DESH BHAGAT COLLEGE BARDWAL-DHURI

(Affiliated to Punjabi University, Patiala, approved by NCTE, Accredited by NAAC "B" Grade)

PG DEPARTMENT OF COMPUTER SCIENCE & IT

Session 2020-2021

Specific Programme Outcomes – On completion of B.C.A., PGDCA, M. Sc IT – (Regular) and M. Sc. IT – (LE) degrees the graduates and post graduate will be able to:

➢ Apply standard Software Application / Engineering practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver quality product for the organization success.

➢ Design and develop computer programs / computer-based systems in the areas related to algorithms, coding, networking, web design, cloud computing, information technology and data analytics of varying complexity.

➢ Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

Programme Outcomes are as:

✓ **Problem analysis:** Identify, formulate and analyze complex computer application problems reaching substantiated conclusions using first principles of programming, coding, designing, research methodology, and modern technology of computer sciences.

✓ **Design / development of solutions:** Design solutions for complex technical problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

✓ **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

✓ **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex technical activities with an understanding of the limitations.

- ✓ **The technology and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- ✓ **Environment and sustainability:** Understand the impact of the professional technology solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- ✓ **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ✓ **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ✓ **Communication:** Communicate effectively on complex technical activities with the technical community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- ✓ **Project management and finance:** Demonstrate knowledge and understanding of the technical and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- ✓ **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

The Objectives of Computer Application are:-

I. The Information Technology prepares a student for basic knowledge using computer to solve data processing problems in daily life.

II. The Computer Studies is designed for students to understand and operate the computer and have special emphasis on sound design principles and programming development.

III. The aims of Computer Application is to provide the students with an opportunity to develop understanding of the basic operations of a computer system and computer applications software.

IV. They also develop the skill of using computer applications software for solving problems.

V. They appreciate the social implications of developments in information technology.

COURSE OUTCOME

BACHELOR OF COMPUTER APPLICATION: (B. C. A. – Three Year Course)

Students will be able to recognize & appreciate the role of computing in a wide variety of activities & application of Modern society, including education, communication. Analyze a given problem and develop an algorithm to solve the problem. Demonstrate the basic technicalities of creating word document, creating power point presentation, design spreadsheet for office use. Develop the software projects by understanding the client requirement. Define fundamental account concept, conventions & terminologies. Implement the various programming languages like C, C++, DBMS, Java, Computer Networks, software design, coding techniques and software testing principle. Students will be able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.

General Education

No.	Name of Course	Description of Course outcome
CO-01	Fundamentals of Information Technology & Its Practical Software Lab-I	The Students after completing course will be able to: Understand basic computer hardware architecture and design fundamental logic circuits. Conversion of different number systems and describe some different codes. Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components. Understand the role of CPU and its components. Learn essential IT support skills including installing, configuring, securing and troubleshooting operating systems and hardware. Gain hands-on experience of working in Microsoft products such as: MS Word, MS Excel and MS PowerPoint.
CO-02	Programming Fundamentals Using C & Its Practical Software Lab- II	The Students after completing course will be able to: Develop logics to create the programs in C. Also learning the basic programming concepts they can easily switch over to any other language in future. Learning Outcomes: After the completion of this course, the student can develop application. Understand the basic terminology used in computer programming, writing, compiling and debugging involving decision structures, loops and functions, arrays, strings and pointers, union, file handling.

CO-03	Digital Electronics	The Students after completing course will be able to: Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by two discreet voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world electronics. Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, etc.
CO-04	Data Structures & Its Practical Software Lab- III	The Students after completing course will be able to: Have a comprehensive knowledge of the data structures and algorithms on which file structures and data bases are based. Understand the importance of data and be able to identify the data requirements for an application. Have an understanding and practical experience of algorithmic design and implementation. Have practical experience of developing applications that utilize databases. Understand the issues involved in algorithm complexity and performance.
CO-05	Computer System Organization and Architecture	The Students after completing course will be able to: Computer organization and architecture: instruction formats and construction; addressing modes; memory hierarchy (cache, main memory and secondary memory) operation and performance; simple pipelines; basic performance analysis; simple OS functions, particularly as they relate to hardware; virtual memory; computer I/O concepts, including interrupt and DMA mechanisms; inter computer communication concepts.
CO-06	Object Oriented Programming Using C++ & Its Practical Software Lab-IV	The Students after completing course will be able to: Explain object-oriented concepts and describe how they are supported by C++ including identifying the features and peculiarities of the C++ programming language. Use C++ to

		demonstrate practical experience in developing object-oriented solutions. Design and implement programs using C++. Analyze a problem description, design and build object-oriented software using good coding practices and techniques. Implement an achievable practical application and analyze issues related to object-oriented techniques in the C++ programming language.
CO-07	Fundamentals of Database Management System & Its Practical Software Lab-V	The Students after completing course will be able to: Understand the current theory and practice of database management system. These include data independence, data constraints procedure, integrity, security, recovery, database design and database administration and conceptual data models. Implement a relational database into a database management system.
CO-08	Computer Networks	The Students after completing course will be able to: Learn the need to create a Network. Learn about different layers and protocols present in those layers. Learn to configure the network devices. Learn about IP -Addressing. Learn about Network Security.
CO-09	Management Information System	The Students after completing course will be able to: Understand the concepts of user, system, functional and non-functional requirements and will be able to explain how software requirement may be organized in a requirements document.
CO-10	Relational Database Management Systems with Oracle & Its Practical Software Lab-VII	The Students after completing course will be able to: Understand the current theory and practice of database management system. These include data independence, data constraints procedure, integrity, security, recovery, database design and database administration and conceptual data models. Implement a relational database into a database management system. Become proficient in using database query language, i.e., Microsoft Office Access, My SQL.

CO-11	System Analysis and Design	The Students after completing course will be able to: Develop skills of system analysis and design. It includes expanded coverage of data flow diagrams, data dictionary, and process specifications.
CO-12	System Software	The Students after completing course will be able to: Understand the concepts of user, system, functional and non-functional requirements and will be able to explain how software requirement may be organized in a requirements document.
CO-13	Java Programming & Its Practical Software Lab-IX	The Students after completing course will be able to: Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism encapsulation and overloading. Identify classes, objects, members of a class and the relationships among them needed for a specific problem. Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling). Use testing and debugging tools to automatically discover errors of Java programs as well as use versioning tools for collaborative programming/editing. Develop programs using the Java Collection API as well as the Java standard class library.
CO-14	Web Designing using HTML and DHTML & Its Practical Software Lab-X	The Students after completing course will be able to: The course introduces students to basic web design using HTML (Hypertext Markup Language), DHTML (Dynamic Hypertext Markup Language) and CSS (Cascading Style Sheets). The course does not require any prior knowledge of HTML or web design. The course is designed to teach the participants how to create web documents using HTML that comprises the best practices of webpage design through the use of CSS, DHTML and XML.

CO-15	E-Commerce	The Students after completing course will be able to: to focuses on principles of e-commerce from a business perspective, providing an overview of business and technology topics, business models, virtual value chains and social innovation and marketing strategies. Students will build their own web presence and market it using an online platform.
CO-16	Operating Systems	The Students after completing course will be able to: Gain extensive knowledge on principles and modules of operating systems. Understand key mechanisms in design of operating systems modules. Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks. Compare performance of processor scheduling algorithms - produce algorithmic solutions to process synchronization problems. Use modern operating system calls such as Linux process and practice with operating system concepts such as process management, synchronization, networked processes and file systems.
CO-17	Software Engineering	Know about the software product and process. Know about software characteristics, components and applications, methods and tools. Understand the software development paradigms. The software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction and deployment.
CO-18	Web Designing using ASP. NET and Its Practical Software Lab - XII	At the end of the course the participant will create a Web form with server controls. Separate page code from content by using code-behind pages, page controls, and components. Display dynamic data from a data source by using Microsoft ADO.NET and data binding. Debug ASP.NET pages by using trace.
CO-19	Computer Applications in Business	Students will learn to solve business problems using computer software, manage data to make data-driven decisions using statistical ideas.

COURSE OUTCOME

POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS: (PGDCA)

It will equip the students with skills required for designing, developing applications in Information Technology. Students will be able to learn the latest trends in various subjects of computers & information technology. The PG Diploma aims at graduates with a computing background and provides a detailed coverage of the key concepts and challenges in data and resource protection and computer software security. To give hands on to students while developing real life IT application as part of the study. To train graduate students in basic computer technology concepts and information technology applications. Design and develop applications to analyze and solve all computer science related problems.

General Education

No.	Name of Course	Description of Course outcome
CO-1	Fundamentals of Information Technology & Its Practical Software Lab - I	The Students after completing course will be able to: Understand basic computer hardware architecture and be able to design fundamental logic circuits. Convert between different number systems and describe some different codes. Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components. Understand the role of CPU and its components. Learn essential IT support skills including installing, configuring, securing and troubleshooting operating systems and hardware. Gain hands-on experience of working in Microsoft products such as: MS Word, MS Excel and MS PowerPoint.
CO-2	Operating Systems	The Students after completing course will be able to: Gain extensive knowledge on principles and modules of operating systems. Understand key mechanisms in design of operating systems modules. Understand process management, concurrent processes and

		threads, memory management, virtual memory concepts, deadlocks. Compare performance of processor scheduling algorithms - produce algorithmic solutions to process synchronization problems. Use modern operating system calls such as Linux process and practice with operating system concepts such as process management, synchronization, networked processes and file systems.
CO-3	Problem Solving using C & Its Practical Software Lab- II	The Students after completing course will be able to : Develop logics to create the programs in C. Also learning the basic programming constructs they can easily switch over to any other language in future. Learning Outcomes: After the completion of this course, the student will be able to develop application. Understand the basic terminology used in computer programming, writing, compiling and debugging involving decision structures, loops and functions, arrays, strings and pointers, union, file handling.
CO-4	Database Management System & Its Practical Software Lab-III	The Students after completing course will be able to: Understand the current theory and practice of database management systems. These include data independence, Data constraints, procedure, integrity, security, recovery, database design and database administration and conceptual data models. Become proficient in using database query language, i.e., Microsoft Office Access, My SQL.

CO-5	Introduction to Computer Network, Internet and E-Commerce	The Students after completing course will be able to: Have a basic knowledge of the use of cryptography and network security. Specify and identify deficiencies in existing protocols and better protocols. Have an understanding of the issues surrounding Mobile and Wireless Networks. The need for Computer Security, Security Strategies, Security Tools, Encryption, Enterprise Networking and Access to the Internet, Antivirus Programs, Security Teams. Define and differentiate various types of Ecommerce. Describe Hardware and Software Technologies for Ecommerce. Explain payment systems for E - commerce. Describe the process of Selling and Marketing on web.
CO-6	Object Oriented Programming Using C++ & Its Practical Software Lab-IV	The Students after completing course will be able to: Explain object-oriented concepts and describe how they are supported by C++ including identifying the features and peculiarities of the C++ programming language. Use C++ to demonstrate practical experience in developing object-oriented solutions. Design and implement programs using C++. Analyze a problem description, design and build object-oriented software using good coding practices and techniques. Implement an achievable practical application and analyze issues related to object-oriented techniques in the C++ programming language.

COURSE OUTCOME

M. Sc. IT – (Information Technology) Regular & Lateral Entry

To provide technology students with the knowledge and ability to students develop creative solutions. Develop skills to learn new technology. Apply computer science theory and software development concepts to construct computing-based solutions. Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, Artificial Intelligence, Mobile applications. Be able to understand the role of Computer Science in solving real time problems in society. Know the recent developments IT, future possibilities and limitations, and understand the value of lifelong learning.

General Education

No.	Name of Course	Description of Course outcome
CO-1	Introduction to Information Technology	The Students after completing course will be able to: Understand basic computer hardware architecture and be able to design fundamental logic circuits. Convert between different number systems and describe some different codes. Understand the fundamental hardware components that make up a computer's hardware and the role of each of these components. Understand the role of CPU and its components. Learn essential IT support skills including installing, configuring, securing and troubleshooting operating systems and hardware. Gain hands-on experience of working in Microsoft products such as: MS Word, MS Excel and MS PowerPoint.
CO-2	Computer Programming using C & Its Practical Software Lab - I	The Students after completing course will be able to: Develop logics to create the programs in C. Also learning the basic programming constructs they can easily switch over to any other language in future.

		Learning Outcomes: After the completion of this course, the student will develop application. Understand the basic terminology used in computer programming, writing, compiling and debugging involving decision structures , loops and functions, arrays, strings and pointers, union, file handling.
CO-3	Computer Organization and Architecture	The Students after completing course will be able to understand Computer organization and architecture: instruction formats and construction; addressing modes; memory hierarchy (cache, main memory and secondary memory) operation and performance; simple pipelines; basic performance analysis; simple OS functions, particularly as they relate to hardware; virtual memory; computer I/O concepts, including interrupt and DMA mechanisms; inter computer communication concepts.
CO-4	Operating Systems	The Students after completing course will be able to: Gain extensive knowledge on principles and modules of operating systems. Understand key mechanisms in design of operating systems modules. Understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks. Compare performance of processor scheduling algorithms - produce algorithmic solutions to process synchronization problems. Use modern operating system calls such as Linux process and practice with operating system concepts such as process management, synchronization, networked processes and file systems.

CO-5	Object Oriented Programming Using C++ & Its Practical Software Lab - II	The Students after completing course will be able to: Explain object-oriented concepts and describe how they are supported by C++ including identifying the features and peculiarities of the C++ programming language. Use C++ to demonstrate practical experience in developing object-oriented solutions. Design and implement programs using C++. Analyze a problem description, design and build object-oriented software using good coding practices and techniques. Implement an achievable practical application and analyze issues related to object-oriented techniques in the C++ programming language.
CO-6	Data and File Structures	The Students after completing course will be able to: Have a comprehensive knowledge of the data structures and algorithms on which file structures and data bases are based. Understand the importance of data and be able to identify the data requirements for an application. Have an understanding and practical experience of algorithmic design and implementation. Have practical experience of developing applications that utilize databases. Understand the issues involved in algorithm complexity and performance.
CO-7	Visual Basic & Its Practical Software Lab - III	The Students after completing course will be able to: Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.)

		Develop a Graphical User Interface (GUI) based on problem description. Develop an Event Planning Chart based on problem description so as to define the processing that is to occur based on specific events. Develop an Algorithm to verify processing is accurate. Develop and debug applications using Visual Basic 2010 (or version required for the course) that runs under Windows operating system Develop programs that retrieve input from a file as opposed to input only provided by user.
CO-8	RDBMS and Oracle & Its Practical Software Lab - III	The Students after completing course will be able to: understand the current theory and practice of database management system. These include data independence, data constraints procedure, integrity, security, recovery, database design and database administration and conceptual data models. Implement a relational database into a database management system. Become proficient in using database query language, i.e., Microsoft Office Access, My SQL.
CO-9	Web Technology & Its Practical Software Lab - IV	The Students after completing course will be able to: Develop web application using server side and client side PHP programming and Database connectivity using My SQL.

CO-10	Java Programming & Its Practical Software Lab - V	The Students after completing course will be able to: Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading. Identify classes, objects, members of a class and the relationships among them needed for a specific problem. Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling). Use testing and debugging tools to automatically discover errors of Java programs as well as use versioning tools for collaborative programming/editing. Develop programs using the Java Collection API as well as the Java standard class library.
CO-11	Software Engineering	The Students after completing course will be able to: Apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction and deployment.
CO-12	Computer Network	The Students after completing course will be able to: Learn the need to create a Network. Learn about different layers and protocols present in those layers. Learn to configure the network devices. Learn about IP -Addressing. Learn about Network Security.

CO-13	Computer Graphics & Its Practical Software Lab - VI	The Students after completing course will be able to: Provide comprehensive introduction about computer graphics system, design algorithms and two dimensional transformations. To make the students familiar with techniques of clipping, three dimensional graphics and three dimensional transformations. To implement various graphics drawing algorithms, 2D-3D transformations and clipping techniques. To implement depth calculations and algorithms to find lines and surfaces algorithms. To implement surface rendering and illumination models.
CO-14	Linux Administration & Its Practical Software Lab - VII	The Students after completing course will be able to: Learn how to install, configure and maintain an Enterprise Linux system in a networked environment, Creating and maintaining system users and groups, Understanding and administering file permissions on directories and regular files.
CO-15	Research Methodology	The Students after completing course will be able to: Research proposal and its elements, Formulation of research problem: criteria of sources and definition, Development of objectives and characteristics of objectives, Development hypothesis and applications. Types of Reports, Planning of Report Writing, Research Report Format, Principles of Writing, Documentation, Data and Data Analysis reporting in a Thesis, Writing of Report, Typing of Report, Briefing. Case study formats of research proposal writing.

CO-16	Artificial Intelligence	The Students after completing course will be able to: Demonstrate knowledge of the building books of AI as presented in terms of intelligent agents. Apply concept Natural Language processing to problems leading to understanding human communication computing, Decision making, problem solving, perception, understanding human communication.

Date: 18/05/2021

Dr. Amrit Singh Madahar
Head
PG Department of Computer Science & IT
Desh Bhagat College Bardwal Dhuri – Sgr

website.

PROGRAM OUTCOMES :

PO1: Applying the knowledge of Mathematics, Science and Mathematics specialization to the solution of complex mathematical problem.

PO2: Identify, formulate, research literature and analyze complex Mathematical Problem reaching substantiated conclusions using Principles of Mathematics, Natural Science and Numerical Analysis.

PO3: Development of solutions for complex mathematical problems.

PO4: Use Research based knowledge and research methods including Analysis & interpretation of data to provide valid condition.

PO5: Speak, read, write & listen clearly in person and through electronic media in English and in one Indian Language and make meaning of the world by connecting people, ideas, books, media & technology.

PO6 : Recognize different value systems including your own, understand the moral dimensions of your decisions and accept responsibility for them.

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PROGRAM SPECIFIC OUTCOMES :

PSO 1: Understand the Structure and basic concepts of Algebra, Complex Analysis, Geometry, Calculus and Functional Analysis.

PSO 2: Analyze the relationship among Mathematics and Applied Mathematics or a related field.

PSO 3: Demonstrate the ability to use symbolic, graphical, numerical written representations of mathematical ideas and learn mathematics through modeling real world situations.

PSO 4: Understand the applications of Mathematics in Statistics, Management Science, Computer Science, Agriculture, Economics, Medicines and Natural Sciences.

PSO 5 : Demonstrate proficiency in writing & understanding proofs.

PSO 6 : To gain experience in investigating the real world problems and learn how to apply mathematical ideas and models to sort out those problems.

PSO 7 : To develop the ability to read and learn Mathematics on their own and to use statistical concepts to analyze real world issues.

PSO 8: To nurture the qualities of power of reasoning, creativity, abstract or partial

thinking, critical thinking, problem solving ability.

PSO 9 : To gain exposure to a variety of areas of mathematics and related fields such as Computer Science ,Natural Science, Business & Economics.

PSO10: To develop the ability to solve financial mathematical problems.

PSO11 : To gain proficiency in transmitting mathematics ideas both oral and in writing.

PSO12: To understand the historical and contemporary role of Mathematics.

PSO13 : To enabled to simplify and evaluate algebraic expressions.

PSO14 : To apply basic algebra and geometry to problems in Radiological Sciences.

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : M.Sc.-I (SEMESTER -I)
NAME OF COURSE : ALGEBRA
NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Compare and contrast about the fundamental theorem of finitely generated abelian groups, homomorphism between two cyclic groups.	Class Tests/ Class Assignments
CO-2	Increase the knowledge of groups, subgroups ,semi-group, monoid ,quasi groups	Class Assignment/ Home Assignment / Authentic problem solving
CO-3	Explain about the permutation group ,clan-equation, alternating group and their simplicity	Group discussion
CO-4	Define about Sylow's group, Sylow's theorem, Ideals, matrix ring and their ideals.	Authentic problem Solving/ Group Discussion
CO-5	Improve the Knowledge for normal Subgroup, cyclic groups and apply these results for on different examples.	Class Assignment/ Seminar/ Group Discussion
CO-6	Ability to understand a large class of commutative rings by regarding them as quotients of polynomial rings by suitable ideals.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   :MATHEMATICS
NAME OF PROGRAMME   :M.Sc.-I (SEMESTER -I)
NAME OF COURSE   :TOPOLOGY-I
NAME OF FACULTY   :Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Develop the concepts of topological space and basic definitions of open sets, neighbourhood, interior, exterior, closure and their axioms for defining topological space.	Class Tests/ Class Assignments
CO-2	Explain the concepts of base and sub base, create new topological space by using subspace.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Define the continuous map, restriction of domain and range, piecewise definition of map's and neighbourhood finite families.	Group discussion
CO-4	Analyse Row point of space are separated by open sets , housdroff spaces and their importance	Authentic problem Solving/ Group Discussion
CO-5	Compare and contrast the Cartesian product spaces and image of connected sets.	Class Assignment/ Seminar/ Group Discussion
CO-6	Apply Knowledge for solve the elementary concepts in product spaces and slices in Cartesian products.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : M.Sc.-I (SEMESTER -I)
NAME OF COURSE : DIFFERENTIAL GEOMETRY
NAME OF FACULTY : Mrs. Sukhsimranjeet Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Explain the basic concept and results related to space curves ,tangents , normal and surfaces.	Class Tests/ Class Assignments
CO-2	Explain the geometry of different types of curves and space.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Enhance the knowledge how to solve the Gaussian and mean curvatures.	Group discussion
CO-4	Utilize geodesics it's all related properties and theorems.	Authentic problem Solving/ Group Discussion
CO-5	Determine principal directions of curvature, asymptotic lines and then apply their important theorems and results to study various properties of curves and surfaces.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explain the codazzi –Mainardi equation and compact surface of constant Gaussian curvature.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : M.Sc.-I (SEMESTER -I)
NAME OF COURSE : MATHEMATICAL ANALYSIS
NAME OF FACULTY : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Apply the knowledge of concepts of mathematical analysis in order to theoretical development of differential mathematical techniques and their applications.	Class Tests/ Class Assignments
CO-2	State the nature of abstract mathematics and explore the concept in further solution.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Identify challenging problems in Taylor's theorem and find their appropriate solution	Group discussion
CO-4	Deal with axiomatic structure of measurable spaces and generalised the properties of measure and lebesque measure.	Authentic problem Solving/ Group Discussion
CO-5	Use theory of vitali lemma and dini derivative in solving different problems.	Class Assignment/ Seminar/ Group Discussion
CO-6	Extend their Knowledge of mathematical analysis for further exploration of the subject for going into research.	Class Assignment/ Group Discussion/ Authentic problem solving

Saroj Bala

B Kaur

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : M.Sc.-I (SEMESTER -I)

NAME OF COURSE : Introduction to computers and c language

NAME OF FACULTY : Mrs. Kirandeep Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-1	Describe the basic concepts and the applications of computer systems	MST, Class Test, GD
CO-2	Demonstrate the concept of input and output devices of Computers	MST, Assignment, PPT
CO-3	Define the anatomy related to networks, operating system and problem solving	MST, PPT, Class Test, Assignment
CO-4	Discuss about the logic building used in programming	MST, Assignment, Class Test, Lab. Work
CO-5	Generate algorithms writing skills for solving various real-life problems	MST, Lab. Work, PPT, Viva
CO-6	Convert the algorithms into computer programs using C language.	MST, Lab. Work, Class Test

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : M.Sc.-I (SEMESTER -II)
NAME OF COURSE : ALGEBRA-II
NAME OF FACULTY : Mrs. Nisha

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Utilize the polynomial rings UFD, Euclidean Domain, principal Ideal Domains to solve different related problem.	Class Tests/ Class Assignments
CO-2	Analyse different types of modules, sub modules, direct sum of sub modules.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Apply the Knowledge of Algebra to attain a good mathematical maturity and enables to build mathematical thinking and reasoning.	Group discussion
CO-4	Design, analyse of and implement the concepts of artinian modules, noetherian modules and artinian implies noetherian in rings	Authentic problem Solving/ Group Discussion
CO-5	Create, select and apply appropriate algebraic structures such as Hilbert basis theorem, composition series of a module	Class Assignment/ Seminar/ Group Discussion
CO-6	Get the information about the Cohen theorem , radical ideal , nil radical , Jacobson Radical and Radical of an artinian ring	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   : MATHEMATICS
NAME OF PROGRAMME   : M.Sc.-I (SEMESTER –II)
NAME OF COURSE   : TOPOLOGY-II
NAME OF FACULTY   : Mrs. Nisha Rani

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Deduce the knowledge of higher separation Axioms for example Regular , completely Regular, normal and completely normal space	Class Tests/ Class Assignments
CO-2	Explain the metric spaces or completely , normal T2 spaces , Urysohans lemma and fietze extension theorem	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Analyse about embedding of tichonou space into parallel tope and stone cech compactification.	Group discussion
CO-4	Apply knowledge for solve identification topology identification map, subspace, general theorem	Authentic problem Solving/ Group Discussion
CO-5	Compare and contract about the categories and fun tars.	Class Assignment/ Seminar/ Group Discussion
CO-6	Define about the category h top, homotopy equivalence, null homotopy and invariance of path components under homotopy type.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   :MATHEMATICS
NAME OF PROGRAMME   :M.Sc.-I (SEMESTER -II)
NAME OF COURSE   :FUNCTIONAL ANALYSIS
NAME OF FACULTY   :Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Explain the fundamental concept of functional analysis and their role in modern mathematics	Class Tests/ Class Assignments
CO-2	Analyse the concept of functional analysis for example continuous and bounded operators, normed spaces and Hahn –branch theorem in linear spaces.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Apply the Hahn –branch theorem in normed linear space and its applications, the open multiplying theorem projections on Branch –spaces, closed graph theorem.	Group discussion
CO-4	Explain the concepts of orthogonality, orthonormal sets and Bessel's inequality.	Authentic problem Solving/ Group Discussion
CO-5	Design the conjugate space of a Hilbert spaces and develop the information about the ad joint operators, self –ad joint operators, normal and unitary operators.	Class Assignment/ Seminar/ Group Discussion
CO-6	Demonstration the nature of Brower's fixed point theorem, schauder fixed point theorem and Picard's theorem.	Class Assignment/ Group Discussion/ Authentic problem solving

DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   : MATHEMATICS
NAME OF PROGRAMME   : M.Sc.-I (SEMESTER -II)
NAME OF COURSE   : COMPLEX ANALYSIS
NAME OF FACULTY   : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Know the fundamental concept of complex analysis.	Class Tests/ Class Assignments
CO-2	Explain the concept of complex integrals and apply Cauchy integral theorem and formula.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Evaluate limits and checking the continuity of complete function and apply the concept of analyticity and the Cauchy-Riemann equation.	Group discussion
CO-4	Solve the problems using Taylor's theorem, Laurent series in an annulus.	Authentic problem Solving/ Group Discussion
CO-5	Apply the knowledge of complex to find the general definition of analytic function and analytic continuation by power series method.	Class Assignment/ Seminar/ Group Discussion
CO-6	Define the information about the Harmonic function on a disc and Schwarz reflection principle	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   : MATHEMATICS
NAME OF PROGRAMME   : M.Sc.-I (SEMESTER -II)
NAME OF COURSE   : DIFFERENTIAL EQUATIONS
NAME OF FACULTY   : Mrs. Sukhsimranjeet kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Explain about the existence of solution of ordinary differential equation of first order, initial value problem, as coli lemma.	Class Tests/ Class Assignments
CO-2	Deduce the information about Cauchy peano existence theorem and method of successive approximations	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Analyze about system of differential equations, nth order differential equation and existence and uniqueness of solutions.	Group discussion
CO-4	Define linear system of equation both homogenous and non-homogenous.	Authentic problem Solving/ Group Discussion
CO-5	Evaluate the able liouville formula and floquet theory	Class Assignment/ Seminar/ Group Discussion
CO-6	Demonstrate the orthogonality of characteristic functions and expansion of a function a series of orthonormal functions.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT :MATHEMATICS
NAME OF PROGRAMME   :M.Sc.-I (SEMESTER -III)
NAME OF COURSE   :DIFFERENTIAL MANIFOLDS
NAME OF FACULTY   :Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-1	Define Differentiable Manifolds and its examples.	Tests/ Class Assignments Cla
CO-2	Compute the differentiable map on manifolds.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Explore the properties of Lie bracket of vector fields and Integral curves.	Group discussion
CO-4	State the concept of torsion tensor and curvature tensor of a connection.	Authentic problem Solving/ Group Discussion
CO-5	Discuss the Binachi's identities and christoffel Symbols.	Class Assignment/ Seminar/ Group Discussion
CO-6	Acquire the knowledge of Gauss wringarten formulae and their applications	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT :MATHEMATICS

NAME OF PROGRAMME :M.Sc.-I (SEMESTER -III)

NAME OF COURSE :FIELD THEORY

NAME OF FACULTY :Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Define Differentiable Manifolds and its examples.	Tests/ Class Assignments Class
CO-2	Compute the differentiable map on manifolds.	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Explore the properties of Lie bracket of vector fields and Integral curves	Group discussion
CO-4	State the concept of torsion tensor and curvature tensor of a connection.	Authentic problem Solving/ Group Discussion
CO-5	Discuss the Binachi's identities and christoffel Symbols.	Class Assignment/ Seminar/ Group Discussion
CO-6	Acquire the knowledge of Gauss wringarten formulae and their applications.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT :MATHEMATICS
NAME OF PROGRAMME :M.Sc.-I (SEMESTER –III)
NAME OF COURSE :ANALYTICAL NUMBER THEORY
NAME OF FACULTY :Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Explain Arithmetic functions, Euler's totient function.	Tests/ Class Assignments Class
CO-2	Deduce big oh notation, Asymptotic equality function.	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Compute partial sum of drichlet product.	Group discussion
CO-4	State Shapiro's Tauberian theorem.	Authentic problem Solving/ Group Discussion
CO-5	Explore the elementry properties of groups	Class Assignment/ Seminar/ Group Discussion
CO-6	Analyse Asymptotic formula for partial sums.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : M.Sc.-I (SEMESTER –III)
NAME OF COURSE : OPTIMIZATION TECHNIQUES
NAME OF FACULTY : Mrs. Amanpreet Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Explore the properties of LPP and Properties of duality by using suitable theorems	Tests/ Class Assignments Class
CO-2	Use the strategies for game theory for maximum minimum principle concept of dominace	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Demonstrate the methods to understand the complimentary slackness theorem and duality theorems.	Group discussion
CO-4	Deduce suitable theory to understand initial basic feasible solution using North West Corner and Least Cost Method.	Authentic problem Solving/ Group Discussion
CO-5	Compute Mathematical formulation of Assignment problem, unbalanced problem and Salesman Problem.	Class Assignment/ Seminar/ Group Discussion
CO-6	State Discrete changes in the cost vector, Requirement vector and coefficient matrix, Deletion of variable and addition of variable.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : M.Sc.-I (SEMESTER -IV)
NAME OF COURSE : MATHEMATICAL METHODS
NAME OF FACULTY : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Explain the linear Integral equation of first and second kind.	Tests/ Class Assignments Class
CO-2	Derive the relation between linear differential equation and Volterra's equation.	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Deduce volterra's equation and Volterra's solution of fredholm equation	Group discussion
CO-4	Explore the properties of Simple variational problems.	Authentic problem Solving/ Group Discussion
CO-5	The concept of Euler's equation and invarience of euler's equation.	Class Assignment/ Seminar/ Group Discussion
CO-6	Compute fixed end point problem for unknown functions.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-I (SEMESTER -I)

NAME OF COURSE : Differential Equations

NAME OF FACULTY : Mrs. Nisha Rani

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Distinguish between linear, nonlinear, partial and ordinary differential equations.	Class Tests/ Class Assignments
CO-2	Recognize and solve a homogenous differential equations, exact differential equations.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Construct a second solution to a second order differential equation reduction.	Group discussion
CO-4	Demonstrate an understanding of basic application problems described by first order differential equations.	Authentic problem Solving/ Group Discussion
CO-5	Develop solutions to differential equations by superposition of known solutions, complete solutions of nonlinear homogenous equations by combination of complementary solution and particular integral.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of all type of differential equation.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-I (SEMESTER -I)

NAME OF COURSE : Calculus

NAME OF FACULTY : Mrs. Nisha Rani

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Assimilate the notions of limit of a sequence and Convergence of a series.	Authentic problem solving, revision, assignments.
CO-2	Calculate the limit and examine the continuity of a Function at a point.	Authentic problem solving, assignments, class tests.
CO-3	Understand the consequences of various mean value theorems for Differentiable functions.	Authentic problem solving, black board test, assignments.
CO-4	Sketch curves in Cartesian and polar coordinate systems.	Authentic problem solving, assignments, class tests.
CO-5	Apply derivative tests in optimization problems appearing in social sciences, Physical sciences, life Sciences and a host of other disciplines.	Authentic problem solving, class test, Assignments.
CO-6	Ability to Write detailed solutions using appropriate Mathematical language.	Authentic problem solving, assignments, class tests.

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc.(Non-Medical)-I (SEMESTER -I)

NAME OF COURSE : Co-Ordinate Geometry

NAME OF FACULTY : Mrs. Nisha Rani

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Find a relationship between the gradients of parallel lines and perpendicular lines.	Class Tests/ Class Assignments
CO-2	Use the strategies introduced for equations of lines, circle, parabola, ellipse, hyperbola.	Class Assignment/ Home Assignment/ Authentic problem solving
CO-3	Comprehend rigorous arguments developing the understanding of the properties such as the perpendicular from the Centre of a circle to a chord bisects the chord.	Group discussion
CO-4	Demonstrate an understanding of points of intersection of a line and a circle, intersection of two curves.	Authentic problem Solving/ Group Discussion
CO-5	Develop a deeper and rigorous understanding of Cartesian , parametric forms of equations	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the tangency properties of circle, parabola, ellipse	Class Assignment/ Group Discussion

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   :MATHEMATICS

NAME OF PROGRAMME   :B.Sc.(Non-Medical)-II
(SEMESTER -III)

NAME OF COURSE   :Analysis-I

NAME OF FACULTY   :Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Use the strategies introduced for determining least upper bounds and greatest lower bounds	Class Assignment/ Home Assignment/Authentic problem solving
CO-2	Find a rational and irrational number between any two distinct real numbers.	Class Tests/ Class Assignments
CO-3	Comprehend rigorous arguments developing the theory underpinning real analysis.	Group discussion
CO-4	Demonstrate an understanding of functions of bounded variation.	Authentic problem Solving/ Group Discussion
CO-5	Develop a deeper and rigorous understanding of fundamental concepts viz. Riemann integration.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of sequences	Class Assignment/ Group Discussion /Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   :MATHEMATICS
NAME OF PROGRAMME   :B.Sc.(Non-Medical)-II
                        (SEMESTER -III)
NAME OF COURSE   :Statics
NAME OF FACULTY   : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Define resultant component of a force, coplanar forces like unlike parallel forces, moment of force and couple with example.	Class Assignment/ Group discussion
CO-2	Prove the parallelogram of forces, Triangle law of forces, Converse of triangle law of forces, Polygon of forces, Lami's theorem, Varignon theorem.	Authentic problem solving
CO-3	Find the resultant of coplanar Couples equilibrium of couples and the equation of line of action of resultant.	Group discussion/ Class Assignment/ Seminar
CO-4	Discuss friction, Force of friction and laws of friction.	Authentic problem Solving/ Seminar/ Group discussion
CO-5	Develop the knowledge about motion.	Class Assignment/ Group Discussion/ Home Assignment
CO-6	Explore Knowledge about triangular law of forces.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-III (SEMESTER -V)

NAME OF COURSE : Discrete Mathematics-I

NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Determine when a function is one-one and onto.	Group discussion
CO-2	Demonstrate different traversal methods for trees.	Class Assignment/Authentic problem solving
CO-3	Model Problems in Computer Science using graphs	Group discussion/ Class Assignment
CO-4	Apply Counting Principle to determine Probability.	Authentic problem Solving/ Seminar
CO-5	Work in a group to understand finite state machine language.	Class Assignment/Group Discussion
CO-6	Discriminate between an Eulerian Graph from a Hamiltonian graph for use in solving mathematical problems.	Class Assignment/ Group Discussion / Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   : MATHEMATICS

NAME OF PROGRAMME   : B.Sc. (Non-Medical)-III (SEMESTER -V)

NAME OF COURSE   : Algebra-I

NAME OF FACULTY   : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Locate and use theorems to solve problems in theory of polynomials over field.	Class Assignment/ Home Assignment/Authentic problem solving
CO-2	Effectively write abstract mathematical proofs in a clear and logical manner.	Class Tests/ Class Assignments
CO-3	Demonstrate ability to think critically by interpreting theorems and relating results to problems in other mathematical disciplines.	Group discussion
CO-4	Demonstrate ability to think critically by recognizing patterns and principles of algebra.	Authentic problem Solving/ Group Discussion
CO-5	Develop a deeper and rigorous understanding of fundamental theorems, homomorphism and isomorphism theorems	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of groups, rings, ideals.	Class Assignment/ Group Discussion / Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-III (SEMESTER -V)

NAME OF COURSE : Mathematical Methods

NAME OF FACULTY : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-1	Make use of Fourier series to analyze wave forms of periodic functions	Class Tests/ Class Assignments
CO-2	Understand the concept of Fourier and Z – transform to evaluate engineering problems	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Understand the importance of Fourier Series.	Group discussion
CO-4	Able to use Fourier series for even and odd functions, Half range Fourier series, Other forms of Fourier series	Authentic problem Solving/ Group Discussion
CO-5	Use the Laplace transforms techniques for solving ODE's	Class Assignment/ Seminar/ Group Discussion
CO-6	Know the basic concepts of Beta function and Gamma functions.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : B.Sc.(Non-Medical)-I (SEMESTER -II)
NAME OF COURSE : Algebra
NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Acquire the knowledge of a matrix, basic operations, rank and determinant of a matrix	Authentic problem solving, revision, assignments.
CO-2	Recognize the concepts of the terms span, linear independence, basis, dimension, and apply these concepts to various vector spaces and subspaces.	Authentic problem solving, assignments, class tests.
CO-3	Understand the concept of linear transformations and their properties and Use the definition and properties of linear transformations and matrices of linear transformations and change of basis, including kernel, range and isomorphism	Authentic problem solving, black board test, assignments.
CO-4	Introduce the new terms Basis and Dimension. Acquire the knowledge of ordered basis	Authentic problem solving, assignments, class tests.
CO-5	Determine Eigen spaces, as well as the geometric and the algebraic multiplicities of an Eigen value and apply the basic diagonalization result	Authentic problem solving, class test, assignments.
CO-6	Apply Clayey-Hamilton Theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods	Authentic problem solving, assignments, class tests.

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : B.Sc. (Non-Medical)-I (SEMESTER -II)
NAME OF COURSE : Analytic Geometry
NAME OF FACULTY : Mrs. Amanpreet Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-1	Analyse characteristics and properties of two and three dimensional geometric shapes and develop mathematical arguments about geometric relationships.	Class Tests/ Class Assignments
CO-2	Relate and integrate geometry into real life contexts as well as into other disciplines.	Class Assignment/ Authentic problem solving /Home Assignment
CO-3	Demonstrate appropriate technique, tools, and formulas to determine measurements.	Group discussion
CO-4	Select and use units of appropriate size and type to measure angles, parameters, surface area and volume.	Authentic problem Solving/ Group Discussion
CO-5	Use visualization, spatial reasoning and geometric modeling to solve problems.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of three dimensional figures sphere, ellipsoid, parrabolloid.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   :MATHEMATICS

NAME OF PROGRAMME   :B.Sc. (Non-Medical)-I
                       (SEMESTER -I)

NAME OF COURSE   :Partial Differential Equation

NAME OF FACULTY   : Mrs. Amanpreet Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	classify partial differential equations , transform into canonical form and Solve simultaneous differential equations.	Authentic problem solving, revision, assignments.
CO-2	solve linear partial differential equations of both first and second order	Authentic problem solving, assignments, class tests.
CO-3	Apply partial derivative equation techniques to predict the behaviour of certain phenomena.	Authentic problem solving, , assignments. black board test
CO-4	Extract information from partial derivative models in order to interpret reality.	Authentic problem solving, assignments, class tests.
CO-5	Study calculus of variation by various equations	Authentic problem solving, class test, assignments.
CO-6	Identify real phenomena as models of partial derivative equations	Authentic problem solving, assignments, class tests.

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-II (SEMESTER -II)

NAME OF COURSE : Advanced Calculus

NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Analyse Continuity and discontinuity of several variables.	Class Assignment/Group discussion
CO-2	Develop the Knowledge to Solve derivatives.	Authentic problem solving/ Group discussion
CO-3	Demonstrate an understanding about Maxima and Minima.	Group discussion/ Class Assignment/ Seminar/ Authentic problem solving
CO-4	Use the Strategies to introduce for determining Limit and continuity.	Authentic problem Solving/ Group discussion
CO-5	Explore the properties of Young's theorem.	Authentic problem solving
CO-6	Model problems for solving Schwarz's theorem.	Authentic problem solving

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(Est. 1982, Govt. Aided, under 2(f) and 12 (B) of UGC, Permanently Affiliated to Punjabi University, Patiala, Approved by NCTE and Accredited by NAAC (B Grade))

DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-I (SEMESTER -I)

NAME OF COURSE : Numerical Methods

NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-1	Apply Appropriate Numerical Methods to solve the problem with most accuracy.	Class Assignment/Group discussion
CO-2	Using Appropriate numerical determine approximate solution ODE and system of linear equation.	Authentic problem solving/ Group discussion
CO-3	Solve problem using Newton forward formula and Newton Backward formula.	Group discussion/ Class Assignment/ Seminar/ Authentic problem solving
CO-4	Demonstrate the concept of maxima and minima for differential difference equation.	Authentic problem Solving/Group discussion
CO-5	Develop deeper and rigorous understanding of summation of series finite difference techniques.	Authentic problem solving
CO-6	Explore the properties of polynomials.	Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-I (SEMESTER -I)

NAME OF COURSE : ANALYSIS-II

NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Comprehended rigorous arguments developing the point wise and uniform convergence of sequence of function and series.	Class Assignment/Group discussion
CO-2	Demonstrate an understanding of convergence of Power series and term by term integration.	Authentic problem solving/ Group discussion
CO-3	Explore the Applications of Green's Stoke and divergence theorem.	Group discussion/ Class Assignment/ Seminar/ Authentic problem solving
CO-4	Use the strategies introduced for determining radius of convergence of power series.	Authentic problem olving/Group discussion
CO-5	Develop the deeper and rigorous understanding of fundamental concept viz. del, gradient, divergence and curl.	Authentic problem solving
CO-6	Compute statement of weirstrass , M-tests for uniform convergence of sequence of functions.	Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-II (SEMESTER -III)

NAME OF COURSE : Dynamics

NAME OF FACULTY : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-1	Make use of techniques for understanding of velocity, acceleration and momentum.	Class Tests/ Class Assignments
CO-2	Understand the notion of the force as a vector.	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Solve Newton's equations of motion, use principles derived from Newton's second law of motion.	Group discussion
CO-4	Able to use principles for derivation of velocity, acceleration, momentum, work, energy.	Authentic problem Solving/ Group Discussion
CO-5	Demonstrate the methods to understand definitions of motion along a smooth inclined plane, simple harmonic motion etc.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of relative motion, relative displacement, linear momentum, impulsive forces.	Class Assignment/ Group Discussion/ Authentic problem solving

Saroj Bala
N. 876

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS
NAME OF PROGRAMME : B.Sc. (Non-Medical)-III (SEMESTER -V)

NAME OF COURSE : Algebra -I
NAME OF FACULTY : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Describe the relationship between the dimensions of the null space and row space of matrix.	Class Tests/ Class Assignments
CO-2	Explain what conditions must be satisfied for unique solutions, infinite solutions and no solution.	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Demonstrate the concepts of Eigen values, equations and diagonalization of matrix.	Group discussion
CO-4	Recognize various characterizations of non-singular matrices, rank nullity theorem, characteristic polynomial.	Authentic problem Solving/ Group Discussion
CO-5	Compute the product of matrix, determinant of matrix, basis of vector spaces.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of basis, vector spaces, orthogonality of matrix.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT : MATHEMATICS

NAME OF PROGRAMME : B.Sc. (Non-Medical)-III (SEMESTER -VI)

NAME OF COURSE : Mathematical Methods-II

NAME OF FACULTY : Mrs. Saroj Bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Apply Laplace transform to solve differential equations.	Class Assignment/Group discussion
CO-2	Obtain Fourier Series expansions for the given functions.	Authentic problem solving/ Group discussion
CO-3	Compute cosine and sine series expansions for given functions.	Group discussion/ Class Assignment/ Seminar/ Authentic problem solving
CO-4	Use the strategies introduced for determining Drichlet Conditions, Fourier and inverse Fourier transformations.	Authentic problem Solving/Group discussion
CO-5	Explore the properties of Parseval identity, Modulation theorem, Convolution theorem,	Authentic problem solving
CO-6	Demonstrate an understanding about simultaneous and second order partial differential equations.	Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT :MATHEMATICS

NAME OF PROGRAMME :B.Sc. (Non-Medical)-III (SEMESTER -VI)

NAME OF COURSE :Algebra-II

NAME OF FACULTY :Dr. Birinder Kaur/ Mrs. Saroj bala

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	Describe the relationship between the dimensions of the null space and row space of matrix.	Class Tests/ Class Assignments
CO-2	Explain what conditions must be satisfied for unique solutions, infinite solutions and no solution.	Class Assignment/ Home Assignment/Authentic problem solving
CO-3	Demonstrate the concepts of Eigen values, equations and diagonalization of matrix.	Group discussion
CO-4	Recognize various characterizations of non-singular matrices, rank nullity theorem, characteristic polynomial.	Authentic problem Solving/ Group Discussion
CO-5	Compute the product of matrix, determinant of matrix, basis of vector spaces.	Class Assignment/ Seminar/ Group Discussion
CO-6	Explore the properties of basis, vector spaces, orthogonility of matrix.	Class Assignment/ Group Discussion/ Authentic problem solving

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DESCRIPTION OF COURSE OUTCOMES

NAME OF DEPARTMENT   : MATHEMATICS

NAME OF PROGRAMME   : B.Sc. (Non-Medical)-III (SEMESTER -VI)

NAME OF COURSE   : Discrete Mathematics -II

NAME OF FACULTY   : Dr. Birinder Kaur

C.O. No.	Description of Course outcome	Methods of Assessment
CO-I	To Understand Logical concepts and to Show logical equivalences by using truth tables and rules in logics.	Class Assignment/Group discussion
CO-2	Learn concept related to counting.	Authentic problem solving/ Group discussion
CO-3	Introduction to Advanced Counting.	Group discussion/ Class Assignment/ Seminar/ Authentic problem solving
CO-4	Comprehended Rigorous arguments developing theory of sets.	Authentic problem Solving/Group discussion
CO-5	Demonstrate an understanding of logical operations and truth tables.	Authentic problem solving
CO-6	Explore the properties of relation and functions.	Authentic problem solving

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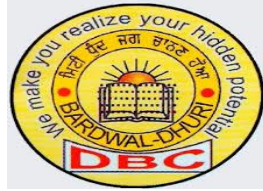
Department of Punjabi

Name of the Course: Punjabi compulsory (B.A-I, B.A-II, B.A-III)

Course Outcome:

1. It will widen the critical and creative faculty of the students and it enables the students to discuss the things around as the subject of punjabi provides a wide range of vocabulary to express particular ideas. It also enables them to learn the literary skills.
2. The course opens the window to the students of various activities in which they can develop deep and think of magnifying their faculties to know and discuss the complex phenomenon around them.
3. The subject caters to both aesthetic and intellectual needs of the students by introducing them to a range of literary pieces.
4. The range of the subject is not only limited to communication skills and sensibility to literature but also to certain other areas of knowledge.

Course Specific Outcome

1. To motivate the students to own and love their mother tongue
2. To bring forth and encourage Punjabi writers and poets.
3. Department of Punjabi provides excellent teaching and learning environment with its focus on continuing education.
4. Students can also opt to become journalists and editors of different newspapers.
5. To educate students about Punjabi culture and heritage through Punjabi literature.
6. To impart quality education in Punjabi to rural and economically weaker students.

(Punjabi literature is an optional subject according to Punjabi university Patiala guidelines)

Name of Course: punjabi Literature (B.A-I, B.A-II, B.A-III)

Course Outcome

1. This subject provides a very vast range of human emotions and experiences. It caters to the aesthetic as well as intellectual needs of the students.
2. The great writers of past and present throw open the reservoirs of knowledge that inspires the students in a better way.
3. It enables the students to know and understand the socio-cultural tendencies of different geographical locations of the world. The wide range of social, cultural, political and economic experiences generates the kind of environment where studentsparticularize and generalize the situations.
4. It enables to find the diminishing and new trends in writing.
5. The subject also throws open the ways for Cinematic studies.
6. It increases the imagination and creativity of the students to such a level that they start perceiving the ever increasing and ever renewing boundaries of human intellect and emotions.

Course Specific Outcome

1. It prepares the students for higher studies in the field of literature.
2. Students can also prepare for the coveted exams like UPSC, PCS.
3. Students can also do B.Ed to become teachers in a school.

Name of Course: M.A. punjabi (Part I& II)

Course Outcome:

This course provides the students with a vast range of writers and their literary and creative styles. Students go through different branches of literature like poetry, drama, novel and theoretical idea and they also get to know the ever expanding and ever renewing processes of literature. Students get to know Indian writers and their different creative styles. Students also read and understand different theoretical schools and Literary criticism gives them insight into the developments in the field of criticism.

Course Specific Outcome

1. Students can explore research areas by joining M.Phil or P.hD. courses.

2. They are also eligible to appear for NET to pursue their career in higher studies.
3. They can write information for magazines, websites etc.
4. They can be bloggers or content writers for ad agencies.
5. They can avail overseas scholarships and get jobs there.
6. As postgraduates from this field, they develop ample critical ability to analyze and reproduce matter easily.
7. They can also become anchors for punjabi news channels.