DEPARTMENT OF PHYSICS - B.Sc.
(Effective from June 2020 onwards)

Sem	Sub.Code	Subject Title	No. of Hours	No. of credits	CIA						End Sem	Total
					Mid	Mon	Week	Session	NSch	Total		
	19P1CC1	Mechanics and Properties of Matter	5	4	15	10	5	5	5	40	60	100
I	19P1CC2	Thermal Physics	4	3	15	10	5	5	5	40	60	100
	19P1CC3	Major practicals-I	3	2	15	10	5	5	5	40	60	100
	19C1ACP1	Allied Physics – I	3	3	-	-	-	-	-	40	60	100
	19C1ACP2	Allied Physics Practicals-I	2	2	-	-	-	-	-	40	60	100
	19P1NME	Physics in everyday life	2	2	15	10	5	5	5	40	60	100
	19B1ACP1	Digital principles and applications	5	5	15	10	5	5	5	40	60	100
II	19P2 CC4	Oscillations and Waves	5	4	15	10	5	5	5	40	60	100
	19P2 CC5	Applied Mechanics	4	3	15	10	5	5	5	40	60	100
	19P2 CC6	Major Practicals - II	3	2	-	-	-	-	-	40	60	100
	19C2ACP3	Allied Physics – II	3	3	15	10	5	5	5	40	60	100
	19C2ACP4	Allied Physics Practicals-II	2	2	-	-	-	-	-	40	60	100
	19P2NME	Physics in everyday life	2	2	15	10	5	5	5	40	60	100
III	19P3CC7	Electromagnetism	5	4	15	10	5	5	5	40	60	100
	19P3CC8	Solid State Physics	4	3	15	10	5	5	5	40	60	100
	19P3CC9	Major Practicals - III	3	2	-	-	-	-	-	40	60	100
	19M3ACP1	Allied Physics – I	3	3	15	10	5	5	5	40	60	100
	19M3ACP2	Allied Physics Practicals -I	2	2	-	-	-	-	-	40	60	100

	19P3SB1	Biomechanics	2	2	15	10	5	5	5	40	60	100
IV	19P4CC10	Analog Electronics	5	4	15	10	5	5	5	40	60	100
	19P4CC11	Materials Science	4	3	15	10	5	5	5	40	60	100
	19P4CC12	Major Practicals – IV	3	2	-	-	-	-	-	40	60	100
	19M4ACP3	Allied Physics –II	3	3	15	10	5	5	5	40	60	100
	19M4ACP4	Allied Physics Practicals - II	2	2	-	-	-	-	-	40	60	100
	19P4SB2	Physics of Stars	2	2	15	10	5	5	5	40	60	100

SEM	Sub.code	Sub. Title	No. of hrs	No. of credit	CIA				Ext	Tot
					T	F.P	Q	Total		
V	P5CC9	Electronics and Communication	7	6	15	5	5	25	75	100
	P5CC10	Optics	7	6	15	5	5	25	75	100
	P5MEB1	Programming with C	5	5	15	5	5	25	75	100
	P5SB3	Physics of Measuring Instruments I	2	2	-	-	-	50	-	50
	P5SB4	Physics of Medical Instruments -I	2	2	-	-	-	50	-	50
VI	P6CC11	Thermodynamics &Statistical Mechanics	5	5	25	5	5	25	75	100
	P6CC12	Modern Physics	5	5	25	5	5	25	75	100
	P6CC13	Major Practicals – III	3	5	-	-	-	40	60	100
	P6CC14	Major Practicals - IV	3	5	-	-	-	40	60	100
	P6ME1/2	Medical Physics/ Microprocessor	5	3	25	5	5	25	75	100
	P6ME3/4	Optoelectronics / Energy Physics	5	3	25	5	5	25	75	100
	P6SB5	Astronomical Measurements and materials characterization	3	5	-	-	-	50	-	50
	P6SB6	Physics of Medical Instruments - II	3	4	-	-	-	50	-	50
	P6CC15	Project	2	-	-	-	-	50	-	50

SEMESTER III
ELECTROMAGNETISM – P3CC6
(For those who joined from June 2019 onwards)

OLD

7 Hrs/week **5 Credits**

Objective

This course imparts a sound knowledge in electromagnetism.

Unit I **(20 Hrs)**

Electrostatics

Electric charge and Coulomb's law
Electric charge – conductors and insulators – Coulomb's law – continuous charge distributions – conservation of charge.

The electric field
The electric field – the electric field of point charges –Electric field of continuous charge distributions -Electric field lines– A point charge in an electric field – A dipole in an electric field – the nuclear model of the atom.

Unit II **(20 Hrs)**

Gauss's law
The flux of a vector field – the flux of the electric field- Gauss's law applications of Gauss's law – Gauss's law and conductors –experimental tests of Gauss's and Coulomb's law

Electric potential energy and potential

Potential energy- electric potential energy- Electric potential –calculating the potential from the field – potential due to point charges – Electric potential of continuous charge distributions – calculating the field from the potential – equipotential surfaces- potential of a charged conductor

UNIT III **(20 Hrs)**

Capacitance
Capacitors - Capacitance – Calculating the capacitance – Capacitors in series and parallel– energy storage in an electric field- capacitors with dielectric

DC Circuits

Electric current- Electromotive force- analysis of circuits- electric field in circuits – resistors in series and parallel- energy transfer in an electric circuit – RC circuits

UNIT IV
The Magnetic field

Magnetic interactions and magnetic poles-magnetic force on a moving charge - circulating charges -the Hall effect – magnetic force on a current carrying wire– torque on a current loop.

The Magnetic field of a current

The magnetic field due to moving charge-- the magnetic field of a current-two parallel currents – the magnetic field of a solenoid- Ampere's law

Faraday's law of induction

Faraday's experiments – Faraday's law of induction – Lenz's law – motional emf – generators and motors induced electric fields

Unit V **(23 Hrs)**
Magnetic properties of matter

The magnetic dipole – a force on a dipole in a non uniform field–atomic and nuclear magnetism – magnetization – magnetic materials -Gauss' law for magnetism

Inductance

Inductance- calculating the inductance – LR circuit- energy storage in a magnetic field- electromagnetic oscillations:qualitative- electromagnetic oscillations:quantitative-damped and forced oscillations

Maxwell's equations and electromagnetic waves

The basic equations of electromagnetism- induced magnetic field and displacement current- Maxwell's equations- generating an electromagnetic wave- traveling waves and Maxwell's equations- energy transport and Poynting vector

Book for study

Physics – Part – II David Halliday, Robert Resnick & Kenneth S. Krane(John Wiley and sons, Inc)

UNIT I : Chapters: 25,26,
UNIT II: Chapters: 27,28
UNIT III: Chapters: 30,31
UNIT IV :Chapters: 32,33,34
UNIT V : Chapters: 35,36, 38

II B.Sc. **NEW**

SEMESTER –III

For those who joined in 2019 onwards **60%**

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAPH	19P3CC7	Electromagnetism	Major Core	5	5

COURSE DESCRIPTION

This course provides an exposure to electric field, electric potential energy, magnetic field, magnetic field of current, magnetic dipole moment, magnetization and Maxwell's electromagnetic waves

COURSE OBJECTIVES

This course deals with fundamentals of electricity, magnetism and electromagnetic theory based on Maxwell's equations

UNIT –I THE ELECTRIC FIELD (12 HRS.)

Coulomb's law - Coulomb's law: Vector form - The electric field - The electric field of point charges-The Electric dipole – Electric field of continuous charge distributions- A Uniform line of charge – A uniform ring or disk of charge – An infinite sheet of charge – A uniform spherical shell of charge – Electric field lines - A dipole in an electric field **Change: 10%**

UNIT –II GAUSS'S LAW, ELECTRIC POTENTIAL ENERGY AND ELECTRIC POTENTIAL (18 HRS.)

Gauss's law- Gauss's law and Coulomb's law-Applications of Gauss's law – Infinite line of charge – Infinite sheet of charge- A spherical shell of charge

Electric potential –Calculating the potential from the field – Potential due to point charges – Potential due to electric dipole - Electric potential of continuous charge distributions–A uniform line of charge – A ring of charge – A charged disk - Equipotential surfaces

Change: 5%

UNIT –III THE MAGNETIC FIELD, THE MAGNETIC FIELD OF A CURRENT

(15 HRS.)

Magnetic interactions and magnetic poles - Magnetic force on a moving charge - Circulating charges –cyclotron - The Hall effect – Magnetic force on a current carrying wire– Torque on a current loop. The magnetic field of a current- A straight wire segment – A circular current loop - Ampere's law- Applications of Ampere's law

Change : 20%

UNIT –IV FARADAY'S LAW OF INDUCTION, MAGNETIC PROPERTIES OF MATERIALS

(15 HRS.)

Change: 10%

Faraday's experiments – Faraday's law of induction – Lenz's law – Motional emf – Eddy currents - Generators and motors.The magnetic dipole –The force on a diole in a nonuniform field- Atomic and nuclear magnetism – Magnetization – Magnetic materials: Paramagnetism – Diamagnetism- Ferromagnetism-Gauss's law for magnetism.

UNIT –V MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES

(15 HRS.)

The basic equations of electromagnetism- Induced magnetic field and displacement current- Maxwell's equations- Generating an electromagnetic wave- Traveling waves and Maxwell's equations- Energy transport and Poynting vector.

Change:10%

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) (2 HRS.) Change: 5%

Invention of Leyden jar, Formulation of quantitative laws of electrostatics and magnetostatics,Development of electromagnetic technology

Total Change: 60%

REFERENCES:

1. David Halliday, Robert Resnick & Kenneth S. Krane , *Physics – Volume II*, Fifth edition, (John Wiley and sons, Inc.) (Relevant sections in all Chapters)
2. Tiwari K, *Electricity and Magnetism*, S. Chand & Co.
3. Dayal D. C., *Electricity and Magnetism*, IV edition, Himalaya Publishing House, Bombay.
4. Sehgal, Chopra and Sehgal, *Electricity and Magnetism*, Sultan Chand and Sons, New Delhi

WEB REFERNCES :

1. http://www.gutenberg.org/ebooks/34221
https://bookboon.com/en/university-physics-ii-notes-and-exercises-i-ebook

OLD

II BSc.PHYSICS-SEMESTER – IV

ELECTRONICS – P4CC7

(For those who joined in June 2019 onwards)

7 Hrs/week **6 Credits**

Course Objective:

The aim of this course is to provide a basic knowledge in semiconductor, transistor, amplifier, oscillator and digital electronics.

Unit I - Semiconductor Diode **(20Hrs)**

PN junction – junction theory – V-I characteristics of a PN junction diode – The ideal diode – Static and dynamic resistance of a diode – Use of diodes in rectifiers – Half wave rectifier – Full wave rectifiers –Efficiency of rectifiers to convert AC into DC – Shunt capacitor – series inductor filter – Choke input LC filter – π filter – types of diodes.

Unit II -Transistor **(25 Hrs)**

Transistor characteristics – Common base (CB) configuration – Common emitter (CE) configuration – Common collector (CC) configuration – comparison between the three configurations – Reason for CE configuration is widely used in amplifier circuits – Basic CE amplifier circuit – DC load line – Amplifier analysis using DC load line –Field Effect Transistor (FET)

Transistor Biasing

Introduction –bias a transistor – selection of operating point – need for bias stabilization – requirements of biasing circuit – different biasing circuits – PNP transistor biasing circuits.

Unit III **(25 Hrs)**

Small signal amplifiers

Introduction – Single stage transistor amplifier – Graphical method: Dc load line and Ac load line, calculation of gain – Equivalent circuit method: Development of Transistor ac equivalent circuit, h-parameter equivalent circuit, amplifier analysis.

Multistage amplifier

Need of Multistage Amplifiers – Gain of a multistage amplifier – Coupling of two stages: Resistance- Capacitance coupling, Transformer Coupling, Direct Coupling – Frequency response curve of an RC coupled amplifier: fall of gain in low frequency range, fall of gain at high frequencies, band width of an amplifier – Analysis of two stage RC coupled amplifier – Distortion in amplifiers: frequency distortion, phase distortion, harmonic distortion – Classification of amplifiers.

Unit IV- Feedback in amplifiers **(20 Hrs)**

Concept of feedback in amplifiers – Types of feedback – Voltage gain of feedback amplifier – Advantages of negative feedback Amplifiers: stabilization of gain, reduction in distortion and noise, increase in the input impedance, decrease in the output impedance, increase in the bandwidth-Amplifier circuits with negative feedback.

Oscillators

Necessity of an oscillator – classification of oscillators – Generation of sine waves using a tuned circuit– positive feedback amplifiers as an oscillator – LC oscillators: Tuned collector oscillator, Tuned base oscillator, Hartley oscillator, Colpitts oscillator – RC oscillators: Phase shift oscillator, Wein bridge oscillator – Crystal oscillators – Astable multivibrators.

Unit V

Operational Amplifier

The operational amplifier (OP-AMP) – Basic concepts- Ideal op-amp-Characteristics of an OP-AMP- Operational amplifiers: Basic inverting OP-AMP, Practical inverting OP-AMP, Non inverting OP- AMP ,Parameters of OP-AMP -Applications of OP-AMP: Scale changer, phase shifter, Summing amplifier, Integrator, Differentiator.

Books for study

1. Basic Electronics and linear circuits – N.N. Bhargava, D.C.Kulshreshtha, S.C.Gupta – Tata McGraw Hill Publishing Company Ltd.
   UNIT I : Ch: 4.1-4.9
   UNIT II : Ch: 5.7- 5.10, 5.14, 7.1- 7.7
   UNIT III : Ch: 8.1-8.4, 9.1- 9.7 (Transistors only)
   UNIT IV: Ch : 12.1-12.5, 13.1-13.8
2. Hand Book of Electronics- Dr.S.L. Gupta, Dr. V. Kumar-20th edition- Pragati Prakashan Publications.
   UNIT V : Chapter: 20.1, 20.4, 20.7 (Relevant sections only).

Books for reference:

1. Principles of Electronics –Eleventh Edition – V.K. Mehta and Rohit Mehta – S.Chand and Company
2. Hand book of Electronics - Dr. S.L. Gupta and Dr. V.Kumar Pragati Prakashan Private Ltd
3. OP-AMPS and Linear Integrated circuits- Ramakant A Gayakwad Prentice Hall of India Private Ltd.

NEW

II B.Sc.

SEMESTER –IV **30%**

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAPH	19P4CC10	Analog Electronics	Major Core	5	5

COURSE DESCRIPTION

The course provides an exposure to transistors, amplifiers, oscillators and operational amplifers

COURSE OBJECTIVES

This course deals with fundamentals and working of electronic devices and its applications

UNIT –I SEMICONDUCTOR DIODE **(12 HRS.)**

PN junction – junction theory –The ideal diode-Static and dynamic resistance of a diode- Use of diodes in rectifiers- Half wave rectifier – Full wave rectifier - Efficiency of rectifiers to convert AC into DC – Shunt capacitor filter – Choke input LC filter – π filter-types of diodes

UNIT –II TRANSISTOR (BJT & FET) **(18 HRS.)**

Change: 10%

Transistor characteristics – Common base (CB) configuration – Common emitter (CE) configuration – Common collector (CC) configuration – comparison between the three configurations – Reason for CE configuration is widely used in amplifier circuits – Basic CE amplifier circuit – DC load line – Amplifier analysis using DC load line - Field Effect Transistor (FET). Structure of a junction field effect transistor – JFET characteristics – JFET parameters

UNIT –III SMALL SIGNAL AMPLIFIERS & MULTISTAGE AMPLIFIERS

(15 HRS.)

Single stage transistor amplifier – Equivalent circuit method: Development of Transistor ac equivalent circuit, h-parameter equivalent circuit, amplifier analysis. Need of Multistage Amplifiers – Gain of a multistage amplifier – Coupling of two stages: Resistance- Capacitance coupling-Frequency response curve of an RC coupled amplifier: fall of gain in low frequency range, fall of gain at high frequencies, band width of an amplifier

Change: 5%

UNIT –IV FEEDBACK IN AMPLIFIERS & OSCILLATORS (15 HRS.)

Change: 10%

Concept of feedback in amplifiers – Types of feedback – Voltage gain of feedback amplifier. Positive feedback amplifiers as an oscillator – LC oscillators: tuned collector oscillator, **tuned base oscillator**, Hartley oscillator, **Colpitts oscillator** – RC oscillators (no derivation): phase shift oscillator, Wein bridge oscillator – Astable multivibrators.(circuit using transistor only)

.**UNIT –V OPERATIONAL AMPLIFIER (15 HRS.)**

The operational amplifier (OP-AMP) – Basic concepts- Ideal op-amp- Characteristics of an OP-AMP- Operational amplifiers: Basic inverting OP-AMP, Practical inverting OP-AMP, Non inverting OP- AMP ,parameters of OP-AMP - Applications of OP-AMP: **Scale changer, phase shifter, Summing amplifier**, Integrator, Differentiator.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) (2 HRS.)

Total Change: 5%

Power Electronics-Electronics technology

Total Change:30%

REFERENCES:

1. Bhargava N N, Kulshreshtha D C, Gupta S.C., *Basic Electronics and linear circuits* Tata McGraw Hill Publishing Company Ltd.

2. Gupta S.L, Kumar V, *Hand Book of Electronics*- -20th edition- Pragati Prakashan Publications.

WEB REFERNCES :

1) http://hyperphysics.phystr.gsu.edu/hbase/magnetic/magcur.html
2) https://www.britannica.com/science/electromagnetism

OLD

III B.Sc. PHYSICS

MAJOR ELECTIVE

P6ME3 –OPTO ELECTRONICS

(For those who join in 2019 onwards)

SEMESTER - VI

HRS/WEEK: 5 **CREDITS: 5**

Objective:
Optoelectronics is a recent field. This course aims at giving an idea about fiber optics systems and communication. This course also deals with the LEDs and stimulated emission in intrinsic semiconductors, photo detectors.

UNIT I : **[12 HRS]**

Forms of communication Systems- The evolution of fiber optic systems -elements of an optical fiber transmission link -The quantum nature of light- basic optical laws & definitions- optical fiber modes and configurations -fiber types -rays and modes - step index fiber structure - ray optics representations -wave representation.

UNIT II **[12 HRS]**

Introduction- Attenuation -Material absorption losses in silica glass fibers: intrinsic absorption, extrinsic absorption -linear scattering losses: Rayleigh scattering, Mie scattering- non-linear scattering losses: stimulated Brillouin scattering, stimulated Raman scattering- Bending losses -core and cladding losses-signal distortion in optical wave guides -information capacity determination -refractive index profiles.

UNIT III **[12 HRS]**

Optical fibers and cables: Introduction-preparation of optical fibers -Vapour phase deposition techniques: outside vapour-phase oxidation process- vapour axial deposition -fluoride glass fibers- plastic-clad fibers -All plastic fibers - fiber strength durability -cable sheath and water barrier -examples of fiber cables.

UNIT IV **[12 HRS]**

Direct band gap semi conductors - Indirect band gap semi conductors- Spantaneous emission: electroluminescense- LEDs emitting different colors -Semiconductor laser: Basic principle of laser action –population inversion –Non-semiconductor laser system -Stimulated emission: Intrinsic semiconductors- Stimulated emission: p-n diode-salient points about LASER action.

UNIT V **[12 HRS]**

Photodetectors : photodetector materials - basic principles for optical detection- The p-n junction photo diode-The p-i -n photo diode -diffusion length and life time - Quantum efficiency -Responsivity -The p-i-n avalanche diode- Electron and hole ionization rates, Responsivity of avalanche photodiode.

Text Books:

Unit I

OPTICAL FIBER COMMUNICATIONS by Gerd Keiser, Second edition, McGraw-Hill International Edition 1991, Singapore.

Ch 1: 1.1-1.3

Ch 2: 2.1.3, 2.2, 2.3, 2.3.1-2.3.5

Unit II

OPTICAL FIBER COMMUNICATIONS- PRINCIPLES AND PRACTICE by John M. Senior, Second edition-Prentice-Hall of India Private Ltd, New Delhi.

Ch 3: 3.1-3.3, 3.3.1, 3.3.2, 3.4, 3.4.1, 3.4.2, 3.5, 3.5.1, 3.5.2

Unit II

OPTICAL FIBER COMMUNICATIONS by Gerd Keiser, Second edition, McGraw-Hill International Edition 1991, Singapore.

Ch 3: 3.1.4, 3.1.5, 3.2, 3.2.1, 3.5.1

Unit III

OPTICAL FIBER COMMUNICATIONS- PRINCIPLES AND PRACTICE by John M. Senior, Second edition- Prentice-Hall of India Private Ltd, New Delhi.

Ch 4: 4.1, 4.2, 4.4, 4.4.1, 4.4.2, 4.5, 4.6.4, 4.6.5, 4.7, 4.7.1, 4.9.3, 4.9.4

Unit IV & Unit V

OPTOELECTRONICS AND FIBER OPTIC COMMUNICATION by C.K. Sarkar, D.C. Sarkar, I Edition, New Age International (P) Ltd., Publishers, New Delhi.

Unit IV- Ch 4: 4.9, 4.10, 4.12, 4.13 (LED emitting different colours only)

Ch 5: 5.1, 5.3, 5.4, 5.9-5.11

Unit V - Ch 6: 6.1- 6.5, 6.7, 6.8, 6.10, 6.13

BOOKS FOR REFERENCE:

1. OPTICAL FIBER COMMUNICATIONS by P.Chakrabarti, McGraw-Hill Education, 1998
2. INTRODUCTION TO FIBER OPTICS by Ajoy Ghatak and K. Thyagarajan, Cambridge University Press, 1998

NEW

65%

III B.Sc.

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAPH	P6ME3	Opto Electronics	Major Elective	5	5

COURSE DESCRIPTION

Aim of this course is to enable the student to understand the concepts in semiconducting materials and fiber optic systems which forms the basis for communication systems.

COURSE OBJECTIVES

Communication Electronweics is a challenging field. This course aims at giving an idea about fiber optics systems and communication. This course also deals with the semiconductors and stimulated emission in intrinsic semiconductors and photo detectors.

UNIT I: FIBER OPTICS (15HRS.)

Forms of communication Systems- The evolution of fiber optic systems - elements of an optical fiber transmission link -The quantum nature of light- basic optical laws & definitions- optical fiber modes and configurations -fiber types -rays and modes -step index fiber structure - ray optics representations -wave representation.

UNIT II: FIBER OPTICS LOSSES **[15 HRS.]**

Introduction- Attenuation -Material absorption losses in silica glass fibers: intrinsic absorption, extrinsic absorption -linear scattering losses: Rayleigh scattering, Mie scattering- non-linear scattering losses: stimulated Brillouin scattering, stimulated Raman scattering- Bending losses -core and cladding losses-signal distortion in optical wave guides -information capacity determination -refractive index profiles.

UNIT III: SEMICONDUCTOR LASER **(15 HRS.)**

Direct band gap semi conductors - Indirect band gap semi conductors- Spontaneous emission: electroluminescense- LEDs emitting different colors - Semiconductor laser: Basic principle of laser action –population inversion –Non-semiconductor laser system -Stimulated emission: Intrinsic semiconductors- Stimulated emission: p-n diode-salient points about LASER action

Change: 20%

UNIT IV: PHOTODIODES **(15 HRS.)**

Photodetectors : photodetector materials - basic principles for optical detection- The p-n junction photo diode-The p-i -n photo diode -diffusion length and life time -Quantum efficiency -Responsivity -The p-i-n avalanche diode- Electron and hole ionization rates, Responsivity of avalanche photodiode.

Change: 20%

UNIT V: OPTICAL FIBER SENSORS **(15 HRS.)**

Introduction- Optical fiber sensors- Phase and polarization fiber sensors- Ring interferometer with multiturn fiber coil- Optical fluid level detector- Optical fiber flow sonsors(Extrinsic)- Optical displacement sensors (Extrinsic)- Optical displacement- moiré fringe modulation sensors- Microbend optical fiber sensors: Introduction- Intrinsic fiber sensors measurement- Current measurement by single – mode optical fiber sensors-Fluoroptic temperature sensors-Photoelastic pressure sensors- Laser Doppler velocimeter using optical fiber.

Change: 20%

UNIT VI: DYNAMISM (Evaluation Pattern-CIA only) **(3 HRS.)**

Application of fibers in telecommunication, Aircrafts and railway- Application of semiconductor in solar cells- Application of Photodiode in smoke detector.

Change: 5%

REFERENCES

1. Gerd Keiser.” Optical fiber communications”. Second edition, McGraw-Hill International Edition. Singapore. 1991.
2. John M. Senior. ”Optical fiber Communications- principles and practice”. Second edition-Prentice-Hall of India Private Ltd. New Delhi.1996.
3. C.K. Sarkar &D.C.Sarkar. “Optoelectronics and Fiber optic communication”. I Edition, New Age International (P) Ltd., Publishers, New Delhi.2001.

Total Change: 65%

OLD

III BSC. PHYSICS- SEMESTER VI

PHYSICS OF MEASURING INSTRUMENTS -II- P6SB5

2 hrs/week **2**
Credits

Objective: To enable the students learn the physics principles behind astronomical measurements, electron microscopes and X-ray diffraction measurements

UNIT I **(8 hours)**

ASTRONOMICAL INSTRUMENTS:

Optical telescopes-radio telescopes-Hubble space telescopes- astronomical spectrographs-Photographic and photoelectric photometry-Spectrophoto-metry-Detectors and image processing.Stellar magnitude sequence- absolute magnitude and the distance modulus-Bolometric magnitude –Stellar parallax and units of stellar distances-Harvard spectral classification- Hertzsprung –Russel diagram.

UNIT II **(7 hours)**

BASIC PHYSICS IN ASTRONOMICAL MEASUREMENTS:

Planck's theory of blackbody radiation- photoelectric effect – pressure of radiation – Doppler effect – Zeeman effect.

UNIT III **(8 hours)**

ELECTRON MICROSCOPES:

Scanning electron microscopy – principle and working only-transmission electron microscopy – Atomic force microscopy.

UNIT IV **(7 hours)**

X-RAY DIFFRACTION MEASUREMENTS:

X-ray diffraction method – Powder method – Determination of lattice constants-Photoelectron spectroscopy.

Books for Study:

1. An Introduction to Astrophysics- Baidyanath Basu-Prentice Hall of India, Pvt Ltd.- Chapter 1 - (1.3 to 1.10)

Chapter 3- (3.1 to 3.3) and Chapter 4- 4.4 & 4.8

2. A basic course in crystallography –Jak Tareen and TRN Kutty-University Press – (relevant sections from pages 180-184)

3. Nano:The essentials –understanding Nanoscience and Nanotechnology-

T. Pradeep – TMG Hill Publishing Co. Ltd. Newdelhi- (Pages 20- 31) relevant sections only.

4.Elements of Solid State Physics – II edition- J.P.Srivastava page 545

NEW

III B.Sc Physics

SEMESTER VI

5%

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAPH	P6SB5	ASTRONAMICAL MEASUREMENTS AND MATERIALS CHARACTERIZATION	Skill BAsed	2	2

COURSE DESCRIPTION

This course emphasis the basic principles and their measurement techniques of astronomical instruments such as optical telescope, Hubble space telescope, astronomical spectrograph, photoelectric photometry, spectrometry and also electron microscopes such as scanning electron microscopy, transmission electron microscopy and atomic force microscopy and X-ray diffraction measurements.

COURSE OBJECTIVES

This course provides the basic understanding required for the measuring techniques involved in astronomical instruments and also different characterizations of samples involved in material science.

UNIT I: BASIC PHYSICS [4HRS]

Planck's theory of blackbody radiation- photoelectric effect – pressure of radiation – Doppler effect – Zeeman effect.

UNIT –II ASTRONOMICAL INSTRUMENTS [5HRS]

Optical telescopes-radio telescopes-Hubble space telescopes- astronomical spectrographs- Photographic and photoelectric photometry-Spectrophoto-metry-Detectors and image processing.

UNIT –III ASTRONOMICAL MEASUREMENTS [6HRS]

Stellar magnitude sequence- absolute magnitude and the distance modulus-Bolometric magnitude –Stellar parallax and units of stellar distances-Harvard spectral classification- Hertzsprung –Russel diagram.

UNIT –IV MATERIAL CHARACTERIZATION [8HRS]

Scanning electron microscopy – principle and working only-transmission electron microscopy – Atomic force microscopy.

UNIT –V X-RAY DIFFRACTION MEASUREMENTS [7HRS]

X-ray diffraction method – Powder method – Determination of lattice constants-Photoelectron spectroscopy.

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) [2HRS]

Magnetic-field-free-Atomic-Resolution Scanning Tunneling Electron Microscope (MARS) – Protein Crystallography.

Change - 5%

REFERENCES:

1. An Introduction to Astrophysics- Baidyanath Basu-Prentice Hall of India, Pvt Ltd.- Chapter 1 - (1.3 to 1.10)

   Chapter 3- (3.1 to 3.3) and Chapter 4- 4.4 & 4.8

2. A basic course in crystallography –Jak Tareen and TRN Kutty-University Press (relevant sections from pages 180-184)

3. Nano:The essentials –understanding Nanoscience and Nanotechnology-T. Pradeep – TMG Hill Publishing Co. Ltd. Newdelhi- (Pages 20- 31) relevant sections only.

4. Elements of Solid State Physics – II edition- J.P.Srivastava page 545

Total Change: 5%

WEB REFERNCES :

1. https://www.nasa.gov/mission_pages/hubble/main/index.html
2. https://en.wikipedia.org/wiki/Hertzsprung%E2%80%93Russell_diagram
3. https://en.wikipedia.org/wiki/Characterization_(materials_science)

Signature of the HOD with Seal

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