MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WB

(Formerly West Bengal University of Technology)

Syllabus for Bachelors in Optometry Programme

(Effective for Students Admitted in Academic Session 2018-2019)

2nd SEMESTER

Paper: PHYSICAL OPTICS

CODE: BO 201

Contact: 3L+1T

Credits: 4

Course Content	
UNIT/MODULE 1	HUYGENS' principle – laws of reflection and refraction at plane and spherical surfaces. Wave velocity & group velocity; determination of velocity of light (any one method.) Interference: Coherence; path and phase difference; Theory of interference fringes-intensity distribution infringes; Young's double slit experiment- Fresnels' bi-prism, Lloyds' error experiments; visibility of fringes. Interference in thin films due to reflected and transmuted light- Interference in wedge Shaped films; Newton's ring experiment; Colour of thin films; Thin film antireflection coating and filters.
UNIT/MODULE 2	Diffraction: Diffraction by single slit; double slit, multiple slit-grating, circular aperture – amplitude & intensity distribution (final expressions only) Circular aperture- airy pattern, resolution by circular apertures. Diffraction grating- reflection, traasnussion , amplitude & phase gratings(definitions in brief) Grating dispersion & dispersive power, spectral resolution; zone plates.
UNIT/MODULE 3	Polarization & Crystal Optics: Concept of polarization, polarizes, analyzers, Linear Scattering- Raleigh & Mie Principles of LASERs.
UNIT/MODULE 4	Lumen method of lighting design utilization factor, light loss factor, Glare and glare index- disability glare- discomfort glare- control of glare- Daylight, its properties. Color lamp – Incandescent lamps - low pressure Hg-lamps- Low-pressure NA- lamp - Typical applications. Recommended level of illuminance for various including those in optometry and ophthalmology driving etc.

	VDU- Design of work station – Flicker color contrast- Regulations regarding the use of VDU. Eye Protectors- their constructions standard relating to eye protection

Reference books-

1. *OPTICS- E. HECHT*
2. *FUNDAMENTALS OF OPTICS- JENKINS*

Paper: OCULAR PHYSIOLOGY
CODE-BO 202
Contact: 3L+1T
Credits: 4

Course Content	
UNIT/MODULE 1	1.Cornea: Brief idea about ultra & histological structure of cornea. Corneal transparency & hydration, Regulation of corneal transparency & hydration. Corneal vascularization. Maurice theory & Goldman's theory. Biochemical composition of cornea. Sources of Nutrients- Oxygen, Glucose, Amino acid. Metabolic pathway in cornea – Glycolysis, HMP shunt. 2. Uveal tissue: Brief idea about uvea. Uveal meshwork. Uveo-scleral drainage. Schlemm's canal switch. 3. Lens: Basic idea about human lens. Function of lens. Lens transparency. Lens culture. Changes in ageing lens. Biochemical composition of lens. Lens protein – their types & characteristics. Lens Metabolism - Carbohydrate metabolism, protein metabolism. Antioxidant mechanism in the lens. 4. Aqueous humour: Formation of Aqueous humour. Drainage & circulation of Aqueous Humor. Rates of production & flow. Functions of Aqueous humour. 5. Vitreous Humour: Composition & distribution of vitreous humour, Physiology & function of vitreous humour, Optical role of vitreous humour.
UNIT/MODULE 2	6.Retina: Retinal structure-layers of retina. Brief idea about rod & cones. Organization of retina. Function of retina. 7.Optic Nerve: Physiology of optic nerve. Photopigments – Rhodopsin & Iodopsin. Chemical nature of Rhodopsin. Visual cycle (Bleaching of Rhodopsin, Transducin cycle, Role of Phosphodiestareses). 8.Ocular Circulation : Vascular structure of the eye – ocular circulation, blood-ocular barrier (Blood-retinal, blood Vitreous &

	blood aqueous barrier). Regulation of ocular circulation. 9. Protective Mechanism of the eye – a. Blinking – muscles of lead closer & lid opening (orbecularisocculli, levatorpalpebre, Muller's muscle, blinking reflexes. b. Lacrimation – i) Lacrimal glands ii) Pre corneal tear film iii) Chemistry of lachrymal secretion tear film iv) Tear film dynamics (secretion of tear, formation of tear, retention & redistribution of tear, displacement phenomena, evaporation from tear film, drying & breakup of tear film, dynamic events during blinking, elimination of tear.) v) Functions of Tear film. Different layers of Tear film. Chemical composition of tears. Tear film abnormalities. Tests for film Adequacy.
UNIT/MODULE 3	10 . Intraocular pressure – Features of normal IOP, Factors influencing the IOP,Control of IOP,Measurement of IOP. 11. Pupil – Normal pupil, Physiological changes in pupil size – Isocoria, Pupillary unrest, Hippies. Pupillary reflex – Light reflex, Near reflex, Darkness reflex , Psycho sensory reflex, Lid closure reflex. 12.Light & Dark adaptation – Dark adaptation curve, Mechanism of dark adaptation, Factors influencing dark adaptation, Time course of light adaptation, Mechanism of light adaptation, Rod vs. cone light adaptation. Purkinje shift of spectral sensitivity. 13.Accommodation – a. Far point , near point, range & amplitude of Accommodation b. Mechanism of accommodation – Increased tension theory, Relaxation theory, Role of lens capsule, Gullstrand mechanical model of accommodation, c. Stimulus for accommodation d. Ocular changes in accommodation. e. Changes in accommodation with arc (Presbyopia)

	f. Nervous mechanism for accommodation
UNIT/MODULE 4	14. Visual acuity – visual angle, Components of Visual acuity (Minimum visible, Resolution , Recognition Hyperacidity), Factors affecting, Measurement of visual acuity. 15. Color vision- a. Physiological, Photochemical & neurological basis of color vision b. Electrophysiology of color vision c. Granit's modulator and dominator theory, Purkinje phenomenon. Young-Helmholtz theory d. Types of color defects e. Color blindness f. Neural analysis **Module: 5** 16. Ocular Nutrition a. Vitamin & its Role in eye b. Role of Antioxidant c. Role of Omega 3 & 6 Fatty acid in eye care

Reference books:

1. ANATOMY AND PHYSIOLOGY OF EYE- A.K.KHURANA, INDU KHURANA

Paper code- ANATOMY (Ocular)
CODE: BO 203
Contact: 3L+1T
Credits: 4

Course Content	
UNIT/MODULE 1	1. Embryology –ocular Formation of optic vesicle & optic stalk, formation of lens vesicle, formation of optic cup, changes in associated mesoderm, development of various structure of eye ball – retina, optic nerve, crystalline lens, cornea, sclera, choroid, cilliary body, iris, viterous. Development of accessory structures of eyeball – eyelids, lacrimal apparatus, extra-ocular muscles, orbit. Milestones in the development of the eye.UNIT 2. Orbit Bony orbit→ Size, shape & relations, walls of the orbit , Base of the orbit, Apex of orbit. Orbital fascia →Fascial bulbi, Fascial sheaths of extraocular muscles, inter-muscular septa. Spaces of orbit → Orbit fat & reticular tissue - Apertures at the base of orbit- Contents of the orbit - Orbital nerve→oculomotor ,Trochler, Abducent, Trigeminal, facial nerves - their functional components, course & distribution, clinically applied aspects. Cornea: Brief idea about ultra & histological structure of cornea. Corneal transparency & hydration. Regulation of corneal transparency & hydration. 3.Uveal Tract & its vascular supply→(a). Iris macroscopic & microscopic appearance. (b) ciliary body – Macroscopic structure.(c). choroid - Macroscopic structure.(d) Blood supply to uveal structure- short & Long Posterior artery & Anterior Artery. (e). Venous drainage.
UINT/MODULE 2	Lens: Basic idea about human lens. Function of lens. Lens transparency. Lens culture. Biochemical composition of lens. Lens protein – their types & characteristics. Vitreous- main masses of vitreous. Base of the vitreous. Hyaloidean vitreous. Vitreous cells. 5. Sclera – Anterior, posterior & middle apertures. Episclera. Sclera

	proper. Lamina fusca. Blood supply of the sclera. Nerve suply of the sclera. 6. Anterior chamber and its angle- angle of the anterior chamber. Trabecular meshwork. Canal of Schlemm. Schwalbe's line. Drainage of aqueous humor. 7. Retina & its vascular supply→ (a). Gross anatomy,(b). Microscopic structure of fovea centralize, (c.) Anatomy of optic nerve, (d). Anatomy of optic nerve, (e.) optic chiasma optic tracts, (f) Lateral Geniculate body, (g). optic radicalism (h). visual cortex, (i). Arrangement of nerve fibers.(j). Blood supply of visual pathways (Arterial circle of willis & its branches).
UNIT/MODULE 3	8. The Ocular motor system→ Extra ocular muscles, nerve supply, motor nuclei, supra nuclear motor centers. 9. The pupillary & ciliary muscle→Anatomy of sphincter & Dilator muscle. Ciliary muscle – Anatomy, types 12. The nerve supply of the eye ball. 10. The lacrimal apparatus→ (a) Lacrimal gland, (b) Palpebral part, (c) Duets of lacrimal gland, (d) structure of the lacrimal gland, (e) Blood supply & nerve supply of the lacrimal gland, (f) lacrimal passages.
UINT/MODULE 4	11. Anatomy of the Ocular Adnexa & glands; Lids - a. Structures of the lids: - Skin, Subcutaneous Areolar Layer, Layer of Striated muscle, Submuscular Areolar Tissue, Fibrous Layer, Conjunctiva. Glands of the Lids- - Meibomian Glands, Glands of Zeis and Glands of Moll. Blood Supply of the Lids, Lymphatic Drainage of the Lids, Nerve Supply of the Lids. 12. Conjunctiva - Palpebral Conjunctiva, Bulbar Conjunctiva, Conjunctival Fornix, Microscopic Structure of the conjunctiva- Epithelium, Substantia Propria. Conjunctival Glands→ Krause's Glands, Wofring's Glands, Henley's Glands, Manz Glands. Blood Supply of the Conjunctiva, Nerve Supply of the Conjunctiva, Caruncle, Plica Semilunaris.

Reference books:

1. ANATOMY AND PHYSIOLOGY OF EYE- A.K.KHURANA,INDU

PAPER: ENVIRONMENT AND ECOLOGY
Code: BO -204
Contact: 1L+1T
Credits: 2

Course Content	
UNIT/MODULE 1	**General** Introduction, components of the environment, environment degradation. **Ecology** Elements of Ecology; Ecological balance and consequences of change, principles of environmental impact assessment.
UNIT/MODULE 2	**Air Pollution and Control** Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures. **Water Pollution and Control** Hydrosphere, natural water, pollutants: their origin and effects, river/lake/ground water pollution, standards and control.
UNIT/MODULE 3	**Land Pollution** Lithosphere, pollution (municipal, industrial, commercial, agricultural, hazardous solid wastes); their origin and effects, collection and disposal of solid waste, recovery and conversion methods. **Noise Pollution** Sources, effects, standards and control.

Reference books:

1. *Environmental Studies – M.P. Poonia & S.C. Sharma, Khanna Publishing*
2. *ENVIRONMENT & ECOLOGY- SUNAKAR PANDA*

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PAPER: COMPUTER FUNDAMENTALS
Code: BO -205
Contact: 1L+1T
Credits: 2

Course Content	
UNIT/MODULE 1	Basic computer Architecture: Fundamentals of Computers, Block diagram of PC, peripheral devices of PC and their functions
UNIT/MODULE 2	Input/Output: Input Devices, Output devices
UNIT/MODULE 3	Processor and memory
UNIT/MODULE 4	Storage Devices

Reference book:

1. *COMPUTER FUNDAMENTALS BY SINHA AND SINHA*
2. COMPUTER FUNDAMENTALS BY R.S. SALARIA (KHANNA)

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PRACTICAL SYLLABUS

PAPER: PHYSICAL OPTICS
CODE: BO-291
Contact: 4P
Credits: 4

1. To determine the wavelength of a monochromatic light source with the help of Fresnel's Biprism.
2. To determine the radius of curvature of convex surface of a lens by Newton's ring method.
3. To determine Planck's constant using photocell.
4. To study the diffraction through a single slit & to determine its width.

5. To determine the slit width & the separation between the slits of a double slit system from its Fraunhoffer diffraction pattern.

6. Determination of the wavelength of monochromatic light using diffraction grating.

7. To calibrate a Polarimeter & hence to determine the unknown concentration of sugar solution.
8. To determine the wavelength of the Laser source by forming diffraction pattern with transmission grating.

9. Use a calibrated Luxmeter to measure the levels of illumination at least 15 working places in the college. Identify the locations & note the measured levels at each location, indicating whether the measured values agree with the prescribed values for comfortable vision. If there are considerable deviations,

PAPER - COMPUTER
CODE: BO-292
Contact: 2P
Credits: 2

1) Software and it's type: Operating System (Windows 7/8/10) [Desktop elements, taskbar, Creation of folders and shortcuts, features of Windows Explorer]

2) Ms Word (2010/2013/2016)

[Concept of Word Processor, Create document, Open document, Save document, Print document, Cut, Copy, Paste, Find and Replace, Basic formatting features- Paragraph alignment, indentation, line spacing, font styles, colours, size, Borders and Shading, Bullets and Numbering, Insert table, textbox, watermark, WordArt, margins, rulers, page break, section break, page orientation, spelling and grammar check, word count, comments, document views, headers and footers, clipart, cover page, format painter]

3) Ms Excel (2010/2013/2016)

[Concept of Spreadsheet, workbook versus worksheet, range of cells, types of cell referencing, name box, formula bar, Autofill, conditional formatting, format as a table, Charts-column, bar and pie,

Functions

- ✓ Autosum (Σ)
- ✓ Text (LEFT, RIGHT, MID, LEN and TRIM)
- ✓ Logical (AND,OR,NOT and IF)
- ✓ Statistical(AVERAGE, COUNTIF, MEDIAN,MODE, MAX, MIN)
- ✓ Date and Time (TODAY and NOW)

4) Ms PowerPoint (2010/2013/2016)

[Concept of Presentation tool, Create a presentation , template, insert slide, change slide layout and format, custom animation, slide transition, slide master, delete slide, set up slide show)

5) Internet- Browser-set up home page, creating bookmark in browser, clearing history and browser cache, surfing,

6) Email- send mail, send attachment, Concept of Cloud Storage(Google drive)- [Save work in Google drive, create files and folders in Google drive, Sh 7) aring files in Google drive,]

8) Rules for creating strong password and basic network security (Antivirus and firewall, protection from phishing mail)