Department of Physics

Scheme of Examination and Syllabus for
Under Graduate Programme
(For Affiliated Colleges as per Scheme A)

Under Multiple Entry and Exit, Internship and
CBCS-LOCF as per NEP-2020
For session 2024-25 (in phased manner)

Subject: Physics

Guru Jambheshwar University of Science &Technology
Hisar-125001, Haryana

(A+ NAAC Accredited State Govt. University)

Guru Jambheshwar University of Science and Technology

Hisar-125001, Haryana

('A+' NAAC Accredited State Govt. University)

Examination Scheme and Syllabus for B. Sc. Physical Science Programme for the session 2024-25
(For Affiliated Colleges as per scheme A according to National Education Policy-2020)

Subject-Physics

SECOND YEAR

SEMESTER-III								
Type of Course	**Course Code**	**Nomenclature of Paper/Course**	**Credits**	**Contact Hours**	**Internal Marks**	**External Marks**	**Total Marks**	**Duration of Exam (Hrs)**
Discipline Specific Course (DSC)	C24PHY301T	Thermodynamics and Statistical Physics	3	3	20	50	70	2.5
	C24PHY301P	Thermodynamics and Statistical Physics Lab	1	2	10	20	30	3
Minor Course (MIC)	C24MIC333T(i)	Electronics Instrumentation	4	4	30	70	100	3
Multidisciplinary Course (MDC)	C24MDC323T	Introductory Modern Physics	2	2	15	35	50	2
	C24MDC323P	Introductory Modern Physics Lab	1	2	10	15	25	3
Skill Enhancement Course (SEC)	C24SEC330T	Numerical Techniques	2	2	15	35	50	2
	C24SEC330P	Numerical Techniques Lab	1	2	10	15	25	3
SEMESTER-IV								
Type of Course	**Course Code**	**Nomenclature of Paper/Course**	**Credits**	**Contact Hours**	**Internal Marks**	**External Marks**	**Total Marks**	**Duration of Exam (Hrs)**
Discipline Specific Course (DSC)	C24PHY401T	Optics	3	3	20	50	70	2.5
	C24PHY401P	Optics Lab	1	2	10	20	30	3
Vocational Course	C24VOC433T	Introduction to Optics	2	2	15	35	50	2
	C24VOC433P	Introduction to Optics Lab	2	4	15	35	50	3
Value Added Course (VAC)	C24VAC408T	Introduction to Satellites	2	2	15	35	50	2

Notes: Students exit the programme after fourth semester and securing 96 credits including 4 credits of summer internship will be awarded UG diploma in the relevant Discipline/subject. Four credit of internship completed by a student during summer after 2nd or 4th semester, will be taken into account in 5th semester who pursue 3-year UG Programme without taking exit option.

Semester-III

Physics
Discipline Specific Course (DSC3)
C24PHY301T: Thermodynamics and Statistical Physics

Paper Code: C24PHY301T
45 Hrs (3Hrs /week) **External Marks: 50**
Credits: 3 **Internal Marks: 20**
Time: 2.5 Hrs **Total Marks: 70**

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2 marks each. In addition to this, eight more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt five questions in all selecting one from each unit in addition to the compulsory Question No.1. All questions carry equal marks. 20% numerical problems are to be set and use of scientific calculator (nonprogrammable) is allowed.

Unit-I

Thermodynamics-I: Thermodynamics systems, variables and equation of state, thermal equilibrium, Zeroth law of thermodynamics; Concept of heat, work and its sign(work done by the system on the system), First law of thermodynamics- its significance and limitations, different types of process-isochoric process, isobaric process, adiabatic process, isothermal process, cyclic process, Reversible and irreversible process, First law and cyclic process; Second law of thermodynamics and its significance, Carnot theorem; Absolute scale of temperature, Absolute Zero, Joule's free expansion, Joule Thomson effect, Entropy, calculations of entropy of reversible and irreversible process, T-S diagram, entropy of a perfect gas, Nernst heat law (third law of thermodynamics).

Unit-II

Thermodynamics-II: Derivation of Clausius-Clapeyron and Clausius latent heat equations and their significance, phase diagram and triple point of a substance, Thermodynamics functions: Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) and the relations between them, derivation of Maxwell thermodynamics relations from thermodynamics functions, Application of Maxwell relations: relations between two specific heats of gas.

Unit-III

Statistical Physics-I: Distribution of N (for N= 2, 3, 4) distinguishable and indistinguishable particles in two boxes of equal size, microstates and microstate's, thermodynamically probability, constraints and accessible states, statistical fluctuations, general distribution of distinguishable particles in compartments of different size, postulates of statistical mechanics

Unit-IV

Statistical Physics-II: Classical statistics, basic approach to these statistics, Maxwell-Boltzmann statistics applied to an ideal gas in equilibrium-energy and speed distribution law, most probable speed, average and r.m.s. speed., Need of Quantum statistics- classical versus quantum statistics, Bose-Einstein energy distribution Law, Fermi Dirac energy distribution Law.

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C24PHY301P: Thermodynamics and Statistical Physics Lab

Paper Code: C24PHY301P
30 Hrs (2 Hrs /week) **External Marks: 20**
Credit: 1 **Internal Marks: 10**
Time: 3 Hrs **Total Marks: 30**

Practical

1. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
2. Measurement of Planck's constant using black body radiation.
3. To determine Stefan's Constant.
4. To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.
5. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
6. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton's disc method.
7. To determine the temperature co-efficient of resistance by Platinum resistance thermometer.
8. To study the variation of thermo emf across two junctions of a thermocouple with temperature.
9. To record and analyze the cooling temperature of an hot object as a function of time using a thermocouple and suitable data acquisition system
10. To calibrate Resistance Temperature Device (RTD) using Null Method/Off-Balance Bridge
11. To prove the law of probability by using one coin, two coins and 10 or more coins.
12. To determine the coefficient of increase of volume of air at constant pressure.
13. To determine the coefficient of increase of pressure of air at constant volume.
14. Computer simulation of Maxwell-Boltzmann distribution, Fermi- Dirac & Bose-Einstein
15. Study of statistical distribution from the given data and to find most probable, average, and rms value
16. Mechanical Equivalent of heat (J) by Joule's calorimeter.

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Suggested Books:

1. Thermal Physics and Statistical Mechanics, S.K. Roy, New Age International Publishers, New Delhi
2. Thermodynamics and Statistical Physics, J.K. Sharma and K.K. Sarkar, Himalaya Publishing House, Bombay
3. Introduction to Thermodynamics and its Applications, Stowe Keith, University Press (India) Pvt. Ltd, Hyderabad
4. Introductory Thermodynamics, Pierre Infelta, BrownWalker Press, Boca Ratan, Florida
5. Fundamentals of Thermodynamics, J. K. Johnson, University of Pittsburgh 2009
6. Thermodynamics and Its Applications, Jefferson Tester, Michael Modell, 3rd Edition
7. Thermodynamics, Statistical Thermodynamics & Kinetics, Thomas Engel, Philip Reid, 2nd Edition
8. Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.

Course Outcomes (COs)

After completing this course, the student will be able to:

CO1. Understand the thermodynamics systems, laws of thermodynamics and their significance, Joule-Thomson effect and entropy.

CO2. Know about the Clausius-Clapeyron and Clausius latent heat equations, Internal energy (U), Helmholtz function (F), Enthalpy (H), Gibbs function (G) of rigidity, Application of Maxwell relations: relations between two specific heats of gas.

CO3. Understand the basics of statistical physics, Classical and quantum statistics, and Maxwell's distribution of speed & velocity.

CO4. Know about the Dulong and Petit Law, B. E. condensation and the F. D. energy distribution Law for electron gas.

CO5. Perform experiments on thermodynamics and statistical physics by different methods and compare the experimental values with the standard values

Mapping of COs with POs
C24PHY301T and C24PHY301P

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	M	S	M	S	M	S	M
CO3	M	S	M	S	M	S	M
CO4	M	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S

S= Strong, M = Medium, W= Weak

Physics
Minor Course (MIC3)
C24MIC333T (i): Electronics Instrumentation

Paper Code: C24MIC333T (i)
60 Hrs (4 Hrs /week) **External Marks: 70**
Credits: 4 **Internal Marks: 30**
Time: 3 Hrs **Total Marks: 100**

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of seven short questions covering the entire syllabus consisting of 2 marks each. In addition to this, eight more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt five questions in all selecting one from each unit and the compulsory Question No.1. All questions carry equal marks

Unit-I

Basics 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 multimeters and their significance.

Unit-II

Digital Multimeter: Block diagram and working of a digital multimeter, Working principle of time interval, frequency and period measurements using universal counter/ frequency counter, Time - base stability, Accuracy and resolution.
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.

Unit-III

Function Generators: Overview of function generators, their purpose, types of waveforms produced, and triggering methods, Generation of waveforms and important features like frequency range and modulation capabilities, working principle of generator, conversion of triangular to square and sine waves, Frequency response, Advance function generators.

Unit-IV

Cathode Ray Oscilloscope: Block diagram of basic CRO, Construction of CRT, Electron gun, electrostatic focusing and acceleration (qualitative treatment only), Brief discussion on screen phosphor, visual persistence & chemical composition, Time base operation, synchronization, Front panel controls,
Specifications of a CRO and their significance, Use of CRO for the measurement of voltage (dc and ac), frequency and time period. Special features of dual trace, Introduction to digital oscilloscope and probes, Digital storage Oscilloscope: Block diagram and principle of working.

Course Outcomes (COs)

After completing this course, the student will be able to:

CO1. Understand the basics of measurements and about multimeter.
CO2. Know about the use and working of digital multimeter and electronic voltmeter.
CO3. Understand the operations of function generators and its uses.
CO4. Understand the working and use of cathode ray oscilloscope in various electronic circuits.

Reference Books:

1. D. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999
2. Physics of Semiconductor Devices, S. M. Sze, Willey Publisher.
3. Integrated Electronics, Jacob Millman and C C Halkias, TATA McGraw-Hill Edition.
4. A text book in Electrical Technology- B L Theraja – S Chand & Co.
5. Basic Electronics and Linear Circuits, N N Bhargava, McGraw-Hill Edition

Mapping of COs with POs
C24MIC333T (i)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	M	S	M	M	S	S
CO2	M	S	S	M	M	S	S
CO3	M	S	S	S	M	S	S
CO4	M	S	S	S	M	S	S

S= Strong, M = Medium, W= Weak

Physics
Multidisciplinary Course (MDC3)
C24MDC323T: Introductory Modern Physics

Paper Code: C24MDC323T
30 Hrs (2 Hrs /week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Introduction to electromagnetic spectra: -Electromagnetic radiations, radio waves, microwaves, Infrared radiations (IR), Visible light, Ultraviolet (UV) light-Rays, Gamma rays, range Applications of electromagnetic Radiations. Dispersion of light, Photoelectric effect, Einstein's explanation. Compton scattering (Only Qualitative), Pair production and annihilation.

Unit-II

Atomic structure: Rutherford scattering, Rutherford's model and its drawbacks, Bohr atomic model; quantization rule, atomic stability, calculation of energy levels for hydrogen atom and their spectra.
Wave properties of matter: De-Broglie wavelength and matter waves; Wave-particle duality, wave packets, phase velocity, group velocity and their relations.

C24MDC323P: Introductory Modern Physics Lab

Paper Code: C24MDC323P
30 Hrs. (2 Hrs. /week) **External Marks: 15**
Credit: 1 **Internal Marks: 10**
Time: 3 Hrs. **Total Marks: 25**

Practical

1. To determine the angle of dispersion.
2. Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light
3. To determine the Planck's constant using LEDs of at least 4 different colours.
4. To determine the thickness of a thin wire using a laser Source.
5. To find the specific rotation coefficient for cane sugar using polarimeter.
6. Study the characteristics of Photodiodes
7. To compare Illuminating power of two sources

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Suggested 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, Knneth S.Krane, JOHN WILEY & SONS, INC
4. "Electromagnetic Waves "by Umran S. Inan and Aziz S. Inan

Course Outcomes (COs)

After completing this course, the student will be able to:

CO1. Understand the electromagnetic spectrum, photoelectric effect, Compton scattering and pair production.
CO2. Know about the description of atomic structure and its various models, and wave properties of matter.
CO3. Perform experiments on measuring the Planck's constant, photo current versus intensity and wavelength of light etc., and compare the experimental values with the standard values.

Mapping of COs with POs
C24MDC323T and C24MDC323P

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	S	M	S	S
CO2	M	S	M	S	M	S	S
CO3	M	S	M	S	M	S	M

S= Strong, M = Medium, W= Weak

Physics
Skill Enhancement Course (SEC3)
C24SEC330T: Numerical Techniques

Paper Code: C24SEC330T
30 Hrs (2 Hrs /week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Introduction to Fortran: Computer architecture and organization, memory and input/output devices, Binary and decimal arithmetic, Fortran character set, Data types and integer constant, variables, Arithmetic expression, Assignment statement, Format statement, Read/write statement, Unformatted input/output statements, Algorithm, Flowcharts, FORTRAN statement & subprograms: GOTO, Computed GOTO, Arithmetic If, logical If, If Then Else, Nested If Then Else, DO loops, Continue statement, nested do loop. Data statement, Double precision, Logical data, Complex data, While structure, Arrays and subscripted variables, Subprograms.

Unit-II

Solutions of algebraic equations: Bisection method, Iteration method, Newton-Raphson method, Muller's method, Quotient-Difference method, Secant Method.
Algorithm, flowchart and program: Finding the roots of a quadratic equations, motion of a projectile, summing a series of numbers, finding factorial of given number, motion in a central force field, addition and multiplication of two matrices, solution of algebraic equations using Bisection and Newton Raphson method.

C24SEC330P: Numerical Techniques Lab

Paper Code: C24SEC330P
30 Hrs (2 Hrs /week) **External Marks: 15**
Credit: 1 **Internal Marks: 10**
Time: 3 Hrs **Total Marks: 25**

Practical

1. Program to find finite integral by Simpson's 1/3 rule
2. Program to find the average and standard deviation
3. Program to compute product of two matrices
4. Program to short marks in ascending order
5. Program to short marks in descending order
6. Compute the sum of a finite series upto correct 3 decimal places
7. Fitting of a straight line using least square method

Note: The list of experiments may vary. The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Course Outcomes (COs)

After completing this course, the student will be able to:

CO1. Understand the basics of computer, memory units, number systems; and their conversion.
CO2. Know about the FORTRAN statements and their sub program.
CO3. Familiar with the FORTRAN programming used in various field of science.

Suggested Books:

1. FORTRAN 77 and Numerical Methods, C.Xavier, New Age International 1994.
2. William E. Mayo and Martin Cwiakala, Programming with Fortran 77, Schaum's outline series, McGraw Hill, Inc.
3. Fortran 77, Programming and applications by RC Verma et al. Allied Publishers, New Delhi.
4. R C Desai, Fortran Programming and Numerical methods, Tata McGraw Hill, New Delhi.

Mapping of COs with POs
C24SEC330T & C24SEC330P

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	M	S	M	M	M	M
CO2	M	M	S	S	M	S	M
CO3	M	M	S	S	M	S	S

S= Strong, M = Medium, W= Weak

Semester-IV

Physics
Discipline Specific Course (DSC)
C24PHY401T: Optics

Paper Code: C24PHY401T
45 Hrs (3 Hrs /week) **External Marks: 50**
Credits: 3 **Internal Marks: 20**
Time: 2.5 Hrs **Total Marks: 70**

Note: The examiner is required to set nine questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 2 marks each. In addition to this, eight more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt five questions in all selecting one from each unit in addition to the compulsory Question No.1. All questions carry equal marks. 20% numerical problems are to be set. Use of scientific calculator (nonprogrammable) is allowed.

UNIT-I

Interference: Division of amplitude and division of wave front, Young's Double Slit experiment, Fresnel's Biprism, Phase change on reflection: Stokes' treatment.
Interference in Thin Films: parallel and wedge-shaped films, Newton's Rings: measurement of wavelength and refractive index (for reflected wave).

UNIT-II

Diffraction: Fresnel Diffraction: Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave, Rectilinear Propagation of Light, Theory of a Zone Plate and its application, Multiple Foci of a Zone Plate, Fraunhofer diffraction: Single slit, Double slit multiple slits and 'n' multiple slits, Diffraction grating (Only Qualitative), Resolving power of Grating, Rayleigh Criteria of the limit of resolution and Resolving Power of a telescope.

UNIT-III

Polarization: Polarization by reflection, refraction and scattering, Malus Law, Phenomenon of double refraction, Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light. Optical activity, Fresnel's theory of optical rotation, Specific rotation.

UNIT-IV

Fiber Optics: Optical Fibers - Construction and working, Critical angle of propagation, Acceptance angle, Numerical Aperture, Modes of propagation, Types of optical fibers, Attenuation. Advantages and applications of Optical Fiber.

C24PHY401P: Optics Lab

Paper Code: C24PHY401P
30 Hrs (2 Hrs /week) **External Marks: 20**
Credit: 1 **Internal Marks: 10**
Time: 3 Hrs **Total Marks: 30**

Practical

1. To determine Refractive index of the material of a prism using sodium source.
2. Determination of wave length of sodium light using Newton's Rings.
3. To determine the dispersive power of a prism.
4. To draw a graph between wave length and minimum deviation for various lines from a Mercury discharge source.
5. Determination of wavelength of sodium light by using a diffraction grating.
6. Resolving power of a telescope.
7. Comparison of Illuminating Powers by a Photometer.
8. Measurement of (a) Specific rotation (b) concentration of sugar solution using polarimeter.
9. Ordinary and extra ordinary refractive indices for calcite or quartz.
10. To find the equivalent focal length of a lens system by nodal slide assembly.

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Suggested Books:

1. Optics, AjoyGhatak, 2008, Tata McGraw Hill
2. Lasers and Non-Linear Optics, B.B.Laud, New Age International (P) Ltd., Publishers, New Delhi
3. Lasers, Principles, Types and Applications, K.R. Nambiar, New Age International (P) Ltd., Publishers, New Delhi
4. Laser, Theory & Applications by K. Thyagarajan and A.K. Ghatak, Macmillan India limited
5. A textbook of optics by N. Subrahmanyam and Brijlal, S. Chand & Company
6. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
7. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi

Course Outcomes (COs)
After completing this course, the students will be able to:

CO1. Understand the Interference, Young's double slit experiment, Fresnel's Biprism, Newton's Rings: measurement of wavelength and refractive index.
CO2. Understand diffraction and its various types, resolving power of grating and telescopes.
CO3. Distinguish between the plane, circular and elliptical polarized light, and use of polarimeter for calculating the specific rotation.
CO4. Develop an understanding on the basic concepts of optical fiber and its various properties.
CO5. Learn about different types of optical fiber and their applications.
CO6. Learn to present observations, results analysis and different concepts related to experiments of optics.

Mapping of COs with POs
C24PHY401T and C24PHY401P

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	S	M	M	M	S	M
CO2	M	S	M	M	M	S	M
CO3	M	S	M	M	M	S	M
CO4	M	S	S	M	M	S	S
CO5	M	S	S	S	M	S	S
CO6	M	S	S	S	M	S	S

S= Strong, M = Medium, W= Weak

Physics
Minor Course (MIC-4/VOC)
C24VOC433T: Introduction to Optics

Paper Code: C24VOC433T
30 Hrs (2 Hrs /week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit consisting of 10 marks each. The student/candidate is required to attempt three questions in all selecting one from each unit in addition to the compulsory Question No.1.

UNIT-I

Interference: Division of amplitude and division of wave front, Young's Double Slit experiment, Interference in Thin Films: parallel and wedge-shaped films, Newton's Rings: measurement of wavelength
Diffraction: Fresnel Diffraction: Fresnel's Assumptions, Fresnel's Half-Period Zones for Plane Wave, Fraunhofer diffraction: Single slit, double slit multiple slits and 'n' multiple slits, Diffraction grating (Only Qualitative), Resolving power of Grating, Rayleigh Criteria of the limit of resolution and Resolving Power of a telescope.

UNIT-II

Polarization: Polarization by reflection, refraction and scattering, Malus Law, Analysis of polarized Light. Nicol prism, Quarter wave plate and half wave plate, production and detection of (i) Plane polarized light (ii) Circularly polarized light and (iii) Elliptically polarized light, specific rotation.
Fiber Optics: Optical Fibers – Construction and working, Critical angle of propagation, Acceptance angle, Numerical Aperture, Modes of propagation, Types of optical fibers, Attenuation. Advantages and applications of Optical Fiber.

C24VOC433P: Introduction to Optics Lab

Paper Code: C24VOC433P
60 Hrs (4 Hrs /week) **External Marks: 35**
Credit: 2 **Internal Marks: 15**
Time: 3 Hrs **Total Marks: 50**

Practical

1. To determine Refractive index of the material of a prism using sodium source.
2. Determination of wave length of sodium light using Newton's Rings.
3. To determine the dispersive power of a prism.
4. To draw a graph between wave length and minimum deviation for various lines from a Mercury discharge source.
5. Determination of wavelength of sodium light by using a diffraction grating.
6. Resolving power of a telescope.
7. Comparison of Illuminating Powers by a Photometer.
8. Measurement of (a) Specific rotation (b) concentration of sugar solution using polarimeter.
9. Ordinary and extra ordinary refractive indices for calcite or quartz.
10. To find the equivalent focal length of a lens system by nodal slide assembly.

Note: The list of experiments may vary. Student will perform at least six experiments. The examiner will allot one practical at the time of end term examination. Students are required to get minimum pass marks separately as per university rules in theory and practical components of the course.

Suggested Books:

1. Optics, AjoyGhatak, 2008, Tata McGraw Hill
2. Laser, Theory & Applications by K. Thyagarajan and A.K. Ghatak, Macmillan India limited
3. A textbook of optics by N. Subrahmanyam and Brijlal, S. Chand & Company
4. B.Sc. Practical Physics, C.L. Arora, S. Chand Publisher, New Delhi
5. Advanced Level Practical Physics, M. Nelkon and Ogborn, Henemann Education Books Ltd., New Delhi

Course Outcomes (Cos)

After completing this course, the students will be able to:

CO1. Understand the Interference, Young's double slit experiment, Newton's Rings: measurement of wavelength and refractive index, diffraction and its various types, resolving power of grating and telescopes.

CO2. Distinguish between the plane, circular and elliptical polarized light, and use of polarimeter for calculating the specific rotation.

CO3. Develop an understanding on the basic concepts of optical fiber and its various properties.

CO4. Learn to present observations, results analysis and different concepts related to experiments of optics.

Mapping of COs with POs

C24VOC433T and C24VOC433P

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	S	S	M	S	M	S	M
CO2	M	S	M	M	M	S	M
CO3	M	S	M	S	M	S	M
CO4	S	S	S	M	S	S	S

S= Strong, M = Medium, W= Weak

Physics
Value Added Course (VAC-3)
C24VAC408T: Introduction to Satellites

Paper Code: C24VAC408T
30 Hrs (2 Hrs /week) **External Marks: 35**
Credits: 2 **Internal Marks: 15**
Time: 2 Hrs **Total Marks: 50**

Note: The examiner is required to set five questions in all. The first question will be compulsory consisting of five short questions covering the entire syllabus consisting of 3 marks each. In addition to this, four more questions (each question may be of 2-3 parts) will be set consisting of two questions from each unit. The student/candidate is required to attempt three questions in all selecting one from each unit in consisting of 10 marks in addition to the compulsory Question No.1.

Unit-I

Introduction: - Historical background of Indian Space Satellites, Concept of Satellite, ideas and theories, Concept of Orbits, the transfer orbit, hurdles in launching a satellite, space scarcity in space. Indian space program, Objectives of the Indian Space Program, Organizational set-up, Indian National Satellites. Milestones in India's Space Programme.

Unit-II

Communication Satellite: Orbit and Description: A brief History of Satellite Communication. Satellite Frequency bands, Satellite Systems, Applications, Orbital Period and Velocity, Effects of Orbital inclination, Azimuth and Elevation, Coverage and Slant range, Eclipse, Orbital perturbations, Placement of a Satellite in a Geo-Stationary Orbit Classification of Satellites based on Orbit Height. Indian remote sensing satellites. Launch vehicle technology.

Suggested Books:

1. Satellite Technology, Anil K Maini and Varsha Aggarwal, Willey Publisher.
2. Hand book of space technology, Denial Jubb, Willey Publisher.
3. Indian Space program- Gurbir Singh, Astrotalkuk Publication.

Course Outcomes (COs)
After completing this course, the student will be able to:

CO1. Understand the basics of Indian Space Satellites such as theories, launching a satellite, space scarcity in space and Indian space program.
CO2. Know about the communication satellite, Satellite Systems, and Placement of a Satellite in a Geo-Stationary Orbit.
CO3. Understand the Classification of Satellites based on Orbit Height, Indian remote sensing satellites, and Launch vehicle technology.

Mapping of COs with POs
C24VAC408T

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	M	M	M	S	M	S	S
CO2	M	M	S	S	M	S	S
CO3	M	M	S	S	M	S	M

S= Strong, M = Medium, W= Weak