Optical Instrument Assignment

1. Two parallel pillars are 11 *km* away from an observer. The minimum distance between the pillars so that they can be seen separately will be

(a) 3.2 *m* (b) 20.8 *m* (c) 91.5 *m* (d) 183 *m*

2. A person cannot see objects clearly beyond 2.0 *m*. The power of lens required to correct his vision will be

(a) + 2.0 *D* (b) – 1.0 *D* (c) + 1.0 *D* (d) – 0.5 *D*

3. When objects at different distances are seen by the eye, which of the following remains constant

(a) The focal length of the eye lens (b) The object distance from the eye lens

(c) The radii of curvature of the eye lens (d) The image distance from the eye lens

4. A person wears glasses of power –2.0 *D*. The defect of the eye and the far point of the person without the glasses will be

(a) Nearsighted, 50 *cm* (b) Farsighted, 50 *cm* (c) Nearsighted, 250 *cm* (d) Astigmatism, 50 *cm*

5. A person is suffering from the defect astigmatism. Its main reason is

(a) Distance of the eye lens from retina is increased (b) Distance of the eye lens from retina is decreased

(c) The cornea is not spherical (d) Power of accommodation of the eye is decreased

6. Myopia is due to

(a) Elongation of eye ball (b) Irregular change in focal length

(c) Shortening of eye ball (d) Older age

7. Human eye is most sensitive to visible light of the wavelength

(a) 6050 *Å* (b) 5500 *Å* (c) 4500 *Å* (d) 7500 *Å*

8. Match the List I with the List II from the combinations shown

(I) Presbiopia	(A) Sphero-cylindrical lens
(II) Hypermetropia	(B) Convex lens of proper power may be used close to the eye
(III) Astigmatism	(C) Concave lens of suitable focal length
(IV) Myopia	(D) Convex spectacle lens of suitable focal length

(a) I-A; II-C; III-B; IV-D (b) I-B; II-D; III-C; IV-A (c) I-D; II-B; III-A; IV-C (d) I-D; II-A; III-C; IV-B

9. The human eye has a lens which has a

(a) Soft portion at its centre (b) Hard surface

(c) Varying refractive index (d) Constant refractive index

10. A man with defective eyes cannot see distinctly object at the distance more than 60 *cm* from his eyes. The power of the lens to be used will be

(a) + 60*D* (b) – 60*D* (c) – 1.66*D* (d) $\frac{1}{1.66}D$

11. A person's near point is 50 *cm* and his far point is 3 *m*. Power of the lenses he requires for

(i) Reading and (ii) For seeing distant stars are

(a) – 2*D* and 0.33*D* (b) 2*D* and – 0.33*D* (c) – 2*D* and 3*D* (d) 2*D* and – 3*D*

12. The focal length of a simple convex lens used as a magnifier is 10 *cm*. For the image to be formed at a distance of distinct vision (D = 25 *cm*), the object must be placed away from the lens at a distance of

(a) 5 *cm* (b) 7.14 *cm* (c) 7.20 *cm* (d) 16.16 *cm*

13. A person is suffering from myopic defect. He is able to see clear objects placed at 15 *cm*. What type and of what focal length of lens he should use to see clearly the object placed 60 *cm* away

(a) Concave lens of 20 *cm* focal length (b) Convex lens of 20 *cm* focal length

(c) Concave lens of 12 *cm* focal length (d) Convex lens of 12 *cm* focal length

14. A person can see a thing clearly when it is at a distance of 1 *metre* only. If he wishes to see a distance star, he needs a lens of focal length

(a) +100 *cm* (b) – 100 *cm* (c) +50 *cm* (d) –50 *cm*

15. A man suffering from myopia can read a book placed at 10 *cm* distance. For reading the book at a distance of 60 *cm* with relaxed vision, focal length of the lens required will be

(a) 45 *cm* (b) – 20 *cm* (c) –12 *cm* (d) 30 *cm*

16. A person can see clearly objects at 100 *cm* distance. If he wants to see objects at 40 *cm* distance, then the power of the lens he shall require is

(a) +1.5 *D* (b) – 1.5 *D* (c) +3.0 *D* (d) –3.0 *D*

17. If the distance of the far point for a myopia patient is doubled, the focal length of the lens required to cure it will become

(a) Half (b) Double

(c) The same but a convex lens (d) The same but a concave lens

18. Image is formed for the short sighted person at

(a) Retina (b) Before retina (c) Behind the retina (d) Image is not formed at all

19. A man who cannot see clearly beyond 5 *m* wants to see stars clearly. He should use a lens of focal length

(a) – 100 *metre* (b) + 5 *metre* (c) – 5 *metre* (d) Very large

20. Far point of myopic eye is 250 *cm*, then the focal length of the lens to be used will be

(a) + 250 *cm* (b) – 250 *cm* (c) + 250/9 *cm* (d) – 250/9 *cm*

21. One can take pictures of objects which are completely invisible to the eye using camera film which are invisible to

(a) Ultra-violet rays (b) Sodium light (c) Visible light (d) Infra-red rays

22. In human eye the focussing is done by

(a) To and fro movement of eye lens (b) To and fro movement of the retina

(c) Change in the convexity of the lens surface (d) Change in the refractive index of the eye fluids

23. The minimum light intensity that can be perceived by the eye is about $10^{-10}\ watt/metre^2$. The number of photons of wavelength 5.6×10^{-7} *metre* that must enter per second the pupil of area $10^{-4}\ metre^2$ for vision, is approximately equal to $(h = 6.6\times10^{-34}\ joule-\sec)$

(a) 3×10^2 *photons* (b) 3×10^6 *photons* (c) 3×10^4 *photons* (d) 3×10^5 *photons*

24. A far sighted man who has lost his spectacles, reads a book by looking through a small hole (3-4 *mm*) in a sheet of paper. The reason will be

(a) Because the hole produces an image of the letters at a longer distance

(b) Because in doing so, the focal length of the eye lens is effectively increased

(c) Because in doing so, the focal length of the eye lens is effectively decreased

(d) None of these

25. The maximum focal length of the eye-lens of a person is greater than its distance from the retina. The eye is

(a) Always strained in looking at an object (b) Strained for objects at large distances only

(c) Strained for objects at short distances only (d) Unstrained for all distances

26. In a compound microscope the object of f_o and eyepiece of f_e are placed at distance *L* such that *L* equals

(a) $f_o + f_e$ (b) $f_o - f_e$

(c) Much greater than f_o or f_e (d) Need not depend either value of focal lengths

27. In a simple microscope, if the final image is located at infinity then its magnifying power is

(a) $\frac{25}{f}$ (b) $\frac{D}{25}$ (c) $\frac{f}{25}$ (d) $\frac{f}{D^{+1}}$

28. In a simple microscope, if the final image is located at 25 *cm* from the eye placed close to the lens, then the magnifying power is

(a) $\frac{25}{f}$ (b) $1+\frac{25}{f}$ (c) $\frac{f}{25}$ (d) $\frac{f}{25}+1$

29. The maximum magnification that can be obtained with a convex lens of focal length 2.5 *cm* is (the least distance of distinct vision is 25 *cm*)

(a) 10 (b) 0.1 (c) 62.5 (d) 11

30. In a compound microscope, the intermediate image is

(a) Virtual, erect and magnified (b) Real, erect and magnified

(c) Real, inverted and magnified (d) Virtual, erect and reduced

31. A compound microscope has two lenses. The magnifying power of one is 5 and the combined magnifying power is 100. The magnifying power of the other lens is

(a) 10 (b) 20 (c) 50 (d) 25

32. Wavelength of light used in an optical instrument are $\lambda_1 = 4000\ \mathring{A}$ and $\lambda_2 = 5000\ \mathring{A}$, then ratio of their respective resolving power (corresponding to λ_1 and λ_2) is

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

33. The angular magnification of a simple microscope can be increased by increasing

(a) Focal length of lens (b) Size of object (c) Aperture of lens (d) Power of lens

34. The magnification produced by the objective lens and the eye lens of a compound microscope are 25 and 6 respectively. The magnifying power of this microscope is

(a) 19 (b) 31 (c) 150 (d) $\sqrt{150}$

35. The length of the compound microscope is 14 *cm*. The magnifying power for relaxed eye is 25. If the focal length of eye lens is 5 *cm*, then the object distance for objective lens will be

(a) 1.8 *cm* (b) 1.5 *cm* (c) 2.1 *cm* (d) 2.4 *cm*

36. The magnifying power of a simple microscope is 6. The focal length of its lens in *metres* will be, if least distance of distinct vision is 25 *cm*

(a) 0.05 (b) 0.06 (c) 0.25 (d) 0.12

37. Relative difference of focal lengths of objective and eye lens in the microscope and telescope is given as

(a) It is equal in both (b) It is more in telescope (c) It is more in microscope (d) It may be more in any one

38. Three objective focal lengths (f_o) and two eye piece focal lengths (f_e) are available for a compound microscope. By combining these two, the magnification of microscope will be maximum when

(a) $f_o = f_e$ (b) $f_o >> f_e$ (c) f_o and f_e both are small (d) $f_o >> f_e$

39. If the red light is replaced by blue light illuminating the object in a microscope the resolving power of the microscope

(a) Decreases (b) Increases (c) Gets halved (d) Remains unchanged

40. In case of a simple microscope, the object is placed at

(a) Focus *f* of the convex lens (b) A position between *f* and 2*f* (c) Beyond 2*f* (d) Between the lens and *f*

41. In a compound microscope cross-wires are fixed at the point

(a) Where the image is formed by the objective (b) Where the image is formed by the eye-piece

(c) Where the focal point of the objective lies (d) Where the focal point of the eye-piece lies

42. The length of the tube of a microscope is 10 *cm*. The focal lengths of the objective and eye lenses are 0.5 *cm* and 1.0 *cm*. The magnifying power of the microscope is about

(a) 5 (b) 23 (c) 166 (d) 500

43. Least distance of distinct vision is 25 *cm*. Magnifying power of simple microscope of focal length 5 *cm* is

(a) 1/5 (b) 5 (c) 1/6 (d) 6

44. The objective of a compound microscope is essentially

(a) A concave lens of small focal length and small aperture (b) Convex lens of small focal length and large aperture

(c) Convex lens of large focal length and large aperture (d) Convex lens of small focal length and small aperture

45. For relaxed eye, the magnifying power of a microscope is

(a) $-\frac{v_o}{u_o}\times\frac{D}{f_e}$ (b) $-\frac{v_o}{u_o}\times\frac{f_e}{D}$ (c) $\frac{u_o}{v_o}\times\frac{D}{f_e}$ (d) $\frac{u_o}{v_o}\times\left(-\frac{D}{f_e}\right)$

46. The focal length of objective and eye-piece of a telescope are 100 *cm* and 5 *cm* respectively. Final image is formed at least distance of distinct vision. The magnification of telescope is

(a) 20 (b) 24 (c) 30 (d) 36

47. A simple telescope, consisting of an objective of focal length 60 *cm* and single eye lens of focal length 5 *cm* is focussed on a distant object in such a way that parallel rays comes out from the eye lens. If the object subtends an angle 2° at the objective, the angular width of the image

(a) 10° (b) 24° (c) 50° (d) 1/6°

48. The diameter of the objective of the telescope is 0.1 *metre* and wavelength of light is 6000 *Å*. Its resolving power would be approximately

(a) 7.32×10^{-6} *radian* (b) 1.36×10^{6} *radian* (c) 7.32×10^{-5} *radian* (d) 1.36×10^{5} *radian*

49. A Gallilean telescope has objective and eye-piece of focal lengths 200 *cm* and 2 *cm* respectively. The magnifying power of the telescope for normal vision is

(a) 90 (b) 100 (c) 108 (d) 198

50. An astronomical telescope and a Galilean telescope use identical objective lenses. They have the same magnification, when both are in normal adjustment. The eye-piece of the astronomical telescope has a focal length *f*

(a) The tube lengths of the two telescopes differ by *f* (b) The tube lengths of the two telescopes differ by 2*f*

(c) The Galilean telescope has a shorter tube length (d) The Galilean telescope has a longer tube length