जम्मू केंद्रीय विश्वविद्यालय
Central University of Jammu

राया – सूचानी (बागला), जिला सांबा – 181143, जम्मू (जम्मू एवं कश्मीर)
Rahya - Suchani (Bagla), District: Samba – 181143, Jammu (J&K)

संख्या: CUJ/Acad/04-X/2023/600 30.11.2023

Notification /अधिसूचना संख्या /18/ /2023

Sub: Course Scheme and Syllabus Notification as per NEP-2020 of 3rd and 4th Semesters of Integrated B.Sc. (Hons) – M.Sc. in Physics w.e.f. Academic Session 2023-24 – Reg.

Ref: Notification No. 173 of 2023 dated 02.11.2023

संदर्भाधीन अधिसूचना के आंशिक संशोधन करते हुए और भौतिकी एवं खगोल विज्ञान विभाग की 31.07.2023 को आयोजित 9 वीं बोर्ड ऑफ स्टडीज (बी.ओ.एस.) की सिफारिश पर और 19.09.2023 को आयोजित 18वीं अकादमिक परिषद बैठक ने NEP-2020 के अनुसार शैक्षणिक सत्र 2023-24 से इंटीग्रेटेड बी.एस.सी. (ऑनर्स) – एम.एससी. भौतिकी पाठ्यक्रम के तीसरे और चौथे सेमेस्टर के पाठ्यक्रम योजना और पाठ्यक्रम को मंजूरी दे दी गई है, जोकि इस प्रकार है :-

In supersession to the notification under reference and on the recommendation of 9th Board of Studies (BoS) held on 31.07.2023 of Department of Physics and Astronomical Sciences and Academic Council in its 18th meeting held on 19.09.2023 has approved, the Course Scheme and Syllabus Notification as per NEP-2020 of 3rd and 4th Semesters of Integrated B.Sc. (Hons) – M.Sc. in Physics w.e.f. Academic Session 2023-24 as detailed below:

SEMESTER III

Course Code	Course Title	Credit	CIA	MSE	ESE	Max. Marks
CORE COURSES						
IPHY2C001T	Mathematical Physics-II (Lecture + Practical)	3(L)	12.5	25	37.5	100
		1(P)	12.5		12.5	
IPHY2C002T	Thermal Physics (Lecture + Practical)	3(L)	12.5	25	37.5	100
		1(P)	12.5		12.5	
OPEN ELECTIVE COURSES(SEC/VAC/AEC/OEC) or on SWAYAM Platform –MOOC Courses						
#	Open Elective Courses	12	-	-	-	300
Total		**20**	-	-	-	**500**

The student has to earn minimum of **20 credits** during the Semester-III. Apart from two core courses of **4 credits** (3 of Lecture and 1 of Practical) **each**, the candidate has to earn **12 more credits** (minimum **two credits** each from **SEC** and two from **AEC**) among the **Open Elective** basket offered by the Department or other Departments or on SWAYAM Platform – MOOC Courses etc.

SEMESTER IV

Course Code	Course Title	Credit	CIA	MSE	ESE	Max. Marks
CORE COURSES						
IPHY2C003T	Mathematical Physics-III (Lecture + Practical)	3(L)	12.5	25	37.5	100
		1(P)	12.5		12.5	
IPHY2C004T	Modern Physics (Lecture + Practical)	3(L)	12.5	25	37.5	100
		1(P)	12.5		12.5	
OPEN ELECTIVE COURSES(SEC/VAC/AEC/OEC) or on SWAYAM Platform –MOOC Courses						
#	Open Elective Courses	12	-	-	-	300
Total		**20**	-	-	-	**500**

The student has to earn minimum of **20 credits** during the Semester-IV. Apart from two core courses of **4 credits** (3 of Lecture and 1 of Practical) **each**, the candidate has to earn **12 more credits** (minimum **two credits** each from **SEC** and two from **VAC**) among the **Open Elective** basket offered by the Department or other Departments or SWAYAM Platform – MOOC Courses etc.

Open elective Courses Offered by Department of Physics:

Course Code	Course Name	Course	Credit	CIA	MSE	ESE	Max. Marks
UPHY0O001T	Analog Electronics	OEC	4	25	25	50	100
UPHY0O002T	Communication Systems	OEC	4	25	25	50	100
UPHY0O003T	Digital Systems and Applications	OEC	4	25	25	50	100
UPHY0O004T	Numerical Methods	OEC	4	25	25	50	100
UPHY0O005T	Atomic and Molecular Physics	OEC	4	25	25	50	100
UPHY0O006T	Introduction to LaTex	SEC	2	12.5	12.5	25	50
UPHY0O007T	Basic of Computer Programming	AEC	2	12.5	12.5	25	50
UPHY0O008T	Weather Forecasting	SEC	2	12.5	12.5	25	50
UPHY0O009T	Electrical Circuits and Network Skills	SEC	2	12.5	12.5	25	50
UPHY0O010T	Basic Instrumentation Skills	SEC	2	12.5	12.5	25	50

20/11/23

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विभागाध्यक्ष /Head
भौतिकी एवं खगोल विज्ञान विभाग/ Department of Physics and Astronomical Sciences

प्रतिलिपि/ Copy to:
परीक्षा नियंत्रक / Controller of Examinations

CoreCourse(CC)

Int. B.Sc.(H)-M.Sc. Physics			
Semester :	IV	**Type:**	Core
Course Name:	Mathematical Physics-III	**Course Code:**	
Credits:	4	**L T P:**	3-0-2

COURSE OUTCOMES:

After the completion of this course, the learner will be able to:

CO 1	*Learn the concepts of complex numbers, function of complex variables and analyze their singularities.*
CO 2	*Perform integration of functions of complex variables.*
CO 3	*Understand the basics of Fourier and Laplace Transforms.*
CO 4	*Solve simple physics problems using Fourier and Laplace Transforms.*
CO 5	*Analyze theorems involving integral transforms and their applications.*
CO 6	*Develop the skills of solving various physics problems entailing complex variables, functions of complex variables and their integrals, and integral transforms.*

UNIT-I

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula. De Moivre's theorem, Simply and multiply connected region, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions

UNIT-II

Matrices, Addition and Multiplication of Matrices: Null Matrices. Diagonal, Scalar and Unit Matrices. Upper-Triangular and Lower-Triangular Matrices. Transpose of a Matrix. Symmetric and Skew-Symmetric Matrices. Conjugate of a Matrix. Hermitian and Skew Hermitian Matrices. Singular and Non-Singular matrices. Orthogonal and Unitary Matrices. Similar Matrices. Trace of a Matrix Eigen – values and Eigen vectors of a Matrix.

UNIT-III

Fourier Transforms: Fourier Integral theorem. Fourier Transform. Examples. Fourier transform of trigonometric, Gaussian, finite wave train & other functions. Representation of Dirac delta function as a Fourier Integral. Fourier transform of derivatives, Inverse Fourier transform, Convolution theorem. Properties of Fourier transforms (translation, change of scale, complex conjugation, etc.). Three dimensional Fourier transforms with examples. Application of Fourier Transforms to differential equations: One dimensional wave and diffusion / heat flow equations.

UNIT-IV

Laplace Transforms: Laplace Transform (LT) of Elementary functions. Properties of LTs: Change of Scale Theorem. Shifting Theorem. LTs of Derivatives and Integrals of Functions, Derivatives and Integrals of LTs. LT of Unit Step function, Dirac Delta function, Periodic Functions. Convolution Theorem. Inverse LT. Application of Laplace Transforms to Differential Equations: Damped Harmonic Oscillator, Simple Electrical Circuits.

UNIT-V

Introduction to Probability: Definition, Independent random variable: sample space and probability distribution functions. Binomial, Gaussian, and Poisson distribution with examples. Mean and variance.

Reference Books:

1. Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.
2. Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
3. Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
4. Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
5. Partial Differential Equations for Scientists & Engineers, S.J. Farlow, 1993, Dover Pub.
6. Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books

B.Sc.(H)-M.Sc. Physics

emester :	IV	Type:	Core
ourse Name:	Mathematical Physics-III Lab		

CO 1 *Learn the computational skills of solving differential equations*

CO 2 *Examine the solutions of first and second order differential equations using scilab*

CO 3 *Evaluate the Dirac Delta Function using scilab.*

CO 4 *Investigate the Frobenius method and Fourier series solutions using scilab.*

CO 5 *Analyze curve fitting procedures and perform Integral transform using scilab.*

CO 6 *Estimate error in a set of data recorded in a physics experiment.*

CO 7 *Explore the scilab proficiency in analyzing simple physics problems.*

cilab based simulations experiments based on Mathematical Physics problems like

1. Solve differential equations:

$dy/dx = e^{-x}$ with $y = 0$ for $x = 0$

$dy/dx + e^{-x}y = x^2$

$d^2y/dt^2 + 2\,dy/dt = -y$

$d^2y/dt^2 + e^{-t}dy/dt = -y$

2. Dirac Delta function:

$\frac{1}{\sqrt{2\pi\sigma^2}}\int e^{\frac{-(x-2)^2}{2\sigma^2}}(x+3)dx$, for $\sigma = 1, 0.1, 0.01$ and show it tend to 5.

3. Fourier Series: Program to sum $\sum_{n=1}^{\infty}(0.2)^n$, evaluate the Fourier coefficients of a given periodic function (square wave)

4. Frobenius method and Special functions:

$$\int_{-1}^{+1} P_n(\mu)P_m(\mu)d\mu = \delta_{n,m},\ Plot\ P_n(x),\ j_\theta(x)$$

Show recursion relation.

5. Calculation of error for each data point of observations recorded in experiments done in previous semester (choose any two).

6. Calculation of least square fitting manually without giving weightage to error. Confirmation of least squar fitting of data through computer program.

7. Evaluation of trigonometric functions e.g. $sin\theta$. Given Bessel's function at N points find its value at an intermediate point. Complex analysis: Integrate $1/(x^2+2)$ numerically and check with computer integration.

8. Integral transform: FFT of e^{-x^2}

Reference Books:

1. Mathematical Methods for Physics and Engineers, K.F Riley, M.P. Hobson and S. J. Bence, 3rd ed., 2006, Cambridge University Press
2. Mathematics for Physicists, P. Dennery and A. Krzywicki, 1967, Dover Publications
3. Simulation of ODE/PDE Models with MATLAB®, OCTAVE and SCILAB: Scientific and Engineering Applications: A. Vande Wouwer, P. Saucez, C. V. Fernández. 2014 Springer ISBN: 978-3319067896
4. Scilab by example: M. Affouf, 2012. ISBN: 978-1479203444
5. Scilab (A free software to Matlab): H. Ramchandran, A.S.Nair. 2011 S.Chand& Company
6. Scilab Image Processing: Lambert M. Surhone. 2010 Betascript Publishing

Int. B.Sc(H)-M.Sc. Physics			
Semester :	IV	**Type:**	Core
Course Name:	MODERN PHYSICS	**Course Code:**	
Credits:	4	**L T P:**	3-1-0

COURSEOUTCOMES:

After the completion of this course, the learner will be able to:

CO 1	*Understand the concept of Relativity*
CO 2	*Understand the interference and basics of the wave theory.*
CO 3	*Know the basic concepts of old Quantum theory.*
CO 4	*Know the basic concepts of need of quantum mechanics.*
CO 5	*Have an understanding of basics of Lasers.*

Unit-I

Theory of Relativity-I

Introduction to Frames of Reference; inertial and non- inertial, Gallian Transformation. Gallian Invariance of Newton's law, Laws of conservation of Linear momentum and Energy, Michelson-Morley Experiment and its outcome.Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Twin Paradox, Basic idea of General theory of relativity.

Unit-II

Theory of Relativity-II

Relativistic momentum and relativistic form of Newton's law, Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum. Energy-Momentum Four Vector, Minkowski space

Unit-III

Quantum theory of Light

Hertz's Experiment, Black Body radiation, ultraviolet catastrophe, Stefan's law, Rayleigh Jean's Law and Planck's Law, Light quantisation and the photoelectric effect, Compton effect, X-rays: Production and properties, de-Broglie wavelength and matter waves; Davisson-Germer experiment.

Unit-IV

Wave-particle duality. Wave description of particles by wave packets. Group and Phase velocities and relati between them. Wave function and its significance, probability interpretation: Normalized wave functions probability amplitudes. Heisenberg uncertainty principle (Statement with illustration and examples).

Unit-V

Optical Fibre: Optical fibre and its types, Critical angle of propagation, modes of propagation, Acceptance angl Numerical aperture. Pulse dispersion, Attenuation and its various mechanism, Advantages and applications optical fibres.

Lasers: Interaction of light with matter, (absorption, spontaneous, Einstein's prediction, stimulated emissio Einstein's relations, Light amplification, Population inversion, Pumping, Principal pumping schemes (three a four levels) Optical resonant cavity, conditions for laser action, Types of lasers (Ruby, He- Ne and semiconduct Characteristics and applications of laser.

Reference Books:

1. Concepts of Modern Physics, Arthur Beiser, 2002, McGraw-Hill.
2. Introduction to Modern Physics, Rich Meyer, Kennard, Coop, 2002, Tata McGraw Hill.
3. Modern Physics, 3rd Ed., R A Serway, C. J. Moses, C. A. Moyer, 2005, Cengage Lerning.
4. Modern Physics, 3rd Ed., Randy Harris, 2018 , Pearson Learning India.

Int. B.Sc(H)-M.Sc. Physics			
Semester :	IV	**Type:**	Core
Course Name:	MODERN PHYSICS LAB	**Course Code:**	
Credits:	1	**L T P:**	0-0-2

COURSE OUTCOMES:

CO 1	*Learn the basic concepts of modern physics.*
CO 2	*Determinethewavelengthandangularspreadoflaserlightusingthediffractionmethod*
CO 3	*Validate experimentally the value of Planck's constant.*
CO 4	*Understand Photo-electric effect by plotting photo current versus intensity and wavelength of light and maximum energy of photo-electrons versus frequency of light.*
CO 5	*Investigate the rotational spectrum of Iodine vapour.*
CO 6	*Derive the work function of materials.*
CO 7	*Design the Millikan drop apparatus to determine the charge of an electron.*
CO 8	*Examine wavelength of H-alphaemission line of Hydrogenatom.*

Atleast 06experiments from following:

1. Measurement of Planck's constant using black body radiation and photo-detector
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine work function of material of filament of directly heated vacuum diode.
4. To determine the Planck's constant using LEDs of at least 4 different colours.
5. To determine the wavelength of H-alpha emission line of Hydrogen atom.
6. To determine the ionization potential of mercury.
7. To determine the absorption lines in the rotational spectrum of Iodine vapour.
8. To determine the value of e/m by (a) Magnetic focusing or (b) Bar magnet.
9. To setup the Millikan oil drop apparatus and determine the charge of an electron.
10. To show the tunneling effect in tunnel diode using I-V characteristics.
11. To determine the wavelength of laser source using diffraction of single slit.
12. To determine the wavelength of laser source using diffraction of double slits.
13. To determine (1) wavelength and (2) angular spread of He-Ne laser using plane diffraction grating

Reference Books

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
3. A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11thEdn, 2011,Kitab Mahal

Int. B.Sc.(H)-M.Sc. Physics			
Semester :		Type:	OEC
Course Name:	DIGITAL SYSTEMS AND APPLICATIONS	Course Code:	
Credits:	4 (3+1)	L T P:	3-0-2

COURSE OUTCOMES:

After the completion of this course, the learner will be able to:

CO 1	*Learn the fundamentals of digital logic gate-circuits and Boolean algebra.*
CO 2	*Understand the circuitry, working and applications of data processing circuits and arithmetic circuits.*
CO 1	*Learn the theory and working principle of basic sequential circuits like flip-flops of various types.*
CO 4	*Apply the knowledge off lip-flops to various shift registers, counters and their applications.*
CO 5	*Understand the working of Timer ICs, Memory ICs and their applications.*
CO 6	*Learn the basics of microprocessor and assembly Language.*

Unit-I

Introduction to CRO: Block Diagram of CRO. Electron Gun, Deflection System and Time Base. Deflection Sensitivity. Applications of CRO: (i) Study of Waveform, (ii) Measurement of Voltage, Current, Frequency, and Phase Difference. **Integrated Circuits** (Qualitative treatment only): Active & Passive components. Discrete components. Wafer. Chip. Advantages and drawbacks of ICs. Scale of integration: SSI, MSI, LSI and VLSI (basic idea and definitions only). Classification of ICs. Examples of Linear and Digital ICs.

Unit-II

Digital Circuits: Difference between Analog and Digital Circuits. Binary Numbers. Decimal to Binary and Binary to Decimal Conversion. BCD, Octal and Hexadecimal numbers. AND, OR and NOT Gates (realization using Diodes and Transistor). NAND and NOR Gates as Universal Gates. XOR and XNOR Gates and application as Parity. **Boolean algebra:** De Morgan's Theorems. Boolean Laws. Simplification of Logic Circuit using Boolean Algebra. Fundamental Products. Idea of Min-terms and Max-terms. Conversion of a Truth table into Equivalent Logic Circuit by (i) Sum of Products Method and (ii) Karnaugh Map.

Unit-III

Data processing circuits: Basic idea of Multiplexers, De-multiplexers, Decoders, Encoders. **Arithmetic Circuits:** Binary Addition. Binary Subtraction using 2's Complement. Halfand Full Adders. Half & Full Subtractors, 4-bit binary Adder/Subtractor. **Sequential Circuits:** SR, D, and JK Flip-Flops. Clocked (Level and

Edge Triggered)Flip-Flops. Preset and Clear operations. Race-around conditions in JK Flip-Flop. M/S JK Flip-Flop.

Unit-IV

Timers: IC 555: block diagram and applications: A stable multi vibrator and Mono stable multi vibrator **Shift registers:** Serial-in-Serial-out, Serial-in-Parallel-out, **Counters(4 bits):** Ring Counter. Asynchronous counters. Decade Counter. Synchronous Counter.

Unit-V

Computer Organization: Input / Output Devices. Data storage (idea of RAM and ROM).Computer memory. Memory organization & addressing. Memory Interfacing. Memory Map.

Intel 8085 Microprocessor Architecture: Main features of 8085. Block diagram.Components. Pin-out diagram. Buses. Registers. ALU. Memory. Stack memory. Timing & Control circuitry. Timing states. Instruction cycle. Timing diagram of MOV and MVI.

Reference Books:

1. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., 2011, Tata McGraw
2. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd.
3. Digital Circuits and systems, Venugopal, 2011, Tata McGraw Hill.
4. Digital Systems: Principles & Applications, R.J.Tocci, N.S.Widmer, 2001, PHI Learning
5. Logic circuit design, Shimon P. Vingron, 2012, Springer.
6. Digital Electronics, Subrata Ghoshal, 2012, Cengage Learning.
7. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.

Int. B.Sc.(H)-M.Sc. Physics			
Semester :		**Type:**	OEC
Course Name:	**ATOMIC AND MOLECULAR PHYSICS**	**Course Code:**	
Credits:	4 (3+1)	**L T P:**	3-1-0

COURSEOUTCOMES:

After the completion of this course, the learner will be able to:

CO 1 *Understand about the atoms and atomic spectra*

CO 2 *Understand about the Zeeman's Effect*

CO 3 *explain the change in behavior of atoms in external applied electric*

CO 4 *Explain rotational, vibrational, electronic and Raman spectra of molecules.*

UNIT-I

Atomic Spectra: Inadequacy of Bohr atomic model, correction due to finite mass of the nucleus, Rydberg constant in terms of reduced mass, Excitation and Ionisation potentials, Franck-Hertz experiment, Bohr-Sommerfeld Model of atom, vector model of an atom, Electron spin, space quantisation, magnetic moment of an electron due to its orbital motion. Stern-Gerlach experiment and its theory, Spin-orbit interaction and Fine structure of spectral lines

UNIT-II

One- and two-valence electron systems: Quantum numbers and selection rules, Pauli's exclusion principle. Electronic configuration of atoms, Pauli Exclusion principle and electron configuration, quantum states. Spectral notations of quantum states. Spin-Orbit Interaction (Single valence electron atom), Energy levels of Na atom, selection rules, sodium Doublet. **Two- valence electron systems:** Spectral terms of two electron atoms, terms for equivalent electrons, LS and JJ coupling schemes. Singlet Triplet separation for interaction energy of LS coupling. Lande's Interval rule, Problems.

UNIT-III

Zeeman Effect : Early discoveries and developments, Experimental arrangement, Normal and anomalous Zeeman Effect Problems, Stark effect (Qualitative discussion), **X-ray spectroscopy:** Nature of X-rays, Discrete and continuous X-ray spectra, Daune and Hunt's Rule, X-ray emission spectra, Mosley's law and its applications. Auger effect , Problems

UNIT-IV

Molecular Spectra: Molecular formation, the H molecular ion, H_2 – molecule. Salient features of molecular spectra. Rotation, vibration and electronic spectra of molecules, associated quantum numbers and selection rules, Theory of pure rotation and rotation- vibration spectra, Raman and IR spectra, simple applications.

UNIT-V

Raman spectroscopy: Classical theory of Raman Effect. Molecular polarizability, Quantum theory of Raman Effect, Experimental set up for Raman Effect, Applications of Raman spectroscopy

Books Recommended:

1. Atomic Physics (Modern Physics), S N Ghosal, (S. Chand)
2. Concepts of Modern Physics 4th edition, Arthur Baiser (McGraw Hill International edition)
3. Introduction to Atomic spectra, H.E White.(McGraw Hill International edition)
4. Introduction to Atomic and Molecular Spectroscopy ,V.K.Jain, Narosa Publication.
5. Molecular Structure And Spectroscopy, 2nd Edition, G. Aruldhas(PHI Learning).
6. Physics of Atoms and Molecules, 2nd edition B H Bransden and C J Joachain, Pearson International.

Int. B.Sc.(H)-M.Sc. Physics			
Semester :		**Type:**	SEC
Course Name:	**Introduction to LaTex**	**Course Code:**	
Credits:	2	**L T P:**	2-0-0

COURSEOUTCOMES:

After the completion of this course, the learner will be able to:

CO 1	Introduce with a software that is being widely used for typesetting especially in Mathematics field.
CO 2	*Understand typing with LaTex software.*
CO 3	*To make conference proceedings and presentations*
CO 4	*Understand to write project report, paper and articles*

UNIT I

Basics: What is LaTeX, Basics for document structuring, preamble preparation, saving a folder. Installation of LaTeX i) Installation of Kile and MikeTeX. ii) Class and packages iii) Latex programming and commands, sample packages iv) Error messages: Some sample errors, list of LaTeX error messages

UNIT II

Formatting of output document :i) Fonts, symbols, indenting, paragraphs, line spacing, word spacing, titles and subtitles ii) Document class, page style, parts of the documents, table of contents iii) Command names and arguments, environments, declarations iv) Theorem like declarations, comments within text,

UNIT –III

Mathematical formulae :i) Mathematical environments, math mode ,mathematical symbols ii) Graphic package, multivalued functions, drawing matrices iii) Tables, tables with captions iv) References to figures and tables in text

UNIT –IV

Drawing with LaTeX i) picture environments ii) extended pictures, other drawing packages iii) Preparing book, project report in LaTeX.

UNIT-V

Introduction to creating slides, adding frames, dividing the slide into multiple columns, adding different blocks, etc

Reference Book :

1. Guide to LATEX, fourth edition, Helmut Kopka, Patrick W. Daly

Int. B.Sc.(H)-M.Sc. Physics			
Semester :			
Course Name:	BASIC INSTRUMENTATION SKILLS	Type:	SEC
		Course Code:	
Credits:	2	L T P:	2-0-0

COURSEOUTCOMES:

After the completion of this course, the learner will be able to:

CO 1 *Learn the necessary working knowledge on accuracy, precision, resolution, range and errors /uncertainty in measurements.*

CO 2 *Gain knowledge on the working and operations of multimeter.*

CO 3 *Understand about digital instruments like voltmeter and mili voltmeter.*

CO 4 *Understand the working, theory and applications of CRO for measurements.*

CO 5 *Understand the concept of impedance bridges and Q-meters.*

CO 6 *Learn about the, block diagram and working of a digital meter and its various associated parameters.*

UNIT-I

Basic of Measurement: Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. Multimeter: Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance.

UNIT-II

Electronic Voltmeter: Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only).Specifications of an electronic Voltmeter / Multimeter and their significance. AC milli voltmeter: Type of AC milli voltmeters. Block diagram ac milli voltmeter, specifications and their significance.

UNIT-III

Oscilloscope: Block diagram of basic CRO. CRT, brief discussion on screen phosphor, visual persistence. Time base operation, synchronization. CRO use for the measurement of voltage (dc and ac), frequency and time period. Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope : principle of working.

UNIT-IV

Impedance Bridges and Q-meters: Block diagram of bridge working principles of basic (balancing type) R L C bridge. Specifications of R L C bridge .Block diagram and working principles of a Q-Meter.

UNIT-V

Digital Instruments: Comparison of analog & digital instruments. Characteristics of a digital meter Working principles and block diagram of digital voltmeter. Principle of time interval, frequency and period measurement using universal counter / frequency counter, time-base stability, accuracy and resolution.

Reference Books:

1. A text book in Electrical Technology – B L Theraja- S Chand and Co. Performance and design of AC machines-M G Say ELBS Edn.
2. Digital Circuits and systems, Venugopal, 2011, Tata Mc Graw Hill. Logic circuit design, Shimon P. Vingron, 2012, Springer.
3. Digital Electronics, Subrata Ghoshal,2012,Cengage Learning.
4. Electronic Devices and circuits, S. Salivahanan & N.S. Kumar, 3rd Ed., 2012, Tata Mc-Graw Hill