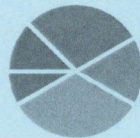


Course Outcomes	CO1	Understand the concepts & terminology of Ocular Anatomy
	CO2	Enlist and memorizing the structure, function & location of different parts of eye
	CO3	Recognize the different Ocular structures
	CO4	Understand relationship between different Ocular structures
	CO5	Develop a holistic approach to Ocular health and medical research

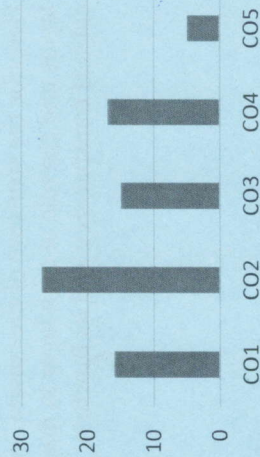
GRAPHICAL REPRESENTATION

Bloom's Level wise Marks Distribution



■ K1 ■ K2 ■ K3 ■ K4 ■ K5 ■ K6

Course Outcome wise Marks Distribution



Program	Bachelor of Optometry		
Subject Name	Ocular Anatomy	Session	Even, 2024-2025
Semester	II	Year	June, 2025 *
- Start writing from 2nd page onwards; <u>don't</u> Write on the 1st Page Backside - Answer all Questions of Section A (Compulsory) - Answer Any Four out of Six of Section B - Answer Any Two out of Four of Section C - Possession of Mobile Phones or any kind of Written Material, Arguments with the Invigilator or Discussing with Co-Student will comes under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Papers.</u>			
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Time: 2 Hour
Max. Marks : 50

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks

Q. N	QUESTIONS	Marks	COs	KL
1				
i	Which extraocular muscle is innervated by the trochlear nerve and lies within the orbit? A) Lateral rectus B) Superior oblique C) Inferior oblique D) Superior rectus	01	CO1	K4
ii	The aqueous humor drains into systemic circulation through the: A) Canal of Schlemm B) Ciliary body C) Vitreous chamber D) Optic canal	01	CO2	K1
iii	The ora serrata marks the junction between the: A) Cornea and sclera B) Ciliary body and iris C) Retina and optic nerve D) Retina and ciliary body	01	CO3	K2
iv	What structure regulates the amount of light entering the eye by adjusting the pupil size? A) Ciliary body B) Retina C) Lens D) Iris	01	CO2	K2
v	Which part of the retina is responsible for the highest visual acuity? A) Optic disc B) Macula C) Fovea centralis D) Peripheral retina	01	CO4	K2
vi	The limbus is the junction between: A) Iris and ciliary body B) Retina and optic disc	01	CO3	K1

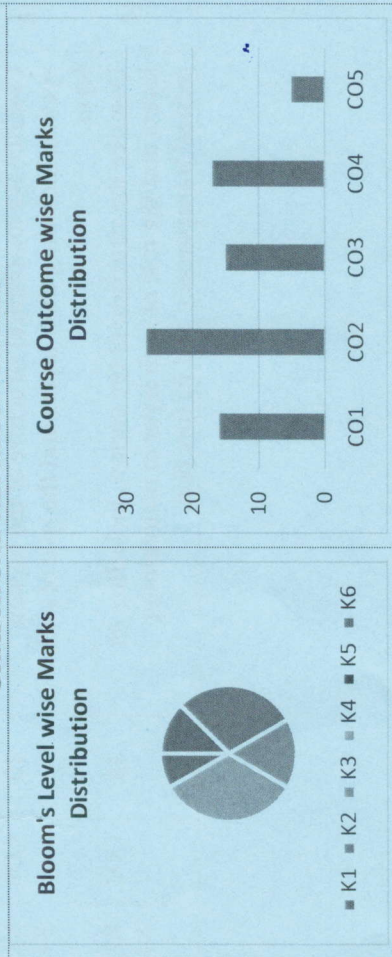
Section C (Answer any TWO out of FOUR) – 20 Marks (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	Describe the structures of retina with the help of diagram and Compare rods and cones in terms of function and location.	10	CO4	K4, K6
9	Explain the important milestones of the development of the eyeball.	10	CO1	K2
10	Describe the anatomical structure of the human eyelids, including their layers and the role of each layer.	10	CO2	K2, K4
11	Describe the structure of the cornea, including its layers and the role of each layer in maintaining corneal transparency and its function.	10	CO2	K2, K4

Section B (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 5 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	How do the cornea and lens work together to focus light on the retina?	05	CO3	K4
3	Explain the role of ciliary body in related to near vision and also explain the two main functions of the ciliary body?	05	CO3	K3
4	Differentiate between the cornea and sclera in terms of function and location with the help of diagram.	05	CO2	K4
5	Design a labeled diagram of the orbital walls and explain the list of the bones forming each wall.	05	CO1	K6
6	Explain Conjunctiva and differentiate between bulbar and palpebral conjunctiva in terms of location and clinical significance.	05	CO4	K2, K3
7	How would a dysfunction in the ciliary body affect intraocular pressure?	05	CO5	K3

Section A (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 5 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
vii	C) Cornea and sclera D) Lens and vitreous The lens is suspended in place by: A) Zonular fibers B) Vitreous base C) Ciliary epithelium D) Bruch's membrane	01	CO3	K1
viii	Which of the following statements about rods is TRUE? A) They are responsible for color vision. B) They function best in bright light. C) They are more numerous than cones. D) They are concentrated in the fovea.	01	CO4	K4
ix	The choroid is most closely associated with which of the following retinal layers? A) Inner nuclear layer B) Ganglion cell layer C) Retinal pigment epithelium D) Nerve fiber layer	01	CO3	K3
x	The function of the choroid is primarily to: A) Refract light B) Control pupil size C) Provide nutrients and oxygen to outer retinal layers D) Drain aqueous humor	01	CO3	K4

Course Outcomes	CO1	Understand the concepts & terminology of Ocular Anatomy
	CO2	Enlist and memorizing the structure, function & location of different parts of eye
	CO3	Recognize the different Ocular structures
	CO4	Understand relationship between different Ocular structures
	CO5	Develop a holistic approach to Ocular health and medical research

GRAPHICAL REPRESENTATION



ARKA JAIN University
Jharkhand

NAAC GRADE A
ACCREDITED UNIVERSITY

[23-06-2025]
END SEM EXAMINATION
School of Allied Health Science

Program	Bachelor of Optometry		
Subject Name	Ocular Anatomy	Session	Even, 2024-2025
Semester	II	Year	June, 2025
Time: 2 Hour Max. Marks : 50 Start writing from 2nd page onwards; <u>don't Write on the 1st Page Backside</u> - Answer all Questions of Section A (Compulsory) - Answer Any <u>Four</u> out of Six of Section B - Answer Any <u>Two</u> out of Four of Section C - Possession of Mobile Phones or any kind of Written Material, <u>Arguments with the Invigilator or Discussing with Co-Student</u> will comes under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Papers.</u>			
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks				
Q. N	QUESTIONS	Marks	COs	KL
i	Which extraocular muscle is innervated by the trochlear nerve and lies within the orbit? A) Lateral rectus C) Inferior oblique B) Superior oblique D) Superior rectus	01	CO1	K4
ii	The aqueous humor drains into systemic circulation through the: A) Canal of Schlemm C) Vitreous chamber B) Ciliary body D) Optic canal	01	CO2	K1
iii	The ora serrata marks the junction between the: A) Cornea and sclera C) Retina and optic nerve B) Ciliary body and iris D) Retina and ciliary body	01	CO3	K2
iv	What structure regulates the amount of light entering the eye by adjusting the pupil size? A) Ciliary body C) Lens B) Retina D) Iris	01	CO2	K2
v	Which part of the retina is responsible for the highest visual acuity? A) Optic disc C) Fovea centralis B) Macula D) Peripheral retina	01	CO4	K2
vi	The limbus is the junction between: A) Iris and ciliary body B) Retina and optic disc	01	CO3	K1

	C) Cornea and sclera	D) Lens and vitreous			
vii	The lens is suspended in place by: A) Zonular fibers C) Ciliary epithelium	01	CO3	K1	
viii	Which of the following statements about rods is TRUE? A) They are responsible for color vision. B) They function best in bright light. C) They are more numerous than cones. D) They are concentrated in the fovea.	01	CO4	K4	
ix	The choroid is most associated with which of the following retinal layers? A) Inner nuclear layer C) Retinal pigment epithelium B) Ganglion cell layer D) Nerve fiber layer	01	CO3	K3	
x	The function of the iris is primarily to: A) Refract light B) Control pupil size C) Provide nutrients to outer retinal layers D) Drain aqueous humor	01	CO3	K4	

Section C (Answer any TWO out of FOUR) - 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Describe the structures of retina with the help of diagram and Compare rods and cones in terms of function and location.	10	CO4	K4, K6
9	Explain the important milestones of the development of the eyeball.	10	CO1	K2
10	Describe the anatomical structure of the human eyelids, including their layers and the role of each layer.	10	CO2	K2, K4
11	Describe the structure of the cornea, including its layers and the role of each layer in maintaining corneal transparency and its function.	10	CO2	K2, K4

Q. No.		Marks	COs	KL
2	How do the ciliary muscles work together to focus light on the retina?	05	CO3	K4
3	Explain the relationship between vision and accommodation functions of the ciliary body?	05	CO3	K3
4	Differentiate between the functions of the sclera and cornea with the help of diagram.	05	CO2	K4
5	Design a labeled diagram of the eyeball showing the location of each wall.	05	CO1	K6
6	Explain the clinical significance of the ciliary body and its location in terms of location.	05	CO4	K2, K3
7	How would you manage a patient with ciliary body affect?	05	CO5	K3

Section D

Section D (Answer any TWO out of FOUR) - 20 Marks
(Each question Carry 5 Marks)

Q. No.		Marks	COs	KL
2	How do the ciliary muscles work together to focus light on the retina?	05	CO3	K4
3	Explain the relationship between vision and accommodation functions of the ciliary body?	05	CO3	K3
4	Differentiate between the functions of the sclera and cornea with the help of diagram.	05	CO2	K4
5	Design a labeled diagram of the eyeball showing the location of each wall.	05	CO1	K6
6	Explain the clinical significance of the ciliary body and its location in terms of location.	05	CO4	K2, K3
7	How would you manage a patient with ciliary body affect?	05	CO5	K3

Program	Bachelor of Optometry	
Subject Name	Ocular Physiology	Session Even, 2024-2025
Semester	II	Year June, 2025
- Start writing from 2nd page onwards; don't Write on the 1st Page Backside - Answer all Questions of Section A (Compulsory) - Answer Any Four out of Six of Section B - Answer Any Two out of Four of Section C - Possession of Mobile Phones or any kind of Written Material, Arguments with the Invigilator or Discussing with Co-Student will comes under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Papers</u>.		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying
	K2 : Understanding	K4 : Analysing
		K5 : Evaluating K6 : Creating

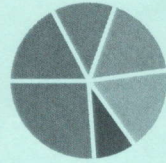
Time: 2 Hour
Max. Marks : 50

- Answer all Questions of Section A (Compulsory)
- Answer Any Four out of Six of Section B
- Answer Any Two out of Four of Section C
- Possession of Mobile Phones or any kind of Written Material, Arguments with the Invigilator or Discussing with Co-Student will comes under Unfair Means and will Result in the Cancellation of the Papers.

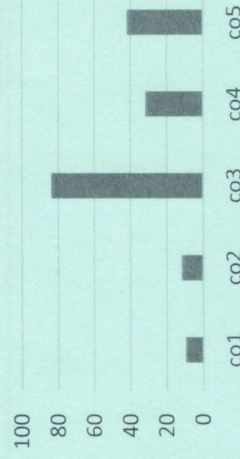
Knowledge Level (KL)

K1 : Remembering
K2 : Understanding
K3 : Applying
K4 : Analysing
K5 : Evaluating
K6 : Creating

Bloom's Level wise Marks Distribution



Course Outcome Wise Marks Distribution



GRAPHICAL REPRESENTATION

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks

Q.N	QUESTIONS	Marks	COs	KL
1				
i	Vision in low light conditions is primarily mediated by: a) Cones b) Rods c) Bipolar cells d) Ganglion cells	01	CO1	K1
ii	Retinal sensitivity is generally highest in the: a) Fovea b) Optic disc c) Peripheral retina under scotopic conditions d) Peripheral retina under photopic conditions	01	CO1	K2
iii	A decrease in the amplitude of the b-wave on an ERG might suggest dysfunction of the: a) Ganglion cells b) Photoreceptors c) Bipolar and Müller cells d) Optic nerve fibers	01	CO3	K3
iv	A defect in the red cone photopigment would result in which type of color vision deficiency? a) Tritanopia b) Deuteranopia c) Protanopia d) Achromatopsia	01	CO3	K3
v	Optical illusions demonstrate that: a) The eye accurately perceives the external world b) Visual perception is solely based on retinal input c) The brain actively interprets and constructs visual reality	01	CO4	K4

	d) Color vision is independent of form perception				
vi	Vernier acuity refers to the ability to detect: a) Differences in brightness b) Differences in color saturation c) Misalignment between two lines d) Objects in dim light	01	CO1	K1	
vii	The perception of depth resulting from the slightly different images received by each eye is called: a) Visual acuity b) Stereopsis c) Color constancy d) Binocular rivalry	01	CO1	K1	
viii	Visual acuity is a measure of the eye's ability to distinguish: a) Different colors b) Movement of objects c) Fine details d) Depth perception	01	CO5	K4	
ix	The primary photopigment in rods is: a) Iodopsin b) Chlorolabe c) Rhodopsin d) Cyanolabe	01	CO2	K1	
x	An increase in intraocular pressure is most directly related to: a) Increased production or decreased drainage of vitreous humor b) Increased production or decreased drainage of aqueous humor c) Changes in the curvature of the lens d) Weakening of the extrinsic eye muscles	01	CO1	K2	
Section B (Answer any FOUR out of SIX) - 20 Marks (Each question Carry 5 Marks)					
Q. No.	QUESTIONS	Marks	COs	KL	
2	Draw a diagram of the visual pathway and label its key components.	05	CO2	K6	
3	Explain how the cornea and lens work together to focus light.	05	CO4	K2	
4	Compare and contrast the sensitivity to light and color in photopic and scotopic vision.	05	CO5	K4	
5	Similarities and differences between extrinsic and intrinsic eye muscles	05	CO5	K6	
6	How would damage to the levator palpebrae superioris muscle affect the function of the eyelid?	05	CO3	K3	
7	How would a blockage in the trabecular meshwork affect intraocular pressure?	05	CO3	K3	

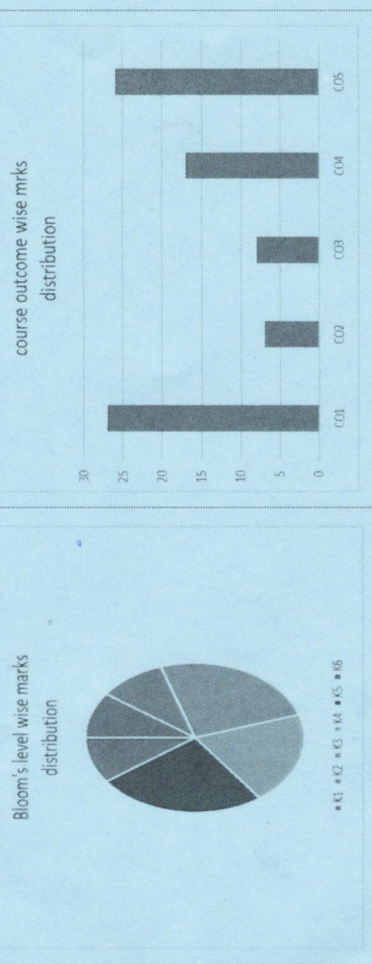
Section C (Answer any TWO out of FOUR) - 20 Marks (Each question Carry 10 Marks)					
Q. No.	QUESTIONS	Marks	COs	KL	
8	Develop a flowchart illustrating the process of accommodation and indicate where presbyopia disrupts this process.	10	CO3	K6	
9	Compare and contrast the composition and functions of the aqueous and vitreous humor.	10	CO4, CO5	K4	
10	Explain why correcting refractive errors is essential for optimal visual function and preventing eye strain.	10	CO3	K5	
11	Discuss the clinical significance of electrophysiological tests in assessing retinal function.	10	CO3	K5	

Program	Bachelor of Optometry		
Subject Name	Ocular Biochemistry	Session	Even, 2024-2025
Semester	II	Year	June, 2025
Time: 2 Hour Max. Marks : 50	• Start writing from 2nd page onwards; don't Write on the 1st Page Backside • Answer all Questions of Section A (Compulsory) • Answer Any <u>Four</u> out of Six of Section B • Answer Any <u>Two</u> out of Four of Section C • Possession of <u>Mobile Phones</u> or any kind of <u>Written Material, Arguments with the Invigilator or Discussing with Co-Student</u> will comes under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Papers.</u>		
Knowledge Level (KL)	K1 : Remembering	K3 : Applying	K5 : Evaluating
	K2 : Understanding	K4 : Analysing	K6 : Creating

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks				
Q. N	QUESTIONS	Marks	COs	KL
i	Cornea get oxygen supply from a) Aqueous humour b) Air c) Vitreous humour d) Both a & b	01	CO1	K1
ii	_____ maintaining the shape and pressure of the eye, a) Aqueous humour. b) Vitreous humour. c) sclera. d) Both a&b	01	CO3	K2
iii	Rhodopsin found in - a) Rod cells b) Cone cells c) Muller cells d) Both a&b	01	CO3	K2
iv	A single layer of cells that pumps fluid out of the cornea, preventing swelling and maintaining its transparency a) Epithelium b) Bowman's layer c) Descemet's membrane d) Endothelium	01	CO2	K3
v	which contains melanin- a) Ciliary body b) Iris c) lens d) Both a & b	01	CO1	K4
vi	Mucin produced by- a) Basal cells b) Goblet cells. c) Muller cells. d) None of the above	01	CO4	K1

CO1	Understand the concepts and theories of Biochemistry
CO2	Understand the chemistry of carbohydrates, proteins, lipids and amino acids related to eye
CO3	Understand the basic metabolism of bio molecules and their energetic related to eye
CO4	Understand the role of Minerals with respect to eyes
CO5	Understand the process of biochemical testing and analyzing the test result.

GRAPHICAL REPRESENTATION



vii	pH of the water is- a) 9 b) 6 c) 7 d) 10	01	CO5	K3
viii	High bilirubin levels causes a) jaundice c) None of the above b) viral hepatitis c) Conjunctivitis	01	CO3	K4
ix	The main protein in the eye lens is called- a) Crystalline c) Albumin b) Myosin d) Keratin	01	CO4	K5
x	Examples of anterior segment immune cells that play a major role to reduce inflammation. a) T-cells c) Mast cells b) B3-H3 cells d) All of the above.	01	CO2	K3

Section B (Answer any FOUR out of SIX) - 20 Marks
(Each question Carry 5 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
2	Write a short notes on electrophoresis test.	05	CO5	K6
3	Write a short notes on glucose effect in the eye.	05	CO2	K4
4	Elaborate water soluble of vitamins that maintain the eye health.	05	CO3	K5
5	Discuss about the aqueous humour substances that maintain the ocular health.	05	CO1	K5
6	Write a short notes on Dialysis.	05	CO5	K6
7	Write a short note on importance of pH buffer solution in eye .	05	CO4	K3

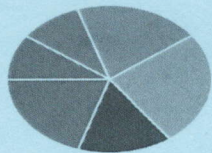
Section C (Answer any TWO out of FOUR) - 20 Marks
(Each question Carry 10 Marks)

Q. No.	QUESTIONS	Marks	COs	KL
8	Explain about the Biochemical function of lens to maintain transparency.	10	CO1	K5
9	Explain about the Biochemical function of cornea to maintain transparency.	10	CO1	K5
10	Elaborate the basic role of Anterior Chamber-Immune Deviation in eye to protect against micro-organisms.	10	CO4	K4
11	Explain about the Biochemical function of tear film to maintain the lubrication.	10	CO5	K3

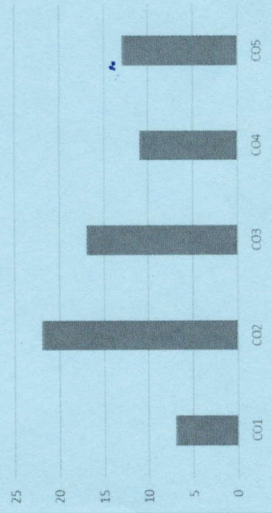
Course Outcomes	CO1	Understand the concepts of schematic & Reduced Eye and Visual Acuity
	CO2	Understand the concept of refractive error and its management options
	CO3	Understand the concept of image formation by different types of lenses
	CO4	Understand the concept of Accommodation & Presbyopia and different options of presbyopia
	CO5	Understand the concepts of Eye with and without crystalline lens

GRAPHICAL REPRESENTATION

Bloom's level wise marks distribution



course outcome wise marks distribution



ARKA JAIN
University
Jharkhand

NAAC
GRADE A
ACCREDITED UNIVERSITY

[03-07-2025]

END SEM EXAMINATION
School of Allied Health
Science

Program	Bachelor of Optometry		
Subject Name	Geometrical Optics-2		
Semester	II	Year	June, 2025
- Start writing from 2nd page onwards; don't Write on the 1st Page Backside - Answer all Questions of Section A (Compulsory) - Answer Any Four out of Six of Section B - Answer Any Two out of Four of Section C - Possession of <u>Mobile Phones</u> or any kind of <u>Written Material</u>, <u>Arguments with the Invigilator or Discussing with Co-Student</u> will come under <u>Unfair Means</u> and will <u>Result</u> in the <u>Cancellation of the Papers</u>.			
Time: 2 Hour Max. Marks : 50			
Knowledge Level (KL)	K1 : Remembering K2 : Understanding	K3 : Applying K4 : Analysing	K5 : Evaluating K6 : Creating

Section A (Each question Carry 01 Marks from Q1-i to x) - 10 Marks

Q. N	QUESTIONS	Marks	COs	KL
1				
i	Aphakia induced - a) Convex lens power. b) Concave lens power. c) Toric lens power. d) Both a & b	01	CO5	K2
ii	Focal length is positive for a) Diverging rays b) Converging lens c) Biconcave lens. d) Both a&c	01	CO3	K3
iii	Refractive index of a medium is a) Speed of light in air to speed of light in vacuum. b) Speed of light in vacuum to speed of light in air. c) Focal length of Object distance. d) Speed of light in medium $\times$ speed of light in air.	01	CO1	K4
iv	The capacity of the eye lens to adjust its focal length is known as a) Rectification b) Regularisation c) Accommodation d) Correction	01	CO4	K2
v	Astigmatism occurs when light hits which part of the eye incorrectly? a) Lens b) Cornea. c) Retina. d) Optic nerve	01	CO2	K1

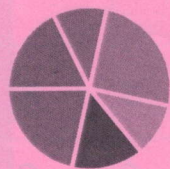
vi	3mm shortening of axial length causes- a) 6 D hypermetropia b) 6 D myopia. c) 9 D hypermetropia. d) 9 D myopia.	01	CO5	K6
vii	Night myopia Causes a) Photopic to scotopic condition b) Mesopic condition. d) None of the above.	01	CO2	K5
viii	If the focal length is 50 cm then what is the lens power. a) 3 D b) 4 D c) 2 D d) 1 D	01	CO3	K6
ix	Normal axial length for adult is a) 23.5-24.5 mm b) 22-25 mm c) 20-24 mm d) 21-23mm	01	CO5	K4
x	Normal dioptric power of the crystalline lens for adult is a) 10-15 D b) 15-20 D c) 20-25 D d) 25-30 D	01	CO1	K5
Section B (Answer any FOUR out of SIX) - 20 Marks (Each question Carry 5 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	Explain about the principle of the snellen's visual acuity chart.	05	CO2	K3
3	Calculate the total eye power by using Listing's Reduced eye theory? (RI of air- 1.00, RI of vitreous- 1.336)	05	CO1	K5
4	Write a short notes about spherical aberration.	05	CO3	K3
5	Explain with an example about with the rule and against the rule astigmatism.	05	CO2	K6
6	Define accommodation. What are the types of anomalies accommodation?	05	CO4	K4
7	Define Presbyopia. How will you correct Presbyopia according to the age?	05	CO4	K4
Section C (Answer any TWO out of FOUR) - 20 Marks (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	Describe the components of visual acuity.	10	CO2	K1
9	Explain about the sign, symptoms and clinical types of myopia. What are the complications of myopia?	10	CO2	K6

10	Enlist the visual acuity chart in different age group. *Explain about any two visual acuity chart.	10	CO3	K4
11	How do you explain aphakia and pseudophakia? Management of aphakia and pseudophakia	10	CO5	K3

Course Outcomes	CO1	Understand concepts & theories of light, its nature & properties
	CO2	Understand concepts & theories of interference, diffraction & polarisation
	CO3	Understand concepts & operations of various optical instruments
	CO4	Understand concepts of laser & radiometry

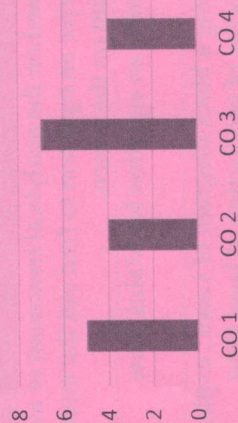
GRAPHICAL REPRESENTATION

Bloom's Level Wise Marks Distribution



■ K1 ■ K2 ■ K3 ■ K4 ■ K5 ■ K6

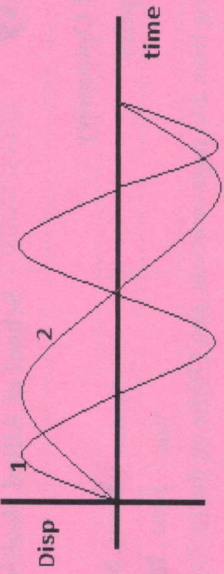
Course Outcome Wise Marks Distribution



 ARKA JAIN University Jharkhand		 [01-07-2025] END SEM EXAMINATION School of Allied Health Science	
Program		Bachelor of Optometry	
Subject Name		Physical Optics	
Semester		II	
Time: 2 Hour Max. Marks : 50		Session	Even, 2024-2025
		Year	June, 2025
- Start writing from 2nd page onwards; <u>don't Write on the 1st Page Backside</u> - Answer all Questions of Section A (Compulsory) - Answer Any Four out of Six of Section B - Answer Any Two out of Four of Section C - Possession of <u>Mobile Phones</u> or any kind of <u>Written Material</u>, <u>Arguments with the Invigilator or Discussing with Co-Student</u> will come under <u>Unfair Means</u> and will <u>Result in the Cancellation of the Papers.</u>			
Knowledge Level (KL)	K1 : Remembering		K5 : Evaluating
	K2 : Understanding		K6 : Creating
	K3 : Applying		
	K4 : Analysing		

Section A (Each question Carry 01 Marks from Q1-i to x) – 10 Marks

Q. N1	QUESTIONS	Marks	COs	KL
i	Which can be polarized? Consider the following: i. Waves created on the surface of water in a pond ii. Waves created by an oscillating electric field in air iii. Sound waves travelling under water (a) i & ii (c) ii & iii (b) ii only (d) i, ii & iii	01	CO3	K3
ii	The phenomenon of polarization of light shows that light has _____ nature. (a) particle (c) longitudinal (b) transverse (d) dual	01	CO2	K5
iii	Which of the following is given in decreasing order of wavelength ? (a) Gamma rays, Ultraviolet, Infrared, Microwaves (b) Gamma rays, Infrared, Ultraviolet (c) Infrared, Microwave, Ultraviolet, Gamma rays (d) Microwave, Infrared, Ultraviolet, Gamma rays	01	CO1	K6
iv	If a particle is executing SHM with an amplitude 2A, the displacement & the distance moved by the body in a time equal to the time period are (a) 0, 8A (c) A, 8A (b) 0, 4A (d) 4A, 0	01	CO2	K4

v	What is the relation between time periods of the two given SHMs.	01	CO4	K5
	 (a) $4T_1 = T_2$ (b) $T_1 = 2T_2$ (c) $2T_1 = T_2$ (d) $T_1 = 4T_2$			
vi	The energy of photon is equal to (a) $h\nu$ (b) $(3/2)h\nu$ (c) $h\nu/2$ (d) None of these	01	CO3	K1
vii	A ray of light passes from medium X to another medium Y. If no refraction occurs, then the angle between the incident light & the surface of medium Y should be (a) 120° (b) 90° (c) 45° (d) 0°	01	CO1	K2
viii	Spontaneous emission produces (a) Coherent light (b) Incoherent light (c) White light (d) None of the above	01	CO3	K2
ix	The electric and magnetic fields of an electromagnetic wave are (a) In phase and parallel to each other. (b) In opposite phases & perpendicular to each other. (c) In opposite phases & parallel to each other. (d) In phase and perpendicular to each other.	01	CO4	K3
x	When a beam of ordinary light is passed through a calcite crystal, the light splits into E-ray & O-ray inside the crystal. (a) Only O-ray is polarized (b) Neither E-ray nor O-ray is polarised (c) Only E-ray is polarized (d) Both E-ray & O-ray is polarised	01	CO2	K2
Section B (Answer any FOUR out of SIX) – 20 Marks (Each question Carry 5 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
2	Explain what is stimulated emission, with a neat labelled diagram.	05	CO1	K4
3	Derive the expression for Brewster's law.	05	CO3	K5

4	What is constructive interference? Derive the conditions for constructive interference to take place.	05	CO3	K4
5	Explain Fraunhofer's diffraction with a neat labelled diagram.	05	CO4	K6
6	Explain Fluorescence & Phosphorescence.	05	CO4	K2
7	What do you understand by SHM? Write a short note.	05	CO2	K5
Section C (Answer any TWO out of FOUR) – 20 Marks (Each question Carry 10 Marks)				
Q. No.	QUESTIONS	Marks	COs	KL
8	Based on the analytical treatment of interference derive an equation to find out the intensity at any point on the screen.	10	CO1	K3
9	Derive an equation for Malus' Law.	10	CO4	K2
10	Using a block diagram of Laser, explain in detail the process of production of laser light.	10	CO2	K1
11	Derive Einstein's A & B coefficients.	10	CO3	K3