	Utech
Name:	
Roll No.:	A Description and Explored
Invigilator's Signature :	

$CS/B.Optm/SEM-1/BO-101/2011-12 \\ 2011 \\ GEOMETRICAL\ OPTICS\ (\ OPTICS-I\)$

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A (Multiple Choice Type Questions)

1.	Choose the correct alternatives for the following: 10 x			
	i)	Number of images formed	l by two plane mirrors inclined	
		at 60° is		
		a) 3	b) 6	
		c) 5	d) 7.	
	ii)		nin prism of refractive index 1.5 and having around 6° is made to deviate light then deviation	
		produced by it is approximately		
		a) 1°	b) 3°	

iii) Vergence V is defined as

a) V = 2R

 2°

c)

b) V = R

4°.

d)

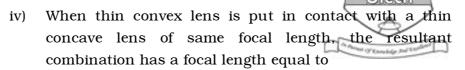
c) V = 3R

d) none of these.

1005

[Turn over

CS/B.Optm/SEM-1/BO-101/2011-12



a) f/2

b) 2*f*

c) 0

d) none of these.

v) A well cut diamond appears bright because

- a) it emits light
- b) it is radioactive
- c) scattering of light
- d) total internal reflection of light.

vi) During refraction of light which of the following remains unchanged ?

- a) Frequency
- b) Speed
- c) Wavelength
- d) Intensity.

vii) Total internal reflection occurs when light travels from

- a) rarer to denser medium
- b) denser to rarer medium
- c) both (a) & (b)
- d) none of these.

viii) If f_1 and f_2 represent the first and second focal lengths of a single spherical refracting surface, then

- a) $f_2 = -f_1$
- b) $f_2 = -\mu f_1$
- c) $f_1 = -\mu f_2$
- d) $f_1 f_2 = -1$.

ix) Optical fibre works on the principle of

- a) refraction
- b) total internal reflection
- c) reflection
- d) none of these.

1005

- x) If two thin lenses of powers P_1 and P_2 are kept in contact then equivalent power is
 - a) $P_1 \times P_2$

b) $P_1 - P_2$

c) $P_1 + P_2$

d) none of these.

GROUP - B

(Short Answer Type Questions)

Write short notes on any three of the following.

 $3 \times 5 = 15$

- 2. Vergence.
- 3. Astigmatism.
- 4. Dispersion of light.
- 5. Critical angle and total internal reflection.

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following.

 $3 \times 15 = 45$

- 6. a) State the factors affecting the angle of deviation of a prism.
 - b) Prove that for a small angle prism δ = A (μ 1), when angle of incidence is very small.
 - c) Establish the relationship between dispersive power, angular dispersion and mean deviation of a prism.
 - d) The minimum deviation produced by a hollow prism filled with a certain liquid is found to be 30° . The refractive angle of the prism is 60° . Calculate the RI of the liquid. 4+4+4+3

CS/B.Optm/SEM-1/BO-101/2011-12

- 7. a) Two thin lenses of focal lengths f_1 and f_2 are kept in contact. Find the focal length and power of the combination.
 - b) What is aberration? What is spherical aberration? How can we minimize spherical aberration?
 - c) A biconvex lens with both faces of the same radius of curvature to be manufactured from a glass of refractive index 1.55. What should be the radius of curvature for the focal length of the lens to be 20 cm? 5+6+4
- 8. a) Find the lateral shift by a plane parallel glass plate of thickness t and refractive index μ .
 - b) What is dispersion of light?
 - c) A ray of light falling at an angle of 45° with the surface of a clean slab of ice of thickness 1 m is refracted into it an angle of 30° . Calculate the time taken by the light rays to cross the slab. Speed of light in vacuum = 3×10^{8} ms⁻¹. 8 + 2 + 5
- 9. a) What is optical fibre? Describe the different types of optical fibre and state its uses.
 - b) An optical fibre is placed in air of which the refractive indices of core and cladding are 1.5 and 1.47. Find acceptance angle and numerical aperture.
 - c) Explain cardinal points for thick lens system with ray diagram. 5 + 5 + 5

1005 4