Computer Application

Program Outcomes

599	B.Sc. (Voc.)	• Upon completion of the programme the student will able to develop extensive knowledge in various areas of Electronics and Instrumentation such as Communication Electronics, Control Systems, Digital Systems Design, Remote Sensing, Bio-medical Instrumentation, Analytical Instrumentation, Industrial Instrumentation. Digital Signal Processing. Microcontrollers. Embedded systems, etc. • Students will be able to select, install, calibrate and maintain instruments used for measurement and analysis. • One will be able to design signal analysis and develop the implementation for control schemes used in various industrial processes. • Apart from this he/her can develop the skill set to execute a Project incorporating industrial standards • The student will be equipped to take up a suitable position in various companies that manufacture electronic test equipment, transducers, process control equipment and recording instruments as well as in process industries

Course Outcomes

S.N.	Program	Course	Out Come
1	B.Sc.(Voc)-599	CA-599101: Fundament of Computer	Knowledge gained: • Understand the theory and architecture of hardwired and microprogram controlled central processing units • To help the Basic architecture of computer with all workflow. • Knows the terms of motherboard,CPU, RAM, ROM, BIOS, CMOS and can express with their own words. • Learn the concepts of parallel processing, pipelining and inter-processorcommunication. • Define different number systems, binary addition and subtraction, 2's complement representation and operations Skills gained:

				• Analyze some of the design issues in terms of speed, technology, cost, performance • Design a simple CPU with applying the theoretical concepts • Understand the architecture and functionality of central processing unit Competency developed: • Use appropriate tools to design verify and test the CPU architecture. Exemplify in a better way the I/O and memory organization. • Identifies and explains computers hardwares describes the communication units of computers. • Defines desktop computer, laptop
		CA-599102: Programming Concept using "C"		Knowledge gained: • Knowledge of, and ability to use, language features used in current programming languages. • An ability to program in different language paradigms and evaluate their relative benefits. • An understanding of the key concepts in the implementation of common features of programming languages. Skills gained: • Investigate semantic issues in programming languages by studying implementations in an interpreter • Define the semantics of a programming language using a definitionalinterpreter. Competency developed: • Solve problems using a range of programming paradigms and assess the effectiveness of each paradigm for a particular problem. • Repeat the sequence of instructions and points for a memory location • Apply code reusability with functions and pointers • Understand the basics of file handling mechanisms • Explain the uses of pre-processors and

			various memory models
		CA-599201: - Operating System	Knowledge gained: • To understand Complexity of Operating system as a software • To understand design issues related to process management and various related algorithms • To understand design issues related to memory management and various related algorithms • To understand design issues related to File management and various related algorithms • Allocate Main Memory based on various memory managementtechniques • Compare Memory allocation using Best fit, Worst fit, and first fit policies • Apply page replacement policies for dynamic memory management • Schedule CPU time using scheduling algorithm for processors • Compare various device scheduling algorithms Skills gained: • To evaluate, and compare OS components through instrumentation forperformance analysis. • To analyze the various device and resource management techniques for timesharing and distributed systems Competency developed: • To design and understand the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems. • To develop and analyze simple concurrent programs using transactional memory and message passing, and to understand the trade-offs and implementation decisions
		CA-599202: :- Data Structure	Knowledge gained: • Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms • Describe common applications for

			arrays, records, linked structures, stacks, queues, trees, and graphs
			• Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
			• Demonstrate different methods for traversing trees
			• Illustrate various technique to for searching, Sorting and hashing
			• Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack
			• Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing.
			• Summarize different categories of data Structures
			Skills gained:
			• Compare alternative implementations of data structures with respect to performance
			• Compare and contrast the benefits of dynamic and static data structures implementations
			• Explain the significance of dynamic memory management Techniques
			• Identify different parameters to analyze the performance of an algorithm.
			Competency developed:
			• Choose appropriate data structures to solve real world problemsefficiently.
			• Design and implement an appropriate hashing function for an application
			• Design algorithms to perform operations with Linear and Nonlinear datastructures
		CA-599301: DBMS-I	Knowledge gained:
			• Types of databases
			• Detailed architecture, define objects, load data, query data and performance tune databases.
			• Writing SQL queries for the given problem statement
			Skills gained:

			• Establish a basic understanding of the process of Database • Develop ER diagram for representing conceptual data model • Convert ER diagram into a set of relations representing logical data model Competency developed: • Gain ability to handle large volumes of structured, semi-structured, and unstructured data using database technologies. • Appreciate the need for DB approach and understand the components androles of DBMS • Apply DB system development life cycle to business problems • Implement a set of relations in the chosen DBMS • Development and Administration using MySQL.integrity, concurrency, and uniform data administration procedures.
		CA-599302: OOPS Concept With C++	Knowledge gained: • an ability to incorporate exception handling in object-oriented programs • an ability to use template classes and the STL library in C++ • an understanding of the concepts of OOPs including inheritance and polymorphism • an ability to overload operators in C++ • an understanding of the difference between function overloading and function overriding Skills gained: • Logical thinking • C++ Programming Competency developed: • Ability to write object-oriented programs of moderate complexity in C++ • Developing real world application using C++
		CA-599401: DBMS-II	Knowledge gained: • Types of databases • Detailed architecture, define objects, load data, query data and performance tune databases. • Writing SQL queries for the given

				problem statement
				Skills gained: • Establish a basic understanding of the process of Database • Develop ER diagram for representing conceptual data model • Convert ER diagram into a set of relations representing logical data model **Competency developed:** • Gain ability to handle large volumes of structured, semi-structured, and unstructured data using database technologies. • Appreciate the need for DB approach and understand the components androles of DBMS • Apply DB system development life cycle to business problems • Implement a set of relations in the chosen DBMS • Development and Administration using MySQL.
		CA-599402: System Analysis & Design		**Knowledge gained:** • Analyze the running time and space complexity of algorithms. • Describe, apply and analyze the complexity of divide and conquer strategy. • Describe, apply and analyze the complexity of greedy strategy. • Describe, apply and analyze the complexity of dynamic programming strategy. • Explain and apply backtracking, branch and bound and string matching techniques to deal with some hard problems. • Describe the classes P, NP, and NPComplete and be able to prove that a certain problem is NP-Complete. • Describe analysis techniques for algorithms. • Identify appropriate data structure and design techniques for different problems • Identify appropriate algorithm to be applied for the various applicationlike geometric modeling, robotics,

				networking, etc.
				- Appreciate the role of probability and randomization in the analysis of algorithm - Differentiate polynomial and non-deterministic polynomial algorithms. Skills gained: - To provide mathematical approach for Analysis of Algorithms - To solve problems using various strategies - To provide mathematical approach for Analysis of Algorithms. - To teach advanced data structures. - To solve complex problems in real life applications. Competency developed: - To analyze strategies for solving problems not solvable in polynomial time - Analyze various algorithms.
		CA-599501: Computer Network		Knowledge gained: - Basic networking concepts, types of networks, various topologies and application of networks - types of addresses, data communication. - wired and wireless networks, its types, functionality of layer - importance of network security and cryptography - concept of networking models, protocols, functionality of each layer Skills gained: - Learn basic networking hardware and tools. - Create hybrid topologies using the existing topologies, and checkefficiency. - Apply different encoding and decoding mechanisms involved in different types of transmission media and to measure the transmission impairments. Competency developed: - Create a new protocol and test its efficiency. - Design a new network architecture using

			protocols and interfaces.₃sector • File sharing - you can easily share data between different users, or access. • It remotely if you keep it on other connected devices. • Resource sharing - using network-connected peripheral devices like printers, scanners and copiers, or sharing software between multiple users, saves money. • Design a model internet with various categories of networks and test the transmission rate.
		CA-599502: Visual Basic 6.0	• The main outcome of Visual Programming helps in software design & development. • Visual programming is an important tool in modern computing, as it helps people quickly and easily visualize complex computer processes. • Visual programming allows users to create visual diagrams and models of their programs.
		CA-599601: Major Project(Project Management)	Knowledge gained: • Identify and define the problem statement • Define and justify scope of the proposed problem • Gather and analyze system requirements • Propose an optimized solution among the existing solutions • Practice software analysis and design techniques • Develop a functional application based on the software design • Apply coding, debugging and testing tools to enhance the quality of the software • Construct new software system based on the theory and practice gained through this exercise • Prepare the proper documentation of software projects following the standard guidelines • Develop technical report writing and oral presentation Skills gained: • Software Project Development Competency developed: Professional Software Developer

Course Code	Course Name	Course Outcome
	CA-599602: Management Information System	**Knowledge gained:** • Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making. • To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems • Managing the digital firm • Compare the processes of developing and implementing informationsystems • Illustrate redesigning the organization with information systems • Debate infrastructure of information technology • Explain relationships between concepts of information systems, organization, management and strategy. **Skills gained:** To provide the theoretical models used in database management systems to answer business questions.

Mathematics

Course Code	Course Name	Course Outcome
MAT 599101	**Algebra, Matrix & Trigonometry**	1. Work with matrices and determine if a given square matrix is invertible. 2. To use mathematically correct language and notation for Algebra. 3. Learn to solve systems of linear equations and application problems requiring them and Find the inverse of a square matrix. 4. Learn to compute determinants and know their properties and find and use eigen values and eigen vectors of a matrix. 5. The basic terminology of linear algebra in Euclidean spaces, including linear independence, spanning, basis, rank, nullity, subspace, and linear transformation. 6. To solve problems that apply Linear Algebra to Chemistry, Economics and Engineering.
MAT 599102	**Differential Calculus and Real Analysis**	1. Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point. 2. Compare and contrast the ideas of continuity and differentiability. 3. To able to calculate limits in inderminate forms by a repeated use of L' Hospital rule. 4. To find maxima and minima, critical points and inflection points of functions and to determine the concarity of curves. 5. Describe the basic difference between the rational and real numbers. 6. Give the definition of concepts related to metric spaces such as continuity,

		compactness, convergent etc. 7. Give the essence of the proof of Bolzanoweistrass theorem the contraction theorem as well as existence of convergent subsequence using equi-continuity. 8. Evaluate the limits of wide class of real sequences. Determine whether or not real series are convergent by comparison with standard series or using the ratio test. 9. The students of Mathematics, Physics, Computer Science, Statistics, etc., are equally benefited with this course as a stepping stone to the broad areas of calculus.
MAT 599202	**Integral Calculus & Ordinary Differential Calculus**	1. Understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus. 2. Locate the x and y intercepts, any undefined points, and any asymptotes. 3. determine asymptotes for rational expressions (we will not go into these graphs in much detail) 4. apply the techniques from the previous section to graph a fourth degree polynomial or higher 5. Determine if there is any symmetry to aid in the graphing process. 6. Determine the point(s) of intersection of pairs of curves. Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases. 2. Student will be able to find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution. 3. Student will be introduced to the complete solution of a non-homogeneous differential equation with constant coefficients by the method of undetermined coefficients. 4. Student will be able to find the complete solution of a differential equation with constant coefficients by variation of parameters. 5. Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.
MAT 599203	**Vector Algebra and Analytical Geometry of 3D**	1. Understand geometrical terminology for angles, triangles, quadrilaterals and circles and measure angles using a protractor. 2. Use geometrical results to determine unknown angles. 3. To get basic knowledge about Circle, Cone, Parabola, Hyperbola, Ellipse etc. To understand the concepts & advance topics related to two & three dimensional geometry. 4. To study the applications of conics. To study the application of Sphere, cone and cylinder. 5. Use Green's theorem to evaluate line integrals along simple closed contours on the plane. Compute the curl and the divergence of vector fields. 6. Apply Stokes' theorem to compute line integrals along the boundary of a surface. Use Stokes' theorem to give a physical interpretation of the curl of a vector field. 7. Use the divergence theorem to give a physical interpretation of the divergence of a vector field. 8. Recognize line and rotational symmetries. To study the application of Sphere, cone and cylinder. 9. Find the areas of triangles, quadrilaterals and circles and shapes based on these.

			10. Calculate directional derivatives and gradients.
			11. Apply gradient to solve problems involving normal vectors to level surfaces.
			12. Explain the concept of vector integration a plane and in space.
MAT 599305	**Mathematical Statistics**		1. This course is designed to provide students with an understanding of the data and its relevance in business and develop an understanding of the quantitative techniques from statistics.
			2. Analyze statistical data graphically using frequency distributions and cummulative frequency distributions. Use Poisson, exponential distributions to solve statistical problems.
			3. Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.
			4. Translate real-world problems into probability models.
			5. Derive the probability density function of transformation of random variables.
			6. Calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.
			7. Use Poisson, exponential distributions to solve statistical problems.
			8. Use discrete and continuous probability distributions, including requirements, mean and variance, and making decisions.
			9. Define binomial outcomes and compute probability of getting X successes in N trials.
			10. Employee the principles of linear regression and correlation, including least square method, predicting a particular value of Y for a given value of X and significance of the correlation coefficient.
MAT 599306	**Numerical Analysis**		1. The main objective of this course is to provide students with an introduction to the field of numerical analysis.
			2. The course will also develop an understanding of the elements of error analysis for numerical methods and certain proofs.
			3. Understand the theoretical and practical aspects of the use of numerical analysis.
			4. Proficient in implementing numerical methods for a variety of multidisciplinary applications.
			5. Establish the limitations, advantages, and disadvantages of numerical analysis.
			6. Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
			7. Understand of common numerical analysis and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.
			8. Derive appropriate numerical methods to solve interpolation based problems.
			9. Derive appropriate numerical methods to solve for various numerical root finding methods.
MAT 599307	**Mechanics**		1. As a bridge between theory and application, mechanics is used to formulate new ideas and theories, discover and interpret phenomena, and develop experimental and computational tools.
			2. Mechanics provides the "building blocks" of statics, dynamics, hydrostatics of materials, and fluid dynamics. Identify mechanisms in real life applications.
			3. The central of gravity concepts in mechanics are force, mass, and motion and Determine/analysis centre of gravity/centroid experimentally.
			4. Perform kinematic analysis of simple mechanisms and static and dynamic force analysis
			5. Analyze velocity and acceleration of mechanisms by vector and graphical methods.
			6. Ability to apply laws of statics.

		7. To know the knowledge of equilibrium conditions of a static body
MAT 599308	**Complex Analysis & Integral transform**	1. The concept of limit for real functions and be able to calculate limits of standard functions and construct simple proofs involving this concept. 2. Introduced to the concept of continuity and be familiar with the statements and proofs of the standard results about continuous real functions; 3. Understand the concept of the differentiability of a real valued function and be familiar with the statements and proofs of the standard results about differentiable real functions. 4. Working knowledge of differentiability for complex functions and be familiar with the Cauchy-Riemann equations. 5. Evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem. 6. Understand purpose and functions of the gamma and beta functions, Fourier series and Transformation. 7. To understand signals and systems in terms of both the time and transform domains, taking advantage of the complementary insights and tools that these different perspectives provide. 8. Use the gamma function, beta function to: evaluate different types of integral calculus problems and Fourier series to solve differential equations.
MAT 599109	**Hydrodynamics and Partial Differential Equation**	1. The objective of hydrodynamics is to understand the motion of fluids. 2. Demonstrate a foundation in the fundamentals of fluid mechanics and relevant analytical, numerical and experimental approaches. 3. Be able to apply advanced numerical methods and measurement techniques to solve-fluid flow problems related to hydrodynamics. 4. To evaluate the hydrostatic pressure loading acting on a body that is immersed in a liquid. 5. Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics. 6. Determine the fluid pressure and use various devices for measuring fluid pressure. 7. Calculate hydrostatic force and use of law of conservation mass to fluid flow. 8. Apply Bernoulli's equation to fluid flow problems and boundary layer theory to determine lift and drag forces on a submerged body. 9. Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces. 10. Differential equation models describe a wide range of complex problems in biology, engineering, physical sciences, economics and finance. 11. Understand analogies between mathematical descriptions of different (wave) phenomena in physics and engineering. 12. Classify PDEs, apply analytical methods, and physically interpret the solutions. Introduction: what is a PDE, first-order linear PDEs, initial

		and boundary conditions, well-posed problems, types of second-order PDEs. 13. Understand what are well-posed initial (and/or boundary) value problems for classical PDEs such as the wave equation, the Laplace equation and the heat (diffusion) equation 14. Know basic analytical techniques for solving the above classical equations.
MAT **599110**	**Mathematical Programming**	1. Recognize the importance and value of Operations Research and linear programming in solving practical problems in industry 2. Interpret the transportation models' solutions and infer solutions to the real-world problems. 3. Recognize and solve assignment problems. 4. Gain knowledge of drawing project networks for quantitative analysis of projects 5. know when simulation and dynamic programming can be applied in real world problems 6. Solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained. 7. Determine optimal strategy for Minimization of Cost of shipping of products from source to Destination/ Maximization of profits of shipping products using various methods, Finding initial basic feasible and optimal solution of the Transportation problems. 8. Optimize the allocation of resources to Demand points in the best possible way using various techniques and minimize the cost or time of completion of number of jobs by number of persons. 9. Model competitive real-world phenomena using concepts from game theory.
MAT **599111**	<mark>**Major Project**</mark>	1. The student should have the following learning outcomes defined in terms of knowledge, skills and general competence: 2. Knowledge: The student has insight in written and oral presentation of mathematical material through the work with, and the presentation of, a written thesis based on a case study. 3. Skills: The student is able to plan and work on a mathematical project from start to end. 4. General competence: The student can project work and to follow it from start to end. 5. Apply the concept of mathematical tools to address real life problems. 6. To understand the motivation behind the statements and proofs
MAT **599112**	**Graph Theory**	1. To understand how graph theory have been. 2. To understand the concept of vertex connectivity and edge connectivity in graphs. 3. To develop the under-standing of Geometric duals in Planar Graphs. 4. To understand Koenigsberg Seven Bridge Problem. 5. To understand the concept of matrices in graphs like Incidence

matrix, Adjacency matrix, Cycle matrix etc.

6. To understand the concept of digraphs, Euler digraphs and Hamiltonian digraphs.
7. To understand the idea of tournaments in digraphs and study some characterizations about tournaments.
8. To have an idea of matching in graphs and study some applications of matching in day to day life problems.
9. To introduce the idea of coloring in graphs.
10. To have an idea of automorphism groups of graphs.

Instrumentation/Optical Instrumentation

code & Subject Name	Course Objective	Course Outcome
C5 Light sources and illumination engineering	To make student understand the importance of illumination engineering in energy conservation and to guide them towards acquiring the knowledge regarding the fundamentals and elementary design aspects of artificial lighting	1. Understand the optical performance of the human eye and knowledge of different types of standard light sources and understand their characteristics and applications 2. Investigate on various types of lighting techniques as well as can evaluate their performance in terms of their colour rendering and luminous efficacy. 3. Develop a clear idea on various illumination techniques and hence can design lighting schemes for specific applications. 4. Learn to understand of UV, IR sources, LED and various optical sources and detectors, their operating principles, characteristics and applications in sensing and measurement techniques 5. Identify, formulate, and figure out the need of research and development activities required for developing efficient artificial illumination.
C2 Wave optics	To make student understand the importance of the basic principles of wave optics and its various application in different fields	1. Understanding of the wave nature of light, including concepts such as interference, diffraction, and polarization. 2.Understand the interference and diffraction phenomena and analyze

		and interpret mathematically
		3. Knowledge about various wave optics phenomena, such as Fresnel and Fraunhofer diffraction, thin film interference etc.
		4. Learn about concept and analyze the polarization of light using various techniques, its applications and significance in optical systems.
		5. Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.
C1 Geometrical optics and optical components	The objective of course is that this course describes and analyze the physical principles that determine how rays behave at various interfaces and Natural optical phenomena and classic optical systems (prisms, telescopes, cameras, etc.)	1. Determine the behavior of a ray (reflection/refraction angles and amplitudes) at any optical surface. 2. Design an imaging system with a desired resolution, field-of-view and magnification and insightful overview of lenses, prism and other optical components 3. Model a complex optical system using paraxial ray tracing. 4. Identify fundamental limits and aberrations in an optical system and techniques involved to minimisation of it 5.Linear systems will be introduced to analyze more complex optical systems
C9 Lasers and advanced instruments	1.Provide students with a basic understanding of laser operation. 2. Develop framework for understanding laser characteristics such as lasing threshold levels, and predicting performance of various laser systems	1.Students will be conversant with basics of laser operation and learn the skills required to calculate essential design requirements such as minimum pumping threshold 2. Students will be able to design stable optical laser cavities and predict performance. 3.Acquire knowledge about principles involves in recording and reconstruction of different types of Holograms and its applications. 4. Understanding Laser Centering devices and advanced Instruments 5.Learn NDT concept
C-10 Fiber optics and optoelectronics	To understand the construction and	1.Understand and analyze the constructional parameters of optical

instrumentation	characteristics of optical fiber cable and to develop the knowledge of optical signal sources and power launching.	fibers and its application in various field. 2. To Be able to design the optical and optoelectronic system. 3. Estimate the losses due to attenuation, absorption, scattering and bending. 4. Compare various optical detectors and choose suitable one for different applications. 5. To be able to identify and understand the operation of various laser diodes and photo detectors.
C 3-Optical workshop technology	Students will *demonstrate an ability to identify and model the problems of the field of* Optical workshop technology	1.To understand optical material classifications and its applications so to identify the appropriate instruments required for specific operations 2 Understand basic operations of various optical machine 3. Understand the figures and optical machines working 4. Understand procedures followed for fabrications and various fabrication method involved 5. Hands-on experience and knowledge in the practical aspects of working with optical components and instruments through Visit to industries, laboratories
C 4-Opto mechanical design and tutorials	To be able to Estimate various effects on the performance of an optical system.	1. Acquire Key optical concept of Ray tracing and gain a comprehensive understanding of optomechanical design principles and techniques. 2. Integrate optical and mechanical components effectively and Ray Tracing through optical components, optical systems and assemblies. 3. Understand optimize mechanical stress to maintain optical performance and learn to Design optical mounts and

		alignmentsystems/assemblies. 4.Engineering Drawing of optical components, assemblies 5.Impart knowledge and skills through practical, computer and on the job training in optical industries.
C 7-Projection and photographic optics	To develop understanding about basic concepts of image geometry and photography	1.Provides a general overview of its theory of projection system and its working principles 2. Course covers the wide area of TV optics and photographic optics 3. Practical skills in photographic optics, camera types, exposure techniques, filters, flash photography, and camera accessories 4.Learn composition techniques for different types of photography 5. Develop proficiency in darkroom processes, film development, digital photography etc.
C8 Ophthalmic optics and optical metrology	To understand *physical characteristics of ophthalmic lenses and demonstrate knowledge and skills of optical systems and dispensing and how visual correction interact with the eye.*	1.Describe the physical properties of light especially with reference to their interaction with the eye and instruments 2. Describe the geometrical principles of light and the laws governing light's interaction with materials 3.Learn lens measurement and prescription using instruments and acquire knowledge and practical skills in optical metrology: measurements and techniques 4 Outline the optical properties, limitations and image formation of common ophthalmic instruments and the design aspects that improve

		image quality
		5. Develop an understanding of Indian standards and calibration procedures in the field
C12- Quality Control, Production- Planning Prospects and Entrepreneurship	*To understand the problems and opportunities faced by the service organizations* and *decision making in planning*, scheduling and control of. Production/Operation function	1.Various National standards involved for optical components, system and instruments and its specified tolerances and specification in optics 2. Importance of quality assurance and stage inspection in production 3. Determining workshop flowcharting and its concepts 4.Concept in production planning layout of workshops 5. Safety measures involved and relevant exposure to national optics industry and R & D organization
C6 Basic optical instruments	To make the students able to understand different aspects of optical instrument	1.Understand the concept of illumination system 2.learn the fundamentals and design of various eyepieces 3. Aware of Principle design parameters involve in construction of microscopes and different types of microscopes available 4.Acquire knowledge of construction and design parameters of different telescopes 5. Understand the Fundamental of Refractometers and monochromators