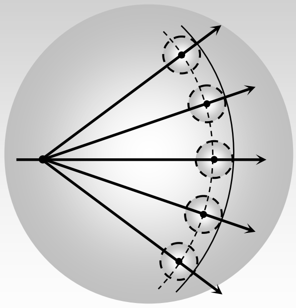


Assignment

Nature of light and interference of light

1. The dual nature of light is exhibited by **[KCET 1999; AIIMS 2001; BHU 2001; Bihar CEE 2004]**

(a) Diffraction and photoelectric effect (b) Diffraction and reflection

(c) Refraction and interference (d) Photoelectric effect

2. Huygen wave theory allows us to know **[AFMC 2004]**

(a) The wavelength of the wave (b) The velocity of the wave

(c) The amplitude of the wave (d) The propagation of wave fronts

3. When a beam of light is used to determine the position of an object, the maximum accuracy is achieved if the light is **[AIIMS 2003]**

(a) Polarised (b) Of longer wavelength (c) Of shorter wavelength (d) Of high intensity

4. Which of the following phenomenon does not show the wave nature of light **[RPET 2003; MP PMT 2003]**

(a) Diffraction (b) Interference (c) Refraction (d) Photoelectric effect

5. As a result of interference of two coherent sources of light, energy is **[MP PMT 2002; KCET 2003]**

(a) Increased

(b) Redistributed and the distribution does not vary with time

(c) Decreased

(d) Redistributed and the distribution changes with time

6. To demonstrate the phenomenon of interference, we require two sources which emit radiation **[AIEEE 2003]**

(a) Of the same frequency and having a definite phase relationship

(b) Of nearly the same frequency

(c) Of the same frequency

(d) Of different wavelengths

7. Consider the following statements

Assertion (A): Thin films such as soap bubble or a thin layer of oil on water show beautiful colours, when illuminated by white light.

Reason (R) : It happens due to the interference of light reflected from the upper surface of the thin film.

Of these statements **[AIIMS 2002]**

(a) Both A and R are true but R is a correct explanation of A (b) Both A and R are true but R is not a correct explanation of A

(c) A is true but R is false
(d) A is false but R is true
(e) Both A and R are false

8. When light passes from one medium into another medium, then the physical property which does not change is

[CPMT 1990; MNR 1995; AMU 1995; UPSEAT 1999, 2000; MP PET 2002; RPET 1996, 2003; AFMC 1993, 98, 2003]

(a) Velocity (b) Wavelength (c) Frequency (d) Refractive index

9. The frequency of light ray having the wavelength 3000$\mathring{A}$ is **[DPMT 2002]**

(a) 9×10^{13} *cycles/sec* (b) 10^{15} *cycles/sec* (c) 90 *cycles/sec* (d) 3000 *cycles/sec*

10. Two coherent sources of different intensities send waves which interfere. The ratio of maximum intensity to the minimum intensity is 25. The intensities of the sources are in the ratio **[RPMT 1989; UPSEAT 2002]**

(a) 25 : 1 (b) 5 : 1 (c) 9 : 4 (d) 25 : 16

11. What is the path difference of destructive interference **[AIIMS 2002]**

(a) $n\lambda$ (b) $n(\lambda + 1)$ (c) $\frac{(n+1)\lambda}{2}$ (d) $\frac{(2n+1)\lambda}{2}$

12. Two coherent monochromatic light beams of intensities I and $4I$ are superposed. The maximum and minimum possible intensities in the resulting beam are

[IIT-JEE 1988; AIIMS 1997; MP PMT 1997; MP PET 1999; KCET (Engg./Med.) 2000; MP PET 2002]

(a) $5I$ and I (b) $5I$ and $3I$ (c) $9I$ and I (d) $9I$ and $3I$

13. Laser beams are used to measure long distance because **[DCE 2001]**

(a) They are monochromatic
(b) They are highly polarised
(c) They are coherent
(d) They have high degree of parallelism

14. Wave nature of light is verified by **[RPET 2001]**

(a) Interference (b) Photoelectric effect (c) Reflection (d) Refraction

15. If the wavelength of light in vacuum be λ, the wavelength in a medium of refractive index n will be**[UPSEAT 2001; MP P**

(a) $n\lambda$ (b) $\frac{\lambda}{n}$ (c) $\frac{\lambda}{n^2}$ (d) $n^2\lambda$

16. Newton postulated his corpuscular theory on the basis of **[UPSEAT 2001; KCET 2001]**

(a) Newton's rings
(b) Colours of thin films
(c) Rectilinear propagation of light
(d) Dispersion of white light

17. Two coherent sources of intensities. I_1 and I_2 produce an interference pattern. The maximum intensity in the interference pattern will be **[UPSEAT 2001; MP PET 2001]**

(a) $I_1 + I_2$ (b) $I_1^2 + I_2^2$ (c) $(I_1 + I_2)^2$ (d) $(\sqrt{I_1} + \sqrt{I_2})^2$

18. Which one among the following shows particle nature of light **[CBSE PM/PD 2001]**

(a) Photo electric effect (b) Interference (c) Refraction (d) Polarization

19. For constructive interference to take place between two monochromatic light waves of wavelength λ, the path difference should be

[MNR 1992; UPSEAT 2001]

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

20. In a wave, the path difference corresponding to a phase difference of ϕ is **[MP PET 2000]**

(a) $\frac{\pi}{2\lambda}\phi$ (b) $\frac{\pi}{\lambda}\phi$ (c) $\frac{\lambda}{2\pi}\phi$ (d) $\frac{\lambda}{\pi}\phi$

21. A beam of monochromatic blue light of wavelength 4200$\mathring{A}$ in air travels in water, its wavelength in water will be **[UPSEAT 2000]**

(a) 2800$\mathring{A}$ (b) 5600$\mathring{A}$ (c) 3150$\mathring{A}$ (d) 4000$\mathring{A}$

22. Wave front originating from a point source is **[RPET 2000]**

(a) Cylindrical (b) Spherical (c) Plane (d) Cubical

23. Waves that can not be polarised are **[KCET 2000]**

(a) Transverse waves (b) Longitudinal waves (c) Light waves (d) Electromagnetic waves

24. According to Huygen's wave theory, point on any wave front may be regarded as **[J & K CET 2000]**

(a) A photon (b) An electron (c) A new source of wave (d) Neutron

25. The light produced by a laser is all the following except **[JIPMER 2000]**

(a) Incoherent (b) Monochromatic

(c) In the form of a narrow beam (d) Electromagnetic

26. The phenomena of interference is shown by **[MNR 1994; MP PMT 1997; AIIMS 1999, 2000; JIPMER 2000; UPSEAT 1994, 2000**

(a) Longitudinal mechanical waves only (b) Transverse mechanical waves only

(c) Electromagnetic waves only (d) All the above types of waves

27. If the ratio of amplitude of two waves is 4 : 3, then the ratio of maximum and minimum intensity is **[MP PMT 1996; AFMC 1997; RPET 2000]**

(a) 16 : 18 (b) 18 : 16 (c) 49 : 1 (d) 94 : 1

28. If the distance between a point source and screen is doubled, then intensity of light on the screen will become **[RPET 1997; RPMT 1999]**

(a) Four times (b) Double (c) Half (d) One-fourth

29. Soap bubble appears coloured due to the phenomenon of **[CPMT 1972, 83, 86; AFMC 1995, 97; RPET 1997; CBSE PMT 1997; AFMC 1997]**

(a) Interference (b) Diffraction (c) Dispersion (d) Reflection

30. Two waves are known to be coherent if they have **[RPMT 1994, 95, 97; MP PMT 1996; MNR 1995]**

(a) Same amplitude (b) Same wavelength

(c) Same amplitude and wavelength (d) Constant phase difference and same wavelength

31. An oil flowing on water seems coloured due to interference. For observing this effect, the approximate thickness of the oil film should be **[DPMT 1987; JIPMER 1997]**

(a) 100 Å (b) 10000 Å (c) 1 *mm* (d) 1 *cm*

32. If L is the coherence length and c the velocity of light, the coherent time is **[MP PMT 1996]**

(a) cL (b) $\frac{L}{c}$ (c) $\frac{c}{L}$ (d) $\frac{1}{Lc}$

33. By a monochromatic wave, we mean **[AFMC 1995]**

(a) A single ray (b) A single ray of a single colour

(c) Wave having a single wavelength (d) Many rays of a single colour

34. Two coherent sources of light produce destructive interference when phase difference between them is **[MP PMT 1994;**

(a) 2π (b) π (c) $\pi/2$ (d) 0

35. Which one of the following statements is correct **[KCET 1994]**

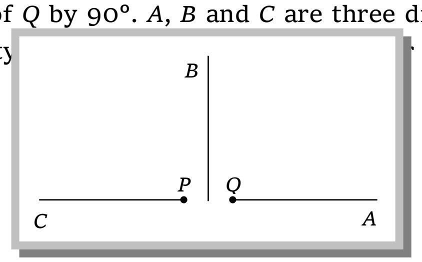
(a) In vacuum, the speed of light depends upon frequency

(b) In vacuum, the speed of light does not depend upon frequency

(c) In vacuum, the speed of light is independent of frequency and wavelength

(d) In vacuum, the speed of light depends upon wavelength

36. Figure here shows P and Q as two equally intense coherent sources emitting radiations of wavelength 20 *m*. The separation PQ is 5.0 *m* and phase of P is ahead of the phase of Q by 90°. A, B and C are three distant points of observation equidistant from the mid-point of PQ. The intensity the ratio **[NSEP 1994]**



(a) 0 : 1 : 4

(b) 4 : 1 : 0

(c) 0 : 1 : 2

(d) 2 : 1 : 0

37. In Huygen's wave theory, the locus of all points in the same state of vibration is called **[CBSE PMT 1993]**

(a) A half period zone (b) Vibrator (c) A wavefront (d) A ray

38. The idea of the quantum nature of light has emerged in an attempt to explain **[CPMT 1990]**

(a) Interference (b) Diffraction

(c) Radiation spectrum of a black body (d) Polarisation

39. The necessary condition for an interference by two source of light is that the **[RPMT 1988; CPMT 1989]**

(a) Two monochromatic sources should be of same amplitude but with a constant phase

(b) Two sources should be of same amplitude

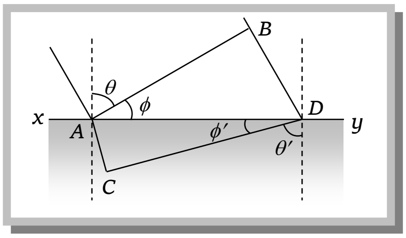
(c) Two point sources should have phase difference varying with time

(d) Two sources should be of same wavelength

40. If the intensity of the waves observed by two coherent sources is I. Then the intensity of resultant waves in constructive interference will be **[RPET 1988]**

(a) $2I$ (b) $4I$ (c) I (d) None of these

41. In figure, a wavefront AB moving in air is incident on a plane glass surface xy. Its position CD after refraction through a glass slab is shown also along with normals drawn at A and D. the refractive index of glass with respect to air will be equal to **[CPMT 1986, 88]**



(a) $\frac{\sin\theta}{\sin\theta'}$

(b) $\frac{\sin\theta}{\sin\phi'}$

(c) (BD/AC)

(d) (AB/CD)

42. Four independent waves are expressed as

(i) $y_1 = a_1 \sin \omega t$ (ii) $y_2 = a_2 \sin 2\omega t$ (iii) $y_3 = a_3 \cos \omega t$ (iv) $y_4 = a_4 \sin(\omega t + \pi/3)$

The interference is possible between **[CPMT 1986]**

(a) (i) and (ii) (b) (i) and (iv) (c) (iii) and (iv) (d) Not possible at all

43. Colour of light is known by its **[MP PMT 1984]**

(a) Velocity (b) Amplitude (c) Frequency (d) Polarisation

44. Laser light is considered to be coherent because it consists of **[CPMT 1972]**

(a) Many wavelengths (b) Uncoordinated wavelengths

(c) Coordinated waves of exactly the same wavelength (d) Divergent beams

45. A laser beam may be used to measure very large distances because **[CPMT 1972]**

(a) It is unidirectional (b) It is coherent (c) It is monochromatic (d) It is not absorbed

46. Interference patterns are not observed in thick films, because

(a) Most of the incident light intensity is observed within the film

(b) A thick film has a high coefficient of reflection

(c) The maxima of interference patterns are far from the minima

(d) There is too much overlapping of colours washing out the interference pattern

47. Phenomenon of interference is not observed by two sodium lamps of same power. It is because both waves have

(a) Not constant phase difference (b) Zero phase difference

(c) Different intensity (d) Different frequencies

Young's double slit experiment

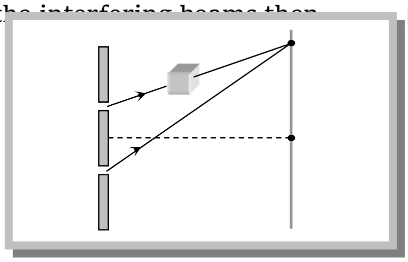
Basic Level

48. In a Young's double slit experiment, the separation between the two slits is 0.9 *mm* and the fringes are observed one *metre* away. If it produces the second dark fringe at a distance of 1 *mm* from the central fringe, the wavelength of monochromatic source of light used is

[KCET 2004]

(a) 500 *nm* (b) 600 *nm* (c) 450 *nm* (d) 400 *nm*

49. A monochromatic beams of light is used for the formation of fringes on the screen by illuminating the two slits in the Young's double slit mica is interposed in the path of one of the interfering beams then **[AIIMS 2004]**



(a) The fringe width increases

(b) The fringe width decreases

(c) The fringe width remains the same but the pattern shifts

(d) The fringe pattern disappears

50. In a Young's double-slit experiment the fringe width is 0.2 *mm*. If the wavelength of light used is increased by 10% and the separation between the slits is also increased by 10%, the fringe width will be **[MP PMT 2004]**

(a) 0.20 *mm* (b) 0.401 *mm* (c) 0.242 *mm* (d) 0.165 *mm*

51. In Young's experiment, the distance between the slits is reduced to half and the distance between the slit and screen is doubled, then the fringe width**[IIT 1981; MP PMT 1994; RPMT 1997; KCET (Engg./Med.) 2000; UPSEAT 2000; AMU**

(a) Will not change (b) Will become half (c) Will be doubled (d) Will become four times

52. In an interference experiment, third bright fringe is obtained at a point on the screen with a light of 700 *nm*. What should be the wavelength of the light source in order obtain 5th bright fringe at the same point**[KCET 2003]**

(a) 500 *nm* (b) 630 *nm* (c) 750 *nm* (d) 420 *nm*

53. In Young's double-slit experiment the fringe width is β. If entire arrangement is placed in a liquid of refractive index *n*, the fringe width becomes **[KCET 2003]**

(a) $\dfrac{\beta}{n+1}$ (b) $n\beta$ (c) β / n (d) $\beta / n - 1$

54. If the separation between slits in Young's double slit experiment is reduced to $\frac{1}{3}rd$, the fringe width becomes *n* times. The value of *n* is **[MP PET 2003]**

(a) 3 (b) $\frac{1}{3}$ (c) 9 (d) $\frac{1}{9}$

55. When a thin transparent plate of thickness *t* and refractive index μ is placed in the path of one of the two interfering waves of light, then the path difference changes by **[MP PMT 2002]**

(a) $(\mu + 1)t$ (b) $(\mu - 1)t$ (c) $\dfrac{(\mu+1)}{t}$ (d) $\dfrac{(\mu-1)}{t}$

56. In a Young's double slit experiment, the source illuminating the slits is changed from blue to violet. The width of the fringes

[Kerala CET (Med.) 2002]

(a) Increases (b) Decreases (c) Becomes unequal (d) Remains constant

57. In Young's double slit experiment, the intensity of light coming from the first slit is double the intensity from the second slit. The ratio of the maximum intensity to the minimum intensity on the interference fringe pattern observed is

[KCET (Med.) 2002]

(a) 34 (b) 40 (c) 25 (d) 38

58. In Young's double slit experiment the wavelength of light was changed from 7000Å to 3500Å. While doubling the separation between the slits which of the following is not true for this experiment **[Orissa JEE 2002]**

(a) The width of the fringes changes

(b) The colour of bright fringes changes

(c) The separation between successive bright fringes changes

(d) The separation between successive dark fringes remains unchanged

59. In Young's double slit experiment, the central bright fringe can be identified **[KCET (Engg.) 2002]**

(a) By using white light instead of monochromatic light (b) As it is narrower than other bright fringes

(c) As it is wider than other bright fringes (d) As it has a greater intensity than the other bright fringes

60. Interference was observed in interference chamber when air was present, now the chamber is evacuated and if the same light is used, a careful observer will see **[CBSE PMT 1993; DPMT 2000; BHU 2002]**

(a) No interference

(b) Interference with bright bands

(c) Interference with dark bands

(d) Interference in which width of the fringe will be slightly increased

61. A slit of width *a* is illuminated by white light. For red light $(\lambda = 6500\,Å)$. The first minima is obtained at $\theta = 30^o$. Then the value of *a* will be **[MP PMT 1987; CPMT 2002]**

(a) 3250 Å (b) $6.5 \times 10^{-4}\,mm$ (c) 1.24 *microns* (d) $2.6 \times 10^{-4}\,cm$

62. In the Young's double slit experiment with sodium light. The slits are 0.589 *m* apart. The angular separation of the third maximum from the central maximum will be (given λ = 589 *mm*) **[Pb. PMT 2002]**

(a) $\sin^{-1}(0.33 \times 10^{8})$ (b) $\sin^{-1}(0.33 \times 10^{-6})$ (c) $\sin^{-1}(3 \times 10^{-8})$ (d) $\sin^{-1}(3 \times 10^{-6})$

63. In the Young's double slit experiment for which colour the fringe width is least **[MP PMT 1994; UPSEAT 2001; MP PET 200**

(a) Red (b) Green (c) Blue (d) Yellow

64. In a Young's double slit experiment, the separation of the two slits is doubled. To keep the same spacing of fringes, the distance *D* of the screen from the slits should be made **[AMU (Engg.) 2001]**

(a) $\frac{D}{2}$ (b) $\frac{D}{\sqrt{2}}$ (c) 2*D* (d) 4*D*

65. Consider the following statements

Assertion (*A*): In Young's experiment, the fringe width for dark fringes is different from that for bright fringes.

Reason (*R*) : In Young's double slit experiment performed with a source of white light, only black and bright fringes are observed

Of these statements **[AIIMS 2001]**

(a) Both *A* and *R* are true and *R* is a correct explanation of *A* (b) Both *A* and *R* are true but *R* is not a correct explanation of *A*

(c) Both *A* and *R* are false (d) *A* is false but *R* is true

(e) *A* is true but *R* is false

66. In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 *nm* is used. If the wavelength of light is changed to 400 *nm*, number of fringes observed in the same segment of the screen is given by **[IIT-JEE (Screening) 2001]**

(a) 12 (b) 18 (c) 24 (d) 30

67. In Young's double slit experiment, a mica slit of thickness *t* and refractive index μ is introduced in the ray from the first source S_1. By how much distance the fringes pattern will be displaced **[RPMT 1996, 97; JIPMER 2000]**

(a) $\frac{d}{D}(\mu - 1)t$ (b) $\frac{D}{d}(\mu - 1)t$ (c) $\frac{d}{(\mu - 1)D}$ (d) $\frac{D}{d}(\mu - 1)$

68. Young's double slit experiment is performed with light of wavelength 550 *nm*. The separation between the slits is 1.10 *mm* and screen is placed at distance of 1 *m*. What is the distance between the consecutive bright or dark fringes **[Pb. PMT 2000]**

(a) 1.5 *mm* (b) 1.0 *m* (c) 0.5 *mm* (d) None of these

69. In interference obtained by two coherent sources, the fringe width (β) has the following relation with wavelength (λ) **[CPMT 1997; MP PMT 2000]**

(a) $\beta \propto \lambda^2$ (b) $\beta \propto \lambda$ (c) $\beta \propto 1/\lambda$ (d) $\beta \propto \lambda^{-2}$

70. In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then in the interference pattern **[IIT-JEE (Screening) 2000]**

(a) The intensities of both the maxima and the minima increase

(b) The intensity of maxima increases and the minima has zero intensity

(c) The intensity of maxima decreases and that of the minima increases

(d) The intensity of maxima decreases and the minima has zero intensity

71. In Young's double slit experiment with a source of light of wavelength 6320$\mathring{A}$, the first maxima will occur when **[Roorkee 1999]**

(a) Path difference is 9480 $\mathring{A}$ (b) Phase difference is 2π radian

(c) Path difference is 6320 $\mathring{A}$ (d) Phase difference is π radian

72. If a transparent medium of refractive index μ = 1.5 and thickness $t = 2.5 \times 10^{-5}$ *m* is inserted in front of one of the slits of Young's double slit experiment, how much will be the shift in the interference pattern? The distance between the slits is 0.5 *mm* and that between slits and screen is 100 *cm* **[AIIMS 1999]**

(a) 5 *cm* (b) 2.5 *cm* (c) 0.25 *cm* (d) 0.1 *cm*

73. If a torch is used in place of monochromatic light in Young's experiment what will happens **[MH CET (Med.) 1999; KCET (Med.) 1999]**

(a) Fringe will appear for a moment then it will disappear (b) Fringes will occur as from monochromatic light

(c) Only bright fringes will appear (d) No fringes will appear

74. When a thin metal plate is placed in the path of one of the interfering beams of light **[KCET (Engg./Med.) 1999]**

(a) Fringe width increases (b) Fringes disappear (c) Fringes become brighter (d) Fringes become blurred

75. What happens by the use of white light in Young's double slit experiment **[Similar to (AIIMS 2001; Kerala 2000); IIT-JEE 1987; RPMT 1993; MP PMT 1996; RPET 1998; UPSEAT 1999]**

(a) Bright fringes are obtained

(b) Only bright and dark fringes are obtained

(c) Central fringe is bright and two or three coloured and dark fringes are observed

(d) None of these

76. Young's experiment is performed in air and then performed in water, the fringe width **[CPMT 1990; MP PMT 1994; RPMT**

(a) Will remain same (b) Will decrease (c) Will increase (d) Will be infinite

77. In Young's experiment, one slit is covered with a blue filter and the other (slit) with a yellow filter. Then the interference pattern **[MP PET 1997]**

(a) Will be blue (b) Will be yellow (c) Will be green (d) Will not be formed

78. Two sources give interference pattern which is observed on a screen. *D* distance apart from the sources. The fringe width is 2*w*. If the distance *D* is now doubled, the fringe width will **[MP PET 1997]**

(a) Become *w*/2 (b) Remain the same (c) Become *w* (d) Become 4*w*

79. In Young's double slit experiment, angular width of fringes is 0.20° for sodium light of wavelength 5890 $\AA$. If complete system is dipped in water, then angular width of fringes becomes **[RPET 1997]**

(a) 0.11° (b) 0.15° (c) 0.22° (d) 0.30°

80. In two separate set-ups of the Young's double slit experiment, fringes of equal width are observed when lights of wavelengths in the ratio 1 : 2 are used. If the ratio of the slit separation in the two cases is 2 : 1, the ratio of the distances between the plane of the slits and the screen in the two set-ups is **[Kurukshetra CEE 1996]**

(a) 4 : 1 (b) 1 : 1 (c) 1 : 4 (d) 2 : 1

81. In a Young's double slit experiment, the central point on the screen is **[MP PMT 1996]**

(a) Bright (b) Dark (c) First bright and then dark (d) First dark and then bright

82. In Young's double slit experiment, the distance between sources is 1 *mm* and distance between the screen and source is 1*m*. If the fringe width on the screen is 0.06 *cm*, then λ = **[CPMT 1996]**

(a) 6000 $\AA$ (b) 4000 $\AA$ (c) 1200 $\AA$ (d) 2400 $\AA$

83. In a Young's double slit experiment, the distance between two coherent sources is 0.1 *mm* and the distance between the slits and the screen is 20 *cm*. If the wavelength of light is 5460 $\AA$ then the distance between two consecutive maxima is **[RPMT 1995]**

(a) 0.5 *mm* (b) 1.1 *mm* (c) 1.5 *mm* (d) 2.2 *mm*

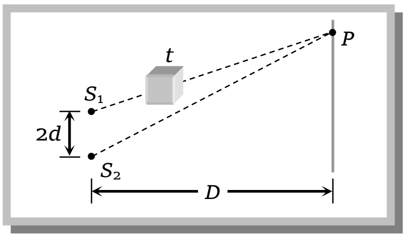
84. If a thin mica sheet of thickness *t* and refractive index $\mu = (5/3)$ is placed in the path of one of the interfering beams as shown in figure, then the displacement of the fringe system is **[CPMT 1995]**

(a) $\frac{Dt}{3d}$

(b) $\frac{Dt}{5d}$

(c) $\frac{Dt}{4d}$

(d) $\frac{2Dt}{5d}$



85. In a double slit experiment, the first minimum on either side of the central maximum occurs where the path difference between the two paths is **[CPMT 1995]**

(a) $\frac{\lambda}{4}$ (b) $\frac{\lambda}{2}$ (c) λ (d) 2λ

86. In Young's double slit experiment, the phase difference between the light waves reaching third bright fringe from the central fringe will be (λ = 6000 $\AA$) **[MP PMT 1994]**

(a) Zero (b) 2π (c) 4π (d) 6π

87. Sodium light $(\lambda = 6\times10^{-7} m)$ is used to produce interference pattern. The observed fringe width is 0.12 *mm*. The angle between the two interfering wave trains is **[CPMT 1993]**

(a) 5×10^{-1} *rad* (b) 5×10^{-3} *rad* (c) 1×10^{-2} *rad* (d) 1×10^{-3} *rad*

88. The contrast in the fringes in any interference pattern depends on **[Roorkee 1992]**

(a) Fringe width (b) Intensity ratio of the sources

(c) Distance between the slits (d) Wavelength

89. In Young's double slit experiment, carried out with light of wavelength λ = 5000 $\AA$, the distance between the slits is 0.2 *mm* and the screen is at 200 *cm* from the slits. The central maximum is at *x* = 0. The third maximum (taking the central maximum as zeroth maximum) will be at *x* equal to **[CBSE PMT 1992]**

(a) 1.67 *cm* (b) 1.5 *cm* (c) 0.5 *cm* (d) 5.0 *cm*

90. In a Young's experiment, two coherent sources are placed 0.90 *mm* apart and the fringes are observed one *metre* away. If it produces the second dark fringe at a distance of 1 *mm* from the central fringe, the wavelength of monochromatic light used would be

[CBSE PMT 1992]

(a) $60 \times 10^{-4}\, cm$ (b) $10 \times 10^{-4}\, cm$ (c) $10 \times 10^{-5}\, cm$ (d) $60 \times 10^{-5}\, cm$

91. In Fresnel's biprism, coherent sources are obtained by **[RPET 1991]**

(a) Division of wavefront (b) Division of amplitude (c) Division of wavelength (d) None of these

92. In Young's experiment, the ratio of maximum and minimum intensities in the fringe system is 9 : 1. The ratio of amplitudes of coherent sources is **[NCERT 1990]**

(a) 9 : 1 (b) 3 : 1 (c) 2 : 1 (d) 1 : 1

93. In a certain double slit experimental arrangement interference fringes of width 1.0 *mm* each are observed when light of wavelength 5000 Å is used. Keeping the set up unaltered, if the source is replaced by another source of wavelength 6000 Å, the fringe width will be **[CPMT 1988]**

(a) 0.5 *mm* (b) 1.0 *mm* (c) 1.2 *mm* (d) 1.5 *mm*

94. In Young's double slit experiment, if the slit widths are in the ratio 1 : 9, then the ratio of the intensity at minima to that at maxima will be **[MP PET 1987]**

(a) 1 (b) 1/9 (c) 1/4 (d) 1/3

95. The Young's experiment is performed with the lights of blue (λ = 4360 Å) and green colour (λ = 5460 Å). If the distance of the 4th fringe from the centre is *x*, then **[CPMT 1987]**

(a) $x(\text{Blue}) = x(\text{Green})$ (b) $x(\text{Blue}) > x(\text{Green})$ (c) $x(\text{Blue}) < x(\text{Green})$ (d) $\frac{x(\text{Blue})}{x(\text{Green})} = \frac{5460}{4360}$

96. In Young's experiment, keeping the distance of the slit from screen constant if the slit width is reduced to half, then **[CPMT 1986]**

(a) The fringe width will be doubled (b) The fringe width will reduce to half

(c) The fringe width will not change (d) The fringe width will become $\sqrt{2}$ times

97. In Young's experiment, if the distance between screen and the slit aperture is increased the fringe width will **[RPET 198**

(a) Decrease (b) Increases but intensity will decrease

(c) Increase but intensity remains unchanged (d) Remains unchanged but intensity decreases

98. In Fresnel's biprism experiment, the two coherent sources are **[RPET 1985]**

(a) Real (b) Imaginary

(c) One is real and the other is imaginary (d) None of these

99. In Fresnel's experiment, the width of the fringe depends upon the distance **[RPET 1985]**

(a) Between the prism and the slit aperture

(b) Of the prism from the screen

(c) Of screen from the imaginary light sources

(d) Of the screen from the prism and the distance from the imaginary sources

100. In the Young's double slit experiment, the ratio of intensities of bright and dark fringes is 9. This means that **[IIT-JEE 1**

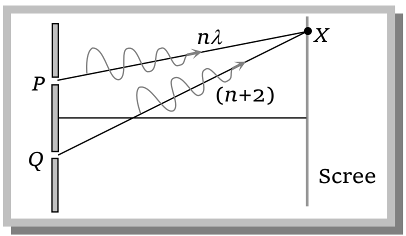
(a) The intensities of individual sources are 5 and 4 units respectively

(b) The intensities of individual sources are 4 and 1 units respectively

(c) The ratio of their amplitudes is 3

(d) The ratio of their amplitudes is 2

101. The figure below shows a double slit experiment. *P* and *Q* are the slits. The path lengths *PX* and *QX* are $n\lambda$ and $(n + 2)\lambda$ respectively where *n* is a whole number and λ is the wavelength. Taking the central bright fringe as zero, what is formed at *X*



(a) First bright

(b) First dark

(c) Second bright

(d) Second dark

102. A plate of thickness t made of a material of refractive index μ is placed in front of one of the slits in a double slit experiment. What should be the minimum thickness t which will make the intensity at the centre of the fringe pattern zero

(a) $(\mu-1)\frac{\lambda}{2}$ (b) $(\mu-1)\lambda$ (c) $\frac{\lambda}{2(\mu-1)}$ (d) $\frac{\lambda}{(\mu-1)}$

103. The thickness of a plate (refractive index μ for light of wavelength λ) which will introduce a path difference of $\frac{3\lambda}{4}$ is

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

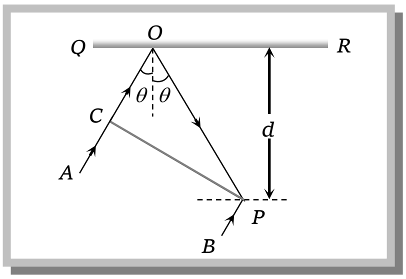
Advance Level

104. In the Young's double slit experiment, if the phase difference between the two waves interfering at a point is ϕ, the intensity at that point can be expressed by the expression (where $A + B$ depends upon the amplitude of the two waves)

[MP PMT/PET 1998; MP PMT 2003]

(a) $I=\sqrt{A^2+B^2\cos^2\phi}$ (b) $I=\frac{A}{B}\cos\phi$ (c) $I=A+B\cos\phi/2$ (d) $I=A+B\cos\phi$

105. In the adjacent diagram CP represents wavefronts and AO and BP the corresponding two rays. Find the condition on θ for constructive interference at P between the ray BP and reflected ray OP **[IIT-JEE (Screening) 2003]**



(a) $\cos\theta = 3\lambda/2d$

(b) $\cos\theta = \lambda/4d$

(c) $\sec\theta - \cos\theta = \lambda/d$

(d) $\sec\theta - \cos\theta = 4\lambda/d$

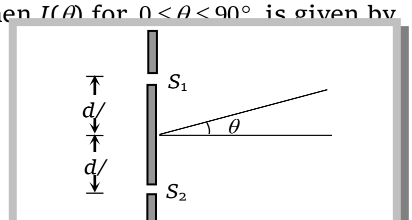
106. When one of the slits of Young's experiment is covered with a transparent sheet of thickness 4.8 *mm*, the central fringe shifts to a position originally occupied by the 30th bright fringe. What should be the thickness of the sheet if the central fringe has to shift to the position occupied by 20th bright fringe **[KCET (Engg.) 2002]**

(a) 3.8 *mm* (b) 1.6 *mm* (c) 7.6 *mm* (d) 3.2 *mm*

107. In the ideal double-slit experiment, when a glass-plate (refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass-plate is **[IIT-JEE (Screening) 2002)]**

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

108. In an interference arrangement similar to Young's double slit experiment, the slits S_1 and S_2 are illuminated with coherent microwave sources each of frequency 10^6 *Hz*. The sources are synchronized to have zero phase difference. The slits are separated by distance d = 150 *m*. The intensity $I(\theta)$ is measured as a function of θ, where θ is defined as shown. If I_0 is maximum intensity, then $I(\theta)$ for $0 \le \theta \le 90°$ is given by **[IIT-JEE 1995]**



(a) $I(\theta) = I_0$ for $\theta = 90°$

(b) $I(\theta) = I_0/2$ for $\theta = 30°$

(c) $I(\theta) = I_0/4$ for $\theta = 90°$

(d) $I(\theta)$ is constant for all values of θ

109. In Young's double slit experiment, white light is used. The separation between the slits is b. the screen is at a distance $d(d >> b)$ from the slits. Some wavelengths are missing exactly in front of one slit. These wavelengths are **[IIT-JEE 1984; AIIMS 1995]**

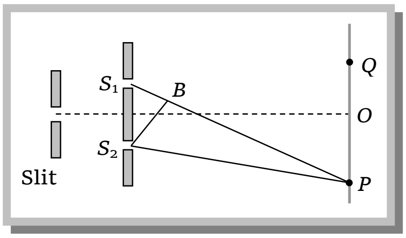
(a) $\lambda = \frac{b^2}{d}$ (b) $\lambda = \frac{2b^2}{d}$ (c) $\lambda = \frac{b^2}{3d}$ (d) $\lambda = \frac{2b^2}{3d}$

110. In a two slit experiment with monochromatic light fringes are obtained on a screen placed at some distance from the sits. If the screen is moved by $5 \times 10^{-2} m$ towards the slits, the change in fringe width is $3 \times 10^{-5} m$. If separation between the slits is $10^{-3} m$, the wavelength of light used is **[Roorkee 1992]**

(a) 6000 Å (b) 5000 Å (c) 3000 Å (d) 4500 Å

111. In the figure is shown Young's double slit experiment. Q is the position of the first bright fringe on the right side of O. P is the 11th fringe on the other side, as measured from Q. If the wavelength of the light used is $6000 \times 10^{-10} m$, then S_1B will be equal to

[CPMT 1986, 92]



(a) $6 \times 10^{-6} m$

(b) $6.6 \times 10^{-6} m$

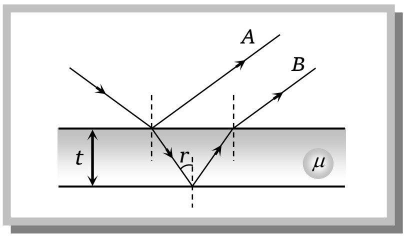
(c) $3.138 \times 10^{-7} m$

(d) $3.144 \times 10^{-7} m$

112. In Young's double slit experiment, the two slits act as coherent sources of equal amplitude A and wavelength λ. In another experiment with the same set up the two slits are of equal amplitude A and wavelength λ but are incoherent. The ratio of the intensity of light at the mid-point of the screen in the first case to that in the second case is **[IIT-JJE 1986]**

(a) 1 : 2 (b) 2 : 1 (c) 4 : 1 (d) 1 : 1

113. When light of wavelength λ falls on a thin film of thickness t and refractive index n, the essential condition for the production of constructive interference fringes by the rays A and B are (m = 1, 2, 3, ...)



(a) $2nt \cos r = \left(m - \frac{1}{2}\right)\lambda$

(b) $2nt \cos r = m\lambda$

(c) $nt \cos r = m\lambda$

(d) $nt \cos r = (m-1)\lambda$

114. Four light waves are represented by

(i) $y = a_1 \sin\omega t$ (ii) $y = a_2 \sin(\omega t + \phi)$ (iii) $y = a_1 \sin 2\omega t$ (iv) $y = a_2 \sin 2(\omega t + \phi)$

Interference fringes may be observed due to superposition of

(a) (i) and (ii) (b) (i) and (iii) (c) (ii) and (iv) (d) (iii) and (iv)

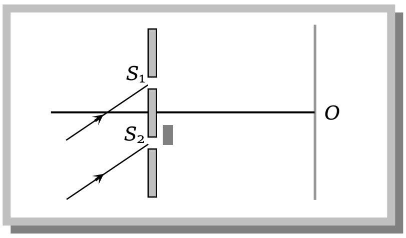
115. In Young's double slit experiment the y-coordinates of central maxima and 10th maxima are 2 cm and 5 cm respectively. When the YDSE apparatus is immersed in a liquid of refractive index 1.5 the corresponding y-coordinates will be

(a) 2 *cm*, 7.5 *cm* (b) 3 *cm*, 6 *cm* (c) 2 *cm*, 4*cm* (d) 4/3 *cm*, 10/3 *cm*

116. The maximum intensity in Young's double slit experiment is I_0. Distance between the slits is $d = 5\lambda$, where λ is the wavelength of monochromatic light used in the experiment. What will be the intensity of light in front of one of the slits on a screen at a distance $D = 10\,d$

(a) $\frac{I_0}{2}$ (b) $\frac{3}{4}I_0$ (c) I_0 (d) $\frac{I_0}{4}$

117. A monochromatic beam of light falls on YDSE apparatus at some angle (say θ) as shown in figure. A thin sheet of glass is inserted in front of the lower slit S_2. The central bright fringe (path difference = 0) will be obtained



(a) At O

(b) Above O

(c) Below O

(d) Anywhere depending on angle θ, thickness of plate t and refractive index of glass μ

118. In Young's double slit experiment how many maximas can be obtained on a screen (including the central maximum) on both sides of the central fringe if $\lambda = 2000\ Å$ and $d = 7000\ Å$

(a) 12 (b) 7 (c) 18 (d) 4

119. Young's double slit experiment is made in a liquid. The 10[th] bright fringe in liquid lies where 6[th] dark fringe lies in vacuum. The refractive index of the liquid is approximately

(a) 1.8 (b) 1.54 (c) 1.67 (d) 1.2

120. Light of wavelength λ_0 in air enters a medium of refractive index n. If two points A and B in this medium lie along the path of this light at a distance x, then phase difference ϕ_0 between these two points is

(a) $\phi_0 = \frac{1}{n}\left(\frac{2\pi}{\lambda_0}\right)x$ (b) $\phi_0 = n\left(\frac{2\pi}{\lambda_0}\right)x$ (c) $\phi_0 = (n-1)\left(\frac{2\pi}{\lambda_0}\right)x$ (d) $\phi_0 = \frac{1}{(n-1)}\left(\frac{2\pi}{\lambda_0}\right)x$

121. In a Young's double slit experiment, the slits are 2 *mm* apart and are illuminated with a mixture of two wavelength $\lambda_0 = 750\,nm$ and $\lambda = 900\,nm$. The minimum distance from the common central bright fringe on a screen 2*m* from the slits where a bright fringe from one interference pattern coincides with a bright fringe from the other is

(a) 1.5 *mm* (b) 3 *mm* (c) 4.5 *mm* (d) 6 *mm*

122. In the ideal double slit experiment, when a glass plate (refractive index 1.5) of thickness t is introduced in the path of one of the interfering beams (wavelength λ), the intensity at the position where the central maximum occurred previously remains unchanged. The minimum thickness of the glass plate is

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

123. Two wavelengths of light λ_1 and λ_2 are sent through a Young's double slit apparatus simultaneously. If the third order λ_1 bright fringe coincides with the fourth order λ_2 bright fringe then

(a) $\frac{\lambda_1}{\lambda_2} = \frac{4}{3}$ (b) $\frac{\lambda_1}{\lambda_2} = \frac{3}{4}$ (c) $\frac{\lambda_1}{\lambda_2} = \frac{5}{4}$ (d) $\frac{\lambda_1}{\lambda_2} = \frac{4}{5}$

124. A flake of glass (refractive index 1.5) is placed over one of the openings of a double slit apparatus. The interference pattern displaces itself through seven successive maxima towards the side where the flake is placed. if wavelength of the diffracted light is $\lambda = 600\,nm$, then the thickness of the flake is

(a) 2100 *nm* (b) 4200 *nm* (c) 8400 *nm* (d) None of these

125. In a double slit experiment, instead of taking slits of equal widths, one slit is made twice as wide as the other. Then in the interference pattern

(a) The intensitites of both the maxima and the minima increase

(b) The intensity of the maxima increases and minima has zero intensity

(c) The intensity of the maxima decreases and that of minima increases

(d) The intensity of the maxima decreases and the minima has zero intensity

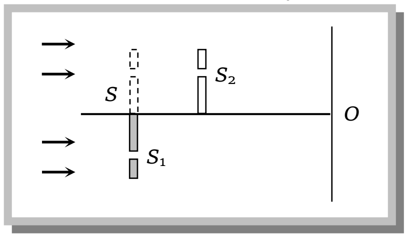
126. In Young's experiment the wavelength of red light is 7800 Å and that of blue light is 5200 Å. The value of n for which the $(n+1)th$ blue bright band coincides with the n^{th} red band is

(a) 4 (b) 3 (c) 2 (d) 1

127. In a double slit experiment if 5^{th} dark fringe is formed opposite to one of the slits, the wavelength of light is

(a) $\frac{d^2}{6D}$ (b) $\frac{d^2}{5D}$ (c) $\frac{d^2}{15D}$ (d) $\frac{d^2}{9D}$

128. In a Young's double slit experiment one of the slits is advanced towards the screen by a distance $d/2$ and $d = n\lambda$ where n is an odd integer and d is the initial distance between the slits. If I_0 is the intensity of each wave from the slits, the intensity at O is



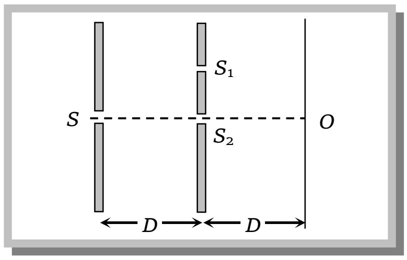
(a) I_0

(b) $\frac{I_0}{4}$

(c) 0

(d) $2I_0$

129. Two ideal slits S_1 and S_2 are at a distance d apart, and illuminated by light of wavelength λ passing through an ideal source slit S placed on the line through S_2 as shown. The distance between the planes of slits and the source slit is D. A screen is held at a distance D from the plane of the slits. The minimum value of d for which there is darkness at O is



(a) $\sqrt{\frac{3\lambda D}{2}}$

(b) $\sqrt{\lambda D}$

(c) $\sqrt{\frac{\lambda D}{2}}$

(d) $\sqrt{3\lambda D}$

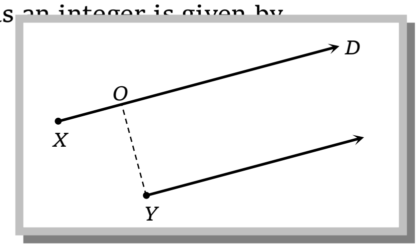
130. In a double slit experiment interference is obtained from electron waves produced in an electron gun supplied with voltage V. if λ is the wavelength of the beam, D is the distance of screen, d is the spacing between coherent source, h is Planck's constant, e is charge on electron and m is mass of electron then fringe width is given as

(a) $\frac{hD}{\sqrt{2meV}\,d}$ (b) $\frac{2hD}{\sqrt{meV}\,d}$ (c) $\frac{hd}{\sqrt{2meV}\,D}$ (d) $\frac{2hd}{\sqrt{meV}\,D}$

131. In a double slit arrangement fringes are produced using light of wavelength 4800 Å. One slit is covered by a thin plate of glass of refractive index 1.4 and the other with another glass plate of same thickness but of refractive index 1.7. By doing so the central bright shifts to original fifth bright fringe from centre. Thickness of glass plate is

(a) 8 μm (b) 6 μm (c) 4 μm (d) 10 μm

132. Two point sources X and Y emit waves of same frequency and speed but Y lags in phase behind X by $2\pi l$ radian. If there is a maximum in direction D the distance XO using n as an integer is given by



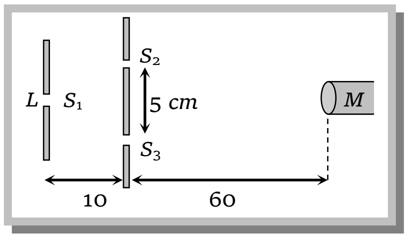
(a) $\frac{\lambda}{2}(n-l)$

(b) $\lambda(n+l)$

(c) $\frac{\lambda}{2}(n+l)$

(d) $\lambda(n-l)$

133. A student is asked to measure the wavelength of monochromatic light. He sets up the apparatus sketched below. S_1, S_2, S_3 are narrow parallel slits, L is a sodium lamp and M is a micrometer eye-piece. The student fails to observe interference fringes. You would advise him to



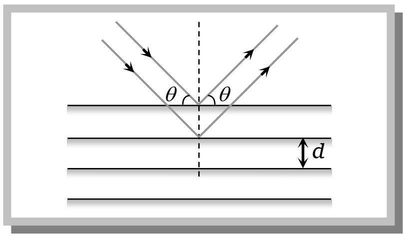
(a) Increase the width of S_1

(b) Decrease the distance between S_2 and S_3

(c) Replace L with a white light source

(d) Replace M with a telescope

134. A beam with wavelength λ falls on a stack of partially reflecting planes with separation d. The angle θ that the beam should make with the planes so that the beams reflected from successive planes may interfere constructively is (where n =1, 2, ……)



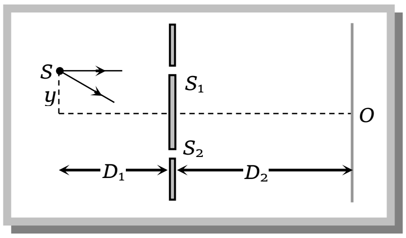
(a) $\sin^{-1}\left(\frac{n\lambda}{d}\right)$

(b) $\tan^{-1}\left(\frac{n\lambda}{d}\right)$

(c) $\sin^{-1}\left(\frac{n\lambda}{2d}\right)$

(d) $\cos^{-1}\left(\frac{n\lambda}{2d}\right)$

135. In a double slit experiment the source slit S is at a distance D_1 and the screen at a distance D_2 from the plane of ideal slit cuts S_1 and S_2 as shown. If the source slit is shifted to by parallel to S_1S_2, the central bright fringe will be shifted by



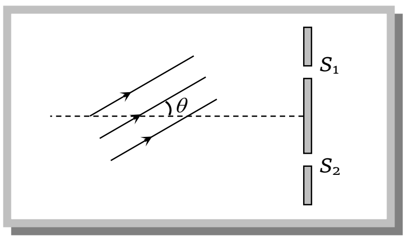
(a) y

(b) $-y$

(c) $\frac{D_2}{D_1}y$

(d) $-\frac{D_2}{D_1}y$

136. A parallel beam of monochromatic light is used in a Young's double slit experiment. The slits are separated by a distance d and the screen is placed parallel to the plane of the slits. The angle which the incident beam must make with the normal to the plane of the slits to produce darkness at the position of central brightness is



(a) $\cos^{-1}\frac{\lambda}{d}$

(b) $\cos^{-1}\frac{2\lambda}{d}$

(c) $\sin^{-1}\frac{\lambda}{d}$

(d) $\sin^{-1}\frac{\lambda}{2d}$

137. In a Young's double slit experiment, let β be the fringe width, and let I_0 be the intensity at the central bright fringe. At a distance x from the central bright fringe, the intensity will be

(a) $I_0\cos\left(\frac{x}{\beta}\right)$ (b) $I_0\cos^2\left(\frac{x}{\beta}\right)$ (c) $I_0\cos^2\left(\frac{\pi x}{\beta}\right)$ (d) $\left(\frac{I_0}{4}\right)\cos^2\left(\frac{\pi x}{\beta}\right)$

138. In Young's double slit experiment the distance d between the slits S_1 and S_2 is 1 *mm*. What should be the width of each slit be so as to obtain 10 maxima of the two slit interference pattern with in the central maximum of the single slit diffraction pattern

(a) 0.1 *mm* (b) 0.2 *mm* (c) 0.3 *mm* (d) 0.4 *mm*

Diffraction of light

139. When light is incident on a diffraction grating the zero order principal maximum will be **[KCET 2004]**

(a) One of the component colours (b) Absent

(c) Spectrum of the colours (d) White

140. A beam of light of wavelength 600 *nm* from a distant source falls on a single slit 1 *mm* wide and the resulting diffraction pattern is observed on a screen 2 *m* away. The distance between the first dark fringes on either side of the central bright fringe is

[IIT-JEE 1994; KCET 2004]

(a) 1.2 *mm* (b) 1.2 *cm* (c) 2.4 *cm* (d) 2.4 *mm*

141. Consider the following statements

Assertion (*A*): When a tiny circular obstacle is placed in the path of light from some distance, a bright spot is seen at the centre of the shadow of the obstacle.

Reason (*R*) : Destructive interference occurs at the centre of the shadow.

Of these statements **[AIIMS 2002]**

(a) Both *A* and *R* are true and *R* is a correct explanation of *A* (b) Both *A* and *R* are true but *R* is not a correct explanation of *A*

(c) *A* is true but *R* is false (d) A is false but R is true

(e) Both *A* and *R* are false

142. The light of wavelength 6328 $\mathring{A}$ is incident on a slit of width 0.2 *mm* perpendicularly situated at a distance of 9 *m* and the central maxima between two minima, the angular is approximately **[MP PMT 1987; Pb. PMT 2002]**

(a) 0.36° (b) 0.18° (c) 0.72° (d) 0.08°

143. A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light

[KCET (Eng./Med.) 2000; BHU 2001]

(a) No change (b) diffraction bands become narrower and crowded together

(c) Bands become broader and farther apart (d) Bands disappear

144. Angular width (β) of central maximum of a diffraction pattern on a single slit does not depend upon **[DCE 2000, 2001]**

(a) Distance between slit and source (b) Wavelength of light used

(c) Width of the slit (d) Frequency of light used

145. In order to see diffraction the thickness of the film is **[J&K CEE 2001]**

(a) 100 Å (b) 10,000 Å (c) 1 *mm* (d) 1 *cm*

146. What will be the angle of diffracting for the first minimum due to Fraunhoffer diffraction with sources of light of wave length 550 *nm* and slit of width 0.55 *mm* **[Pb. PMT 2001]**

(a) 0.001 *rad* (b) 0.01 *rad* (c) 1 *rad* (d) 0.1 *rad*

147. The bending of beam of light around corners of obstacles is called

[NCERT 1990; AFMC 1995; RPET 1997; CPMT 1999; JIPMER 2000]

(a) Reflection (b) Diffraction (c) Refraction (d) Interference

148. Diffraction effects are easier to notice in the case of sound waves than in the case of light waves because **[RPET 1978;**

(a) Sound waves are longitudinal (b) Sound is perceived by the ear

(c) Sound waves are mechanical waves (d) Sound waves are of longer wavelength

149. Direction of the first secondary maximum in the Fraunhofer diffraction pattern at a single slit is given by (*a* is the width of the slit)

[KCET 1999]

(a) $a\sin\theta = \frac{\lambda}{2}$ (b) $a\cos\theta = \frac{3\lambda}{2}$ (c) $a\sin\theta = \lambda$ (d) $a\sin\theta = \frac{3\lambda}{2}$

150. A slit of size 0.15 *cm* is placed at 2.1 *m* from a screen. On illuminated it by a light of wavelength $5\times10^{-5}\,cm$. The width of diffraction pattern will be **[RPET 1999]**

(a) 70 *mm* (b) 0.14 *mm* (c) 1.4 *cm* (d) 0.14 *cm*

151. Yellow light is used in a single slit diffraction experiment with a slit of 0.6 *mm*. If yellow light is replaced by *x*-rays, than the observed pattern will reveal **[IIT-JEE 1999]**

(a) That the central maxima is narrower (b) More number of fringes

(c) Less number of fringes (d) No diffraction pattern

152. A parallel monochromatic beam of light is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of incident beam. At the first maximum of the diffraction pattern the phase difference between the rays coming from the edges of the slit is **[IIT–JEE 1995, 98]**

(a) 0 (b) $\frac{\pi}{2}$ (c) π (d) 2π

153. Diffraction and interference of light suggest **[CPMT 1995; RPMT 1998]**

(a) Nature of light is electro-magnetic (b) Wave nature

(c) Nature is quantum (d) Nature of light is transverse

154. A light wave is incident normally over a slit of width $24\times10^{-5}\,cm$. The angular position of second dark fringe from the central maxima is 30°. What is the wavelength of light **[RPET 1995]**

(a) 6000 Å (b) 5000 Å (c) 3000 Å (d) 1500 Å

155. A beam of light of wavelength 600 *nm* from a distant source falls on a single slit 1.00 *nm* wide and the resulting diffraction pattern is observed on a screen 2 *m* away. The distance between the first dark fringes on either side of the central bright fringe is **[IIT-JEE 1994]**

(a) 1.2 *cm* (b) 1.2 *mm* (c) 2.4 *cm* (d) 2.4 *mm*

156. A parallel beam of monochromatic light of wavelength 5000 Å is incident normally on a single narrow slit of width 0.001 *mm*. The light is focused by a convex lens on a screen placed on the focal plane. The first minimum will be formed for the angle of diffraction equal to **[CBSE PMT 1993]**

(a) 0° (b) 15° (c) 30° (d) 60°

157. Light appears to travel in straight lines since **[RPMT 1997; AIIMS 1998; CPMT 1987, 89, 90, 2001; KCET (Engg.) 2002; BHU 2**

(a) It is not absorbed by the atmosphere (b) It is reflected by the atmosphere

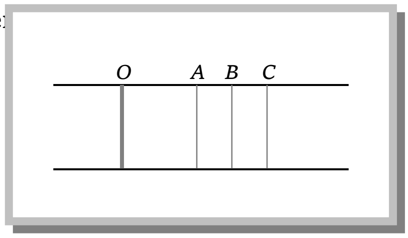
(c) It's wavelength is very small (d) It's velocity is very large

158. The condition for observing Fraunhofer diffraction from a single slit is that the light wavefront incident on the slit should be

[MP PMT 1987]

(a) Spherical (b) Cylindrical (c) Plane (d) Elliptical

159. The position of the direct image obtained at *O*, when a monochromatic beam of light is passed through a plane transmission grating at normal incide



The diffracted images *A, B* and *C* correspond to the first, second and third order diffraction when the source is replaced by an another source of shorter wavelength **[CPMT 1986]**

(a) All the four shift in the direction *C* to *O* (b) All the four will shift in the direction *O* to *C*

(c) The images *C*, *B* and *A* will shift toward *O* (d) The images *C, B* and *A* will shift away from *O*

160. To observe diffraction the size of an obstacle **[CPMT 1982]**

(a) Should be of the same order as wavelength (b) Should be much larger than the wavelength

(c) Have no relation to wavelength (d) Should be exactly $\frac{\lambda}{2}$

161. The first diffraction minima due to a single slit diffraction is at $\theta = 30^o$ for a light of wavelength 5000 Å. The width of the slit is

[CPMT 1985]

(a) $5 \times 10^{-5} cm$ (b) $1.0 \times 10^{-4} cm$ (c) $2.5 \times 10^{-5} cm$ (d) $1.25 \times 10^{-5} cm$

162. Radio waves diffract pronoucedly around buildings while light waves which are also electromagnetic waves do not because **[PPE 1978]**

(a) Wavelength of the radio waves is not comparable with the size of the obstacle

(b) Wavelength of radio waves is of the order of 200-500 *m* hence they bend more than the light waves whose wavelength is very small

(c) Light waves are transverse whereas radio waves are longitudinal

(d) None of the above

163. One cannot obtain diffraction from a wide slit illuminated by a monochromatic light because **[PPE 1978]**

(a) The half period elements contained in a wide slit are very large so the resultant effect is general illumination

(b) The half period elements contained in a wide slit are small so the resultant effect is general illumination

(c) Diffraction patterns are superimposed by interference pattern and hence the result is general illumination

(d) None of these

164. In the far field diffraction pattern of a single slit under polychromatic illumination, the first minimum with the wavelength λ_1 is found to be coincident with the third maximum at λ_2. So

(a) $3\lambda_1 = 0.3\lambda_2$ (b) $3\lambda_1 = \lambda_2$ (c) $\lambda_1 = 3.5\lambda_2$ (d) $0.3\lambda_1 = 3\lambda_2$

165. In case of Fresnel diffraction

(a) Both source and screen are at finite distance from diffracting device

(b) Source is at finite distance while screen at infinity from diffraction device

(c) Screen is at finite distance while source at infinity from diffracting device

(d) Both source and screen are effectively at infinity from diffracting device

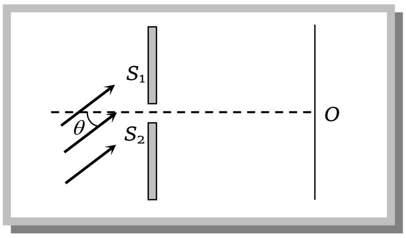
166. Light of wavelength λ = 5000 $\mathring{A}$ falls normally on a narrow slit. A screen placed at a distance of 1 *m* from the slit and perpendicular to the direction of light. The first minima of the diffraction pattern is situated at 5 *mm* from the centre of central maximum. The width of the slit is

(a) 0.1 *mm* (b) 1.0 *mm* (c) 0.5 *mm* (d) 0.2 *mm*

167. Light falls normally on a slit of width 0.3 *mm*. A lens of focal length 40 *cm* collects the rays at its focal plane. The distance of the first dark band from the direct one is 0.8 *mm*. The wavelength of light is

(a) 4800 Å (b) 5000 Å (c) 6000 Å (d) 5896 Å

168. A parallel monochromatic beam of light is incident at an angle θ to the normal of a slit of width *e*. The central point *O* of the screen will be dark if



(a) $e \sin\theta = n\lambda$ where n = 1, 3, 5 ...

(b) $e \sin\theta = n\lambda$ where n = 1, 2, 3 ...

(c) $e \sin\theta = (2n-1)\lambda / 2$ where n = 1, 2, 3 ......

(d) $e \cos\theta = n\lambda$ where n = 1, 2, 3, 4 ....

Polarization of Light

169. The angle of incidence at which reflected light is totally polarized for reflection from air to glass (refraction index n) is **[AIEEE 2004]**

(a) $\sin^{-1}(n)$ (b) $\sin^{-1}\left(\frac{1}{n}\right)$ (c) $\tan^{-1}\left(\frac{1}{n}\right)$ (d) $\tan^{-1}(n)$

170. Through which character we can distinguish the light waves from sound waves **[CBSE PMT 1990; RPET 2002]**

(a) Interference (b) Refraction (c) Polarisation (d) Reflection

171. Which of following can not be polarised **[Kerala PMT 2001]**

(a) Radio waves (b) Ultraviolet rays (c) Infrared rays (d) Ultrasonic waves

172. A polaroid is placed at 45° to an incoming light of intensity I_0. Now the intensity of light passing through polaroid after polarisation would be **[CPMT 1995]**

(a) I_0 (b) $I_0/2$ (c) $I_0/4$ (d) Zero

173. Plane polarised light is passed through a polaroid. On viewing through the polaroid we find that when the polariod is given one complete rotation about the direction of the light, one of the following is observed **[MNR 1993]**

(a) The intensity of light gradually decreases to zero and remains at zero

(b) The intensity of light gradually increases to a maximum and remains at maximum

(c) There is no change in intensity

(d) The intensity of light is twice maximum and twice zero

174. Out of the following statements which is not correct **[CPMT 1991]**

(a) When unpolarised light passes through a Nicol's prism, the emergent light is elliptically polarised

(b) Nicol's prism works on the principle of double refraction and total internal reflection

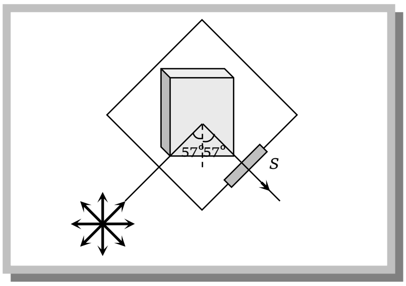
(c) Nicol's prism can be used to produce and analyse polarised light

(d) Calcite and Quartz are both doubly refracting crystals

175. A ray of light is incident on the surface of a glass plate at an angle of incidence equal to Brewster's angle ϕ. If μ represents the refractive index of glass with respect to air, then the angle between reflected and refracted rays is **[CPMT 1989]**

(a) $90+\phi$ (b) $\sin^{-1}(\mu\cos\phi)$ (c) 90° (d) $90^o - \sin^{-1}(\sin\phi/\mu)$

176. Figure represents a glass plate placed vertically on a horizontal table with a beam of unpolarised light falling on its surface at the polarising angle of 57° with the normal. The electric vector in the reflected light on screen S will vibrate with respect to the plane of incidence in a **[CPMT 1988]**



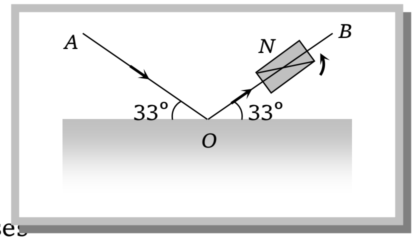
(a) Vertical plane

(b) Horizontal plane

(c) Plane making an angle of 45° with the vertical

(d) Plane making an angle of 57° with the horizontal

177. A beam of light AO is incident on a glass slab $(\mu = 1.54)$ in a direction as shown in figure. The reflected ray OB is passed through a Nicol prism on viewing through a Nicole prism, we find on rotating the prism that **[CPMT 1986]**



(a) The intensity is reduced down to zero and remains zero

(b) The intensity reduces down some what and rises again

(c) There is no change in intensity

(d) The intensity gradually reduces to zero and then again increases

178. Polarised glass is used in sun glasses because **[CPMT 1981]**

(a) It reduces the light intensity to half an account of polarisation (b) It is fashionable

(c) It has good colour (d) It is cheaper

179. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarisation is **[CPMT 1978]**

(a) 0^o (b) 45^o (c) 90^o (d) 180^o

180. The transverse nature of light is shown by **[CPMT 1972, 74, 78; RPMT 1999; MP PMT 2000; AFMC 2001; AIEEE 2002; MP PET 2004]**

(a) Interference of light (b) Refraction of light (c) Polarisation of light (d) Dispersion of light

181. A calcite crystal is placed over a dot on a piece of paper and rotated, on seeing through the calcite one will be see **[CPMT 1971]**

(a) One dot (b) Two stationary dots

(c) Two rotating dots (d) One dot rotating about the other

182. In a doubly refracting crystal, optic axis is a direction along which

(a) A plane polarised beam does not suffer deviation

(b) Any beam of light does not suffer any deviation

(c) Double refraction does not take place

(d) Ordinary and extraordinary rays undergo maximum deviation

183. Which is incorrect with reference to polarisation by reflection

(a) The degree of polarisation varies with the angle of incidence

(b) Percentage of the polarising light in the reflected beam is the greatest at the angle of polarisation

(c) Reflected light is plane polarised in the plane of incidence

(d) Reflected light is plane polarised in the plane perpendicular to plane of incidence

184. Two polarising plates have polarising directions parallel so as to transmit maximum intensity of light. Through what angle must either plate be turned if the intensities of the transmitted beam is to drop by one-third

(a) $55^o18'$ (b) $144^o22'$ (c) Both of these (d) None of these

185. The polaroid is

(a) Celluloid film (b) Big crystal

(c) Cluster of small crystals arranged in a regular way (d) Cluster of small crystals arranged in a haphazard way

186. Light from the cloudless sky is

(a) Fully polarised (b) Partially polarised (c) Unpolarised (d) Can not be said

Doppler's Effect of Light

187. The observed wavelength of light coming from a distant galaxy is found to be increased by 0.5% as compared with that comparing from a terrestrial source. The galaxy is **[MP PMT 1993, 2003]**

(a) Stationary with respect to the earth

(b) Approaching the earth with velocity of light

(c) Receding from the earth with the velocity of light

(d) Receding from the earth with a velocity equal to $1.5 \times 10^6 m/s$

188. In hydrogen spectrum the wavelength of H_α line is 656 nm whereas in the spectrum of a distant galaxy. H_α line wavelength is 706nm. Estimated speed of the galaxy with respect to earth is **[IIT-JEE 1999; UPSEAT 2003]**

(a) $2 \times 10^8 m/s$ (b) $2 \times 10^7 m/s$ (c) $2 \times 10^6 m/s$ (d) $2 \times 10^5 m/s$

189. A star emits light of 5500 $\mathring{A}$ wavelength. Its appears blue to an observer on the earth, it means **[DPMT 2002]**

(a) Star is going away from the earth
(b) Star is stationary
(c) Star is coming towards earth
(d) None of the above

190. The 6563 Å line emitted by hydrogen atom in a star is found to be red shifted by 5 Å. The speed with which the star is receding from the earth is **[Pb. PMT 2002]**

(a) $17.29 \times 10^9 m/s$ (b) $4.29 \times 10^7 m/s$ (c) $3.39 \times 10^5 m/s$ (d) $2.29 \times 10^5 m/s$

191. Three observers *A*, *B* and *C* measure the speed of light coming from a source to be v_A, v_B and v_C. The observer *A* moves towards the source, the observer *C* moves away from the source with the same speed. The observer *B* stays stationary. The surrounding space is vacuum very where. Then **[Kerala CET (Med.) 2002]**

(a) $v_A > v_B > v_C$ (b) $v_A < v_B < v_C$ (c) $v_A = v_B = v_C$ (d) $v_A = v_B > v_C$

192. A star emitting light of wavelength 5896 Å is moving away from the earth with a speed of 3600 *km/sec*. The wavelength of light observed on earth will ($c = 3 \times 10^8 m/\sec$ is the speed of light) **[MP PET 1995, 2002]**

(a) Decrease by 5825.25 Å (b) Increase by 5966.75 Å (c) Decrease by 70.75 Å (d) Increase by 70.75 Å

193. The periodic time of rotation of a certain star is 22 days and its radius is $7 \times 10^8 m$. If the wavelength of light emitted by its surface be 4320 Å, the Doppler shift will be (1 day = 86400 *sec*) **[MP PET 2001]**

(a) 0.033 $\AA$ (b) 0.33 $\AA$ (c) 3.3 $\AA$ (d) 33 $\AA$

194. A heavenly body is receding from earth such that the fractional change in λ is 1, then its velocity is **[DCE 2000]**

(a) C (b) $\frac{3C}{5}$ (c) $\frac{C}{5}$ (d) $\frac{2C}{5}$

195. A star is going away from the earth. An observer on the earth will see the wavelength of light coming from the star **[MP PMT 1999]**

(a) Decreased
(b) Increased
(c) Neither decreased nor increased
(d) Decreased or increased depending upon the velocity of the star

196. If the shift of wavelength of light emitted by a star is towards violet, then this shows that star is **[RPET 1996; RPMT 199**

(a) Stationary (b) Moving towards earth (c) Moving away from earth (d)Information is incomplete

197. When the wavelength of light coming from a distant star is measured it is found shifted towards red. Then the conclusion is

[JIPMER 1999]

(a) The star is approaching the observer
(b) The star recedes away from earth
(c) There is gravitational effect on the light
(d) The star remains stationary

198. In the spectrum of light of a luminous heavenly body the wavelength of a spectral line is measured to be 4747 Å while actual wavelength of the line is 4700 Å. The relative velocity of the heavenly body with respect to earth will be (velocity of light is $3 \times 10^8 m/s$) **[MP PET 1997; MP PMT/PET 1998]**

(a) $3 \times 10^5 m/s$ moving towards the earth
(b) $3 \times 10^5 m/s$ moving away from the earth
(c) $3 \times 10^6 m/s$ moving towards the earth
(d) $3 \times 10^6 m/s$ moving away from the earth

199. The wavelength of light observed on the earth, from a moving star is found to decrease by 0.05%. Relative to the earth the star is

[MP PMT/PET 1998]

(a) Moving away with a velocity of $1.5 \times 10^5 m/s$
(b) Coming closer with a velocity of $1.5 \times 10^5 m/s$
(c) Moving away with a velocity of $1.5 \times 10^4 m/s$
(d) Coming closer with a velocity of $1.5 \times 10^4 m/s$

200. Due to Doppler's effect, the shift in wavelength observed is 0.1 Å for a star producing wavelength 6000 Å. Velocity of recession of the star will be **[KCET 1998]**

(a) 2.5 *km/s* (b) 10 *km/s* (c) 5 *km/s* (d) 20 *km/s*

201. A rocket is going away from the earth at a speed of $10^6 m/s$. If the wavelength of the light wave emitted by it be 5700 Å, what will be its Doppler's shift **[MP PMT 1990, 94; RPMT 1996]**

(a) 200 Å (b) 19 Å (c) 20 Å (d) 0.2 Å

202. A rocket is going away from the earth at a speed 0.2 *c*, where *c* = speed of light, it emits a signal of frequency $4\times10^7 Hz$. What will be the frequency observed by an observer on the earth **[RPMT 1996]**

(a) $4\times10^6 Hz$ (b) $3.3\times10^7 Hz$ (c) $3\times10^6 Hz$ (d) $5\times10^7 Hz$

203. A star moves away from earth at speed 0.8 *c* while emitting light of frequency $6\times10^{14} Hz$. What frequency will be observed on the earth (in units of $10^{14} Hz$) (*c* = speed of light) **[MP PMT 1995]**

(a) 0.24 (b) 1.2 (c) 30 (d) 3.3

204. The sun is rotating about its own axis. The spectral lines emitted from the two ends of its equator, for an observer on the earth, will show **[MP PMT 1994]**

(a) Shift towards red end

(b) Shift towards violet end

(c) Shift towards red end by one line and towards violet end by other

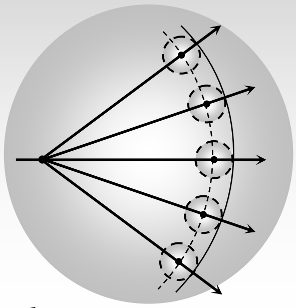
(d) No shift

205. The time period of rotation of the sun is 25 days and its radius is $7\times10^8 m$. The Doppler shift for the light of wavelength 6000 Å emitted from the surface of the sun will be **[MP PMT 1994]**

(a) 0.04 *Å* (b) 0.40 *Å* (c) 4.00 *Å* (d) 40.0 *Å*

206. The apparent wavelength of the light from a star moving away from the earth is 0.01 % more than its real wavelength. Then the velocity of star is **[CPMT 1979]**

(a) 60 *km/sec* (b) 15 *km/sec* (c) 150 *km/sec* (d) 30 *km/sec*



Answer Sheet

Assignments

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
a	d	c	d	b	a	c	c	b	c	d	c	d	a	b	c	d	a	c	c
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
c	b	b	c	a	d	c	d	a	d	b	b	c	b	c	d	c	c	a	b
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
c	d	c	c	a	d	a	b	c	a	d	d	c	a	b	b	a	d	a	d
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
c	d	c	c	c	b	b	c	b	a	b, c	b	d	b	c	b	d	d	b	a
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
a	a	b	a	b	d	b	b	b	d	a	c	c	c	c	a	b	b	d	b,d
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
c	c	a	d	b	d	a	a,b	a,c	a	a	b	a	a,d	c	a	d	b	a	b
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
c	a	a	c	a	c	d	c	c	a	a	b	b	c	d	d	c	b	d	d
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
c	a	b	a	b	a	b	d	d	b	a	c	b	a	d	c	c	c	c	a
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
b	b	a	c	a	a	c	b	d	c	d	b	d	a	c	a	d	a	a	c
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
d	c	c	c	c	d	d	b	c	d	c	d	a	a	b	b	b	d	b	c
201	202	203	204	205	206														
b	b	b	c	a	d														