FACULTY OF EDUCATION
SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES
Outcome based Curriculum for
Undergraduate Degree Courses in Bachelor of Science
Department of Computer Science

Vision of the Departments:

To establish a center of excellence in **Bachelor of Science (Computer Science)** such as Mathematics, Physics and Computer Science that provide foundation for also in communication skills that helps students to express themselves effectively who can be globally challenged in engineering fundamentals – experimental, analytical, computational and designing abilities.

Mission of the Departments:

To create, share, and apply knowledge in Computer Science, including in interdisciplinary areas that extend the scope of Computer Science and benefit humanity; to educate students to be successful, ethical, and effective problem-solvers and life-long learners who will contribute positively to the economic well-being of our region and nation and who are prepared to tackle complex 21st Century challenges facing the world.

Department of Computer Science focuses on the following:

- To provide necessary background
- For producing a meaningful career in Computer Science and related fields
- For acquiring, Mathematical skills and employability skills.
- Nurture and train students to develop skills, analysis, logical reasoning and problem solving.

- Create an ambience to inculcate the traits of professional competencies, such as accountability, ethics, common skills and lifelong learning.

Programme Educational Objectives: Bachelor of Science (Computer Science)

PEO1. To teach Physics, Computer Science and Mathematics for U.G. and P.G. programs.

PEO2. To inform and motivate students to study the fundamental aspects of science and its applications.

PEO3. Graduates will develop the skill to write entrance exam conducted by IIT's/Universities to pursue PG and Integrated Ph.D and will shine as great Mathematicians.

PEO4. Graduates to develop confidence to appear for SSC (CGL), IBPS, RRB and Civil services exam and will occupy higher posts in administrative level.

PEO5. Graduates will prepare in advance to appear for TRB after completing B.Ed and become a dedicated faculty.

PEO6. Graduates develop teaching skills, Subject knowledge in the course of their study which will help them to shine in various fields including Education, IT, etc.

PEO7. Graduates will use their course as a training ground to develop their positive attitude, skills which will enable them to become a multi facet personality shining in any chosen field.

POs of the Program's (PO's) :

PO-01: Disciplinary knowledge: Ability to build (either independently or by joining higher academic program) on of the core computer science concepts learnt in the course. Ability to apply the core computer science concepts to solve the problems in the IT industry.

PO-02: Communications skills: Ability to communicate various concepts of mathematics in effective and coherent manner both in writing and orally, ability to present the complex mathematical ideas in clear, precise and confident way, ability to explain the development and importance of mathematics and ability to express thoughts and views in mathematically or logically correct statements.
PO-03: Scientific reasoning :Given a problem, the graduates will be able to analyse it, suggest solutions, and critically evaluate the solutions proposed by others.
PO-04: Problem solving: Capacity to use the gained knowledge to solve different kinds of non-familiar problems and apply the learning to real world situations; Capability to solve problems in computer graphics using concepts of linear algebra; Capability to apply the knowledge gained in differential equations to solve specific problems or models in operations research, physics, chemistry, electronics, medicine, economics, finance etc.
PO-05: Research-related skills: Capability to ask and inquire about relevant/appropriate questions, ability to define problems, formulate hypotheses, test hypotheses, formulate mathematical arguments and proofs, draw conclusions; ability to write clearly the results obtained.
PO-06: Information/digital literacy: Capacity to use ICT tools in solving problems or gaining knowledge; capacity to use appropriate softwares and programming skills to solve problems in mathematics,
PO-07: Self-directed learning: Ability to work independently, ability to search relevant resources and e-content for self-learning and enhancing knowledge in mathematics.
PO-08: Moral and ethical awareness/reasoning: Ability to identify unethical behavior such as fabrication or misrepresentation of data, committing plagiarism, infringement of intellectual property rights.
PO-09: Lifelong learning: Ability to acquire knowledge and skills through self-learning that helps in personal development and skill development suitable for changing demands of workplace.

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PROGRAM SPECIFIC OUTCOMES (PSOs) :

PSO1. Different types of theories are studies in physics and with the help of Mathematics they are verified and proved, experimentally acknowledged. The students became aware about the secrets of nature. Their minds become analytic and problem solving using with computer science.
PSO2. Demonstrate coherent knowledge and understanding of the logical organization of a digital computer, its components and working. Understanding of the time and space complexities of algorithms designed to solve computational problems.
PSO3. Apply knowledge of logical skills to identify and analyze problems and issues, and seek solutions to real-life problems. For example, creating mobile applications, database applications, and educative computer games.
PSO4. Communicate mathematics effectively by written, computational and graphic means.
PSO5. Create mathematical ideas from basic axioms.
PSO6. Gauge the hypothesis, theories, techniques and proofs provisionally.
PSO7. Utilize mathematics to solve theoretical and applied problems by critical understanding, analysis and synthesis.
PSO8. Identify applications of mathematics in other disciplines and in the real-world, leading to enhancement of career prospects in a plethora of fields and research

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Program PO's and PSO's Mapping:

			PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9		
S. No	**Program**	**Courses Category**	Disciplinary knowledge	Communications skills	Scientific reasoning	Problem solving	Research-related skills	Information/digital literacy	Self-directed learning	Moral and ethical awareness/reasoning	Lifelong learning	**PSO 1**	**PSO 2**
1	B.Sc (Computer Science)	COMPUTER SCIENCE	*		*	*	*	*	*			*	*
2		PHYSICS				*	*					*	
3		MATHEMATICS	*			*			*				*
4		FOUNDATION COURSE								*			*

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YEARLY wise PO's and SPO's Mapping:

Year	Name of the Courses/POs(Basic, Core Electives, Projects, Internships etc.)	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2
		Disciplinary knowledge	Communications skills	Scientific reasoning	Problem solving	Research-related skills	Information/ digital literacy	Self-directed learning	Moral and ethical awarenes s/reasoning	Lifelong learning		
I YEAR	Fundamental of computer and PC software	*	*	*	*		*					
	Desktop Publishing and Multimedia	*	*	*	*		*					
	Mathematical Physics, Mechanics and Properties of Matter	*	*	*	*						*	
	Thermodynamics and Statistical Physics	*	*	*	*						*	
	Algebra and Trigonometry	*	*	*	*		*	*				*
	Calculus and differential equations	*	*	*	*			*				*
	Vector Analysis and Geometry	*	*	*				*				
	Moral value and language	*	*	*					*			*
	Development of Entrepreneurship	*	*	*								*
	Computer science: practical											
	Physics :practical										*	
II YEAR	Object oriented programming using c++	*	*	*	*			*				
	Data structure and algorithms	*	*	*	*			*				
	Optics	*	*	*	*						*	
	Electro-statics, magneto statics and	*	*	*	*						*	

	electrodynamics											
	Abstract algebra	*	*	*	*			*				*
	Advanced calculus	*	*	*				*				*
	Differential equation	*	*	*	*			*				
	Moral value and LANGUAGE-II	*	*	*					*			*
	Environmental studies	*	*	*								*
	Computer science : practical		*	*								
	Physics :practical		*	*							*	
III YEAR	Database management system	*	*	*	*			*				
	Operating system	*	*	*	*			*				
	Physics Paper-I(Quantum Mechanics and Spectroscopy)	*	*	*	*						*	
	Physics Paper-II(Solid State Physics and Devices)	*	*	*	*						*	
	Mathematics paper-i(linear algebra and numerical analysis)	*	*	*	*			*				*
	Mathematics Paper-II(Real and Complex Analysis	*	*	*				*				*
	Mathematics paper-iii(statistical	*	*	*				*				

	methods)											
	Foundation Course Paper-I(Moral Value and Language-III)	*	*	*					*			*
	Foundation Course Paper-II(Basics of Computer App.Information Technology)	*	*	*	*							*
	Computer science : practical			*							*	
	Physics :practical			*							*	
	Project/internship									*		

Structure of Programme: To fulfill the need of development of all the POs/ GAs, as per above mapping, the following semester wise programme structure are as under.

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

Total Credits*= 160

Structure of Undergraduate Engineering program:

S. No.	Course Category	Credits of the EE Curriculum
1.	Humanities and Social Sciences including Management	11
2.	Basic Sciences	24
3.	Engineering Sciences including workshop, drawing, basics of electrical/mechanical/computer etc.	19
4.	Professional Core Subjects	52
5.	Professional Subjects: Subjects relevant to chosen specialization/branch	18
6.	Open Subjects: Electives from other technical and/or emerging subjects	18

7.	Project work, seminar and internship in industry or elsewhere	18
8.	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	Non-credit
	Total	**160**

***Definition of Credit:**

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (Lab)/week	1 Credit

year	Group	paper	Subject code	Name of subject	Maximum marks
First Year	Computer Science	I	BSCC(Y-101A)	Fundamental of computer and PC software	50
		II	BSCC(Y-101B)	Desktop Publishing and Multimedia	50
	Physics	I	BSCC(Y-102A)	Mathematical Physics, Mechanics and Properties of Matter	50
		II	BSCC(Y-102B)	Thermodynamics and Statistical Physics	50
	Mathematics	I	BSCC(Y-103A)	Algebra and Trigonometry	50
		II	BSCC(Y-103B)	Calculus and differential equations	50
		III	BSCC(Y-103C)	Vector Analysis and Geometry	50
	FOUNDATION COURSE	I	FC(Y-104A)	Moral value and language	100
		II	FC(Y-104B)	Development of Entrepreneurship	100

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	Practical	I	BSCC (Y-101D)	Computer Science : Practical	50
		II	BSCC (Y-102C)	Physics :Practical	50
Second Year	Computer Science	I	BSCC (Y-201A)	Object oriented programming using c++	50
		II	BSCC (Y-201B)	Data structure and algorithms	50
	Physics	I	BSCC (Y-202A)	Optics	50
		II	BSCC (Y-202B)	Electro-statics, magneto statics and electrodynamics	50
	Mathematics	I	BSCC (Y-203A)	Abstract algebra	50
		II	BSCC (Y-203B)	Advanced calculus	50
		III	BSCC (Y-203C)	Differential equation	50
	FOUNDATION COURSE	I	FC(Y-204A)	Moral value and LANGUAGE-II	100
		II	FC(Y-204B)	Environmental studies	100
	Practical	I	BSCC (Y-201D)	Computer Science : Practical	50
		II	BSCC (Y-202C)	Physics :Practical	50
Third Year	Computer Science	I	BSCC (Y-301)	Database Management System	50
		II		Operating System	50
	Physics	I	BSCC (Y-302)	Physics Paper-I(Quantum Mechanics and Spectroscopy)	50
		II		Physics Paper-II(Solid State Physics and Devices)	50
	Mathematics	I	BSCC (Y-303)	Mathematics Paper-I(Linear Algebra And Numerical Analysis)	50
		II		Mathematics Paper-II(Real and Complex Analysis	50

		III		Mathematics Paper-III(Statistical Methods)	50
	Foundation Course	I	FC(Y-304A)	Foundation Course Paper-I(Moral Value and Language-III)	100
		II	FC(Y-304B)	Foundation Course Paper-II(Basics of Computer App.Information Technology)	100
	Practical	I	BSCC (Y-301D)	Computer Science : Practical	50
		II	BSCC (Y-302C)	Physics :Practical	50
	Project/Internship	-	BSCC (Y-305)	Project/Internship	100

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Scheme of Exanimation (BSc CS) Academic Year 2019-20

BSC COMPUTER SCIENCE - I YEAR

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory		CCE/Internal		Total		Practical		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
I st Year	BSCC(Y-101A)	COMPUTER SCIENCE	Paper-I	Fundamental of computer and PC software	40	13	10	4	50	17	50	17	150	50
	BSCC (Y-101B)		Paper-II	Desktop Publishing and Multimedia	40	13	10	4	50	17				
	BSCC (Y-102A)	PHYSICS	Paper-I	Mathematical Physics, Mechanics and Properties of Matter	40	13	10	4	50	17	50	17	150	50
	BSCC (Y-102B)		Paper-II	Thermodynamics and Statistical Physics	40	13	10	4	50	17				
	BSCC (Y-103A)	MATHEMATICS	Paper-I	Algebra and Trigonometry	40	13	10	4	50	17	-	-	150	50
	BSCC (Y-103B)		Paper-II	Calculus and differential equations	40	13	10	4	50	17				
	BSCC (Y-103C)		Paper-III	Vector Analysis and Geometry	40	13	10	4	50	17				
	FC(Y-104A)	FOUNDATION COURSE	Paper-I	Moral value and language	80	26	20	8	100	33	-	-	100	33
	FC(Y-104B)		Paper-II	Devlepoment of Entrepreneurship	80	26	20	8	100	33	-	-	100	33

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BSC COMPUTER SCIENCE - II YEAR

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory		CCE/Internal		Total		Practical		Total	
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
II Year	BSCC (Y-201A)	CHEMISTRY	Paper-I	Object oriented programming using c++	40	13	10	4	50	17	50	17	150	50
	BSCC (Y-201B)		Paper-II	Data structure and algorithms	40	13	10	4	50	17				
	BSCC (Y-202A)	PHYSICS	Paper-I	Optics	40	13	10	4	50	17	50	17	150	50
	BSCC (Y-202B)		Paper-II	Electro-statics, magneto Statics and Electrodynamics	40	13	10	4	50	17				
	BSCC (Y-203A)	MATHEMATICS	Paper-I	Abstract algebra	40	13	10	4	50	17	-	-	150	50
	BSCC (Y-203B)		Paper-II	Advanced calculus	40	13	10	4	50	17				
	BSCC (Y-203C)		Paper-III	Differential equation	40	13	10	4	50	17				
	FC(Y-204A)	FOUNDATION COURSE	Paper-I	Moral value and Language-ii	80	26	20	8	100	33	-	-	100	33
	FC(Y-204B)		Paper-II	Environmental studies	80	26	20	8	100	33	-	-	100	33

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BSC COMPUTER SCIENCE - III YEAR

Year	Paper Code	Subject Name	Paper No.	Paper Name	Theory		CCE/Internal		Total		Practical		Project /internship		Total
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
III Year	BSCC (Y-301A)	COMPUTER SCIENCE	Paper -I	Database Management System	40	13	10	4	50	17					100
	BSCC (Y-301B)		Paper -II	Operating System	40	13	10	4	50	17					
	BSCC (Y-302A)	PHYSICS	Paper -I	Quantum Mechanics and Spectroscopy	40	13	10	4	50	17					100
	BSCC (Y-302B)		Paper -II	Solid State Physics and Devices	40	13	10	4	50	17					
	BSCC (Y-303A)	MATHEMATICS	Paper -I	Linear Algebra And Numerical Analysis	40	13	10	4	50	17	-	-			150
	BSCC (Y-303B)		Paper -II	Real and Complex Analysis	40	13	10	4	50	17					
	BSCC (Y-303C)		Paper -III	Statistical Methods	40	13	10	4	50	17					
	FC(Y-304A)	FOUNDATION COURSE	Paper -I	Moral value and language	80	26	20	8	100	33	-	-			100
	FC(Y-304B)		Paper -II	Development of Entrepreneurship	80	26	20	8	100	33	-	-			100
	BSCC (Y-301C)	COMPUTER SCIENCE	PRACTICAL								50	17			50
	BSCC (Y-302C)	PHYSICS	PRACTICAL								50	17			50
	BSCC (Y-305)	PROJECT / INTERNSHIP											100	33	100

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Course Content

Year-wise Courses Details

B.SC Computer Science Ist year

BSCC(Y-101A) Fundamental of computer and PC software

BSCC(Y-101A)	**PAPER- I**	**Fundamental of computer and PC software**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Objective :

Making the students understand and learn the basics of computer how to operate it, to make familiar with the part and function of computer , its types , how to use computer in our day to day life , its characteristics, its usage , Limitations and benefits etc. and Understanding Word Processing and Spread Sheet.

Outcomes :

1) Describe the usage of computers and why computers are essential components in business and society and education .

2) Utilization the Operating system and working Internet Web resources and evaluate on-line e-business system.

3) Solve common business problems using appropriate Information Technology applications and systems.

4.Describe the working with the MS word and spreadsheet .

5) Identify categories of programs, system software and applications. Organize and work with files and folders.

6) Describe various types of networks network standards and communication software.

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Contents:

Unit- I **10HOURS**

Introduction to computer system: block diagram, components, motherboard, processor, main memory, cache memory, hard disk.

Input device, output device, eternal storage devices: floppy disk CD ROM, DVD, USB derives.

Types of software: system Software, application software .System Software: operating system, utility programs, anti-virus, and disk cleaning .Application software: example commercial software with brief introduction.

Programming language : low level language ,high level language ,assembly language ,middle level language ,compiler ,interpreter ,assembler , difference between compiler and interpreter .

Unit: II **10HOURS**

Operating system : definition , functions of operating system,CUI,GUI,types of operating system like single user ,multi user, real time, time sharing and batch processing ,multiprogramming ,multiprocessing ,multitasking, distributed processing .elementary idea of various common operating system prevalent round the world .

MS windows: introduction and its features, desktop, taskbar, files and folder start menu operations

My computer, network neighborhood,recycle-bin,windows explorer, creating ,copying ,moving and deleting files , setting wall paper , changing the mouse pointer, paint, notepad .

Unit: III **10HOURS**

Introduction of MS Word: Advantages of word Processing, Creating, saving, and editing a document: selecting, deleting, replacing text, copying text to another file. Insert ,formatting text and paragraph , using the font ,dialog box, paragraph formatting using bullets and numbering in paragraph ,use of smart art ,checking spelling ,line spacing , margins, space before and after paragraph , mail merge ,customizing the ribbon.

Introduction of MS excel: entering the information, numbers, formulas, editing data in a cell, excel functions, using a range with SUM, Moving and copying data, inserting and deleting row and columns in the worksheet, using the format cells.

Introduction of MS power point: introduction, slide show, formatting, creating a presentation inserting smart art, adding objects applying transitions, animation effects, adding tables.

Unit: IV **8HOURS**

Decision support system: importance of decision support system, limitation, characteristics of DSS, decision support and structure of decision making and repititativeness of decision, DSS users.

Expert system: support for decision making phases, support for the intelligent phases, support for design phase, support for choice phase.

Management Information System: introduction, role of IT, MIS characteristics and application areas, business and technology trends –specialization, management by methodology, decentralization, internationalization etc.

Unit: V **8 HOURS**

Internet : meaning ,definitions ,history ,internet protocols,TCP/IP,FTP,HTTP,URL, internet bwrowsers,WWW ,search engines ,introduction internet security terminology-network security,firewall,cryptography, password ,biometrics, digital signature, digital certificate.Business application of internet, email, use net ,news group,telnet,intranet, extranet eticketing,chatting.

E-Banking and its benefits: smart card, E-cash, online financial services stock trading, E-brocking.E-business model, do it yourself model, made to order model, information service model, emerging hybrid models.

Text Books and Reference Books:

1. Computer Fundamental by P.K.Sinha
2. Fundamental of Information Technology by A. Leon M. Leon
3. Computer today by Suresh K. Basandra
4. P C Software by Nitin K Nayak

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BSCC(Y-101B) Desktop Publishing and Multimedia

BSCC(Y-101B)	**PAPER- I**	**Desktop Publishing and Multimedia**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Objective :

DTP refers to the process of producing publications like cards, newspapers etc. by designing their text and graphic layout and inserting, editing, formatting and printing of text and graphical objects using a special desktop publishing software installed on computers. -The term desktop means that all the publishing process can now be done on a desk in the office or at home using a personal computer. -The difference between a desktop publisher and a word processor is that a desktop publisher software gives the user more tools and control of the page layout, text manipulation and graphics design than a word processor.

Outcomes :

1. Identify desktop publishing terminology and concepts and DTP Software and Hardware.

2. Manipulate text and graphics to create a balanced and focused layout.

3. Create New Page , brochures, and multiple page documents.

4. learning and working with Multimedia Elements like Text Images, Sound, Animation and Video. Text, Concept of Plain Text and Formatted Text, RTF & HTML Text, Image etc.

5. Overview and concept of MIDI.

Contents:

Unit – I **10HOURS**

Importance and Advantages of DTP, DTP Software and Hardware, Commercial DTP Packages, Page Layout programs, Introduction to Word Processing. Commercial DTP Packages, Difference between DTP Software and Word Processing Software.

Unit- II **08HOURS**

Types of Graphics, Uses of Computer Graphics Introduction to Graphics Programs, Font and Type faces, Types of Fonts, Creation of Fonts (Photographer), Anatomy of Type faces, Printers, Types of Printers used in DTP, Plotter, Scanner.

Unit-III **08HOURS**

History and Versions of Page Maker, Creating a New Page, Document Setup Dialog Box, Paper Size, Page Orientation, Margins, Different Methods of placing text and graphics in a document, Master Page, Story Editor, Formatting of Text, Indent, Leading, Hyphenation, Spelling Check, Creating Index, Text Wrap, Position (Superscript/Subscript),Control Palette.

Unit-IV **10HOURS**

History, Multimedia Elements; Text Images, Sound, Animation and Video. Text, Concept of Plain Text and Formatted Text, RTF & HTML Text, Image , Importance of Graphics in Multimedia, Image Capturing Methods, Scanner, Digital Camera, Sound – Sound and its effect in Multimedia, Analog and Digital Sound, Animation, Basics, Principles and use of Animation. Video, Basics of Video, Analog and Digital Video.

Unit-V **08HOURS**

Features of Multimedia, Overview of Multimedia, Multimedia Software Tools, Multimedia Authoring- Production and Presentation, Graphic File Formats, MIDI- Overview, Concepts, Structure of MIDI Devices, MIDI Messages.

Text Books and reference books:

1. Desktop Publishing on PC by M.C. Sharma
2. Professional in Desktop Publishing by Dinesh Maidasani
3. DTP Courses 2/e by Singh & Singh
4. Multimedia, Computing, Communication & Applications by Ralf Steinmetz
5. Fundamentals of Multimedia by Ze - Nian Li
6. Page Maker- Manual
7. ‘o’ Level module m3.2 Desktop publishing & Presentation graphics by V.K. Jain

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MS-Word

1. Create a document and apply different Editing options.
2. Create Banner for your college.
3. Design a Greeting Card using Word Art for different festivals.
4. Create your Biodata and use page borders and shading .
5. Create a document and insert headers and footer, page title etc.
6. Implement Mail Merge.
7. Insert a table into a document.
8. Create a document and apply different formatting options.

MS Excel

1. Design your class Time Table.
2. Prepare a Mark sheet of your class subjects..
3. Prepare a Salary Slip of an employee.
4. Prepare a bar chart & pie chart for analysis of Election Results.
5. Prepare a generic Bill of a Super Market.
6. Work on the following exercise on a workbook:

a) Copy an existing Sheet
b) Rename the old Sheet
c) Insert a new Sheet into an existing Workbook
d) Delete the renamed Sheet.

7. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance , total percentage of attendance of each student &average of attendance
8. Create a worksheet on Students list of any 4 faculties and perform following database functions on it,

    a) Sort data by Name
    b) Filter data by Class
    c) Subtotal of no. of students by Class.

MS Power Point

1. Design a presentation of your institute using auto content wizard, design templateand blank presentation.
2. Design a presentation illustrating insertion of pictures, word Art and clipart.
3. Design a presentation learn how to save it in different format, copying and opening an existing presentation.
4. Design a presentation illustrating insertion of movie ,animation and sound.
5. Illustrate use of custom animation and slide transition (using different effects).
6. Design a presentation using charts and tables of the marks obtained in class.
7. Illustrate use of macro in text formatting in your presentation.

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PageMaker

1. Create a Greeting Card for New Year.
2. Create a Visiting Card.
3. Create your Resume.
4. Create an advertisement for job in well-known firm.
5. Create a Newspaper Report.
6. Create a document by importing Graphic Image from Clip Art.
7. Create a Wedding Card.
8. Type a document using Story Editor .
9. Input a text from Word Document into a PageMaker document.
10. Create a document on Importance of Text Wrap applying proper font sizes

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BSCC(Y- 102A) -Mathematical Physics, Mechanics and Properties of Matter

BSCC (Y- 102A)	**Paper-I**	**Mathematical Physics, Mechanics and Properties of Matter**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives: The emphasis of course is to equip students with the mathematical and critical skills required in solving problems of interest to physicists. The course will also expose students to fundamental computational physics skills enabling them to solve a wide range of physics problems. The skills developed during course will prepare them not only for doing fundamental and applied research but also for a wide variety of careers.

Course Learning Outcomes After completing this course, student will be able to

- Draw and interpret graphs of various functions.
- Solve first and second order differential equations and apply these to physics problems.
- Understand the concept of gradient of scalar field and divergence and curl of vector fields
- Perform line, surface and volume integration and apply Green's, Stokes' and Gauss's Theorems to compute these integrals.
- Apply curvilinear coordinates to problems with spherical and cylindrical symmetries.
- Understand elementary probability theory and the properties of discrete and continuous distribution functions.
- In the laboratory course, the students will be able to design, code and test simple programs in C++ in the process of solving various problems.

Contents:

Unit – I Mathematical Physics **Total- 6 Hours**

Addition, subtraction and product of two vectors: Polar and axial vector and their examples from physics. Triple and quadruple product (without geometrical applications): Scalar and vector field: Differentiation of a vector: Repeated integral of a function of more than one variable; Unit tangent vector and unit normal vector; Gradient, Divergence and Curl; Laplacian operator; Idea of line. Surface and volume integrals; Stokes' and Green's theorems.

Unit – II Mechanics **Total- 5 Hours**

Position. Velocity and acceleration vector, Components of velocity and acceleration in different coordinate systems, Newton's Laws of motion and its explanation with problems various types of forces in nature (explanation), Pseudo Forces (e.g. Centrifugal Force). Coriolis force and its applications.Motion under a central force, Derivation of Kepler'slaws.Gravitional law and field.Potential due to a spherical body.Gauss &Poisson sequation of Gravitational Self-energy.System of particles. Centre of mass and reduced Mass. Elastic and inelastic collisions.

Unit-III General Properties of Matter **Total- 8 Hours**

Elastic moduli and their relations, Determination of Y of rectangular thin bar loaded at the Centre; Torsional oscillations, Torsional rigidity of a wire, to determine by torsional oscillations.Surface Tension. Angle of Contact, Capillary Rise Methods; Energy required to rise a liquid in capillary tube: Factors affecting surface tension: Jeager's Method for Determination of Surface Tension: Applications of surface Tension. Concept of Viscous Forces and viscosity: Steady and Turbulent Flow. Reynolds's Number: Equation of Continuity: Bernoulli's Principle: Application of Bernoulli's equation- (i) Speed of Efflux (ii) Venturiemeter (iii) Aspirator Pump (iv) Change of Plane of Motion of a spinning ball.

Unit IV: Oscillations **Total- 5 Hours**

Concept of Simple, Periodic & Harmonic Oscillation With Illustrations: Differential equation of harmonic oscillator: Kinetic and potential energy of Harmonic Oscillator; Oscillations of two masses connected by a spring; Translational and Rotational motion, Moment of Inertia and their Production, Principal moments and axes, Motion of Rigid Body, Euler's equation.

Unit V: **Total- 6 Hours**

Relativistic Mechanics: Michelson- Morley experiment and its outcome; Postulates of Special Theory of Relativity: Lorentz Transformation. Simultaneity and order of events: Lorentz contraction; Time dilation: Relativistic transformation of velocity, Frequency and Wave number: Relativistic addition of Velocities: Variation of Mass with velocity.

Ealier Development in Physics up to 18th Century: Contribution of Aryabhatt. Archimedes, Nicolus Copernicus. Galileo Galilei, Huygens. Robert Hooke.

Torricelli, Vernier, Pascal, Kepler. Newton. Boyle, Young, Thompson, Coulomb, Amperes. Gauss, Biot-Savarts , Cavendish, Galvani, Franklin and Bernoulli.

Reference Books:

- University Physics: Sears and Zeemansky. XIth edition. Pearson Education
- Concept of Physics: H.C. Varma. BharatiBhavan Publishers
- Problems in Physics: P.K. Srivastava, Willey Eastern Ltd.

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BSCC (Y- 102B) Thermodynamics and Statistical Physics

BSCC (Y- 102B)	**Paper-II**	**Thermodynamics and Statistical Physics**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives

This course deals with the relationship between the macroscopic properties of physical systems in equilibrium. It reviews the concepts of thermodynamics learnt at school from a more advanced perspective and develops them further. The primary goal is to understand the fundamental laws of thermodynamics and their applications to various systems and processes. In addition, it will also give exposure to students about the Kinetic theory of gases, transport phenomena involved in ideal gases, phase transitions and behavior of real gases.

Course Learning Outcomes

 Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics.

 Understand the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.

 Know about reversible and Irreversible processes.

 Learn about Maxwell's relations and use them for solving many problems in Thermodynamics

 Understand the concept and behavior of ideal and real gases.

 Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.

 In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determination of Mechanical Equivalent of Heat (J), coefficient of thermal conductivity of good and bad conductor, temperature coefficient of resistance, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a thermocouple.

Contents:

Unit- I: **Total- 7 Hours**

Thermodynamics – I Reversible and irreversible process. Heat engine. Definition of Efficiency, Carnot's Ideal heat engine, Carnot's Cycle, Effective way to increase efficiency, Carnot's engines and refrigerator, Coefficient of Performance, Second law of thermodynamics, Various Statements of Second law of thermodynamics, Carnot's theorem, Clapeyron's latent heat

equation, Carnot's cycle and its applications. Steam engine, Otto engine.Petrol engine, Diesel engine.

Unit – II: Thermodynamics-II **Total- 7 Hours**

Concept of entropy, Change in entropy in adiabatic process, Change in entropy in reversible cycle.Principle of increase of entropy. Change in entropy in irreversible process. T-S diagram.Physical significance of Entropy of a Perfect gas.Kelvin's Thermodynamic scale of temperature, The Size of a degree, Zero of absolute scale, Identity of a perfect gas scale and absolute scale.Third law of Thermodynamics, Zero Point energy, Negative temperature (not possible), Heat death of the universe.Relation between thermodynamic Variable (Maxwll's relations).

Unit- III: Statistical Physics – I **Total- 9 Hours**

Description of a system: Significance of statistical approach, Particle-States System-states. Microstates and Macro-states' of a system, Equilibrium states, Fluctuations, Classical & Statistical Probability, The equi-probability postulate, Statistical ensemble, Number of states accessible to a system, Phase space, Micro Canonical Ensemble, Canonical Ensemble. Helmholtz free energy, Enthalpy, First law of thermodynamics, Gibbs free energy, Grand Canonical Ensemble.

Unit – IV Statistical Physics-II **Total- 8 Hours**

Statistical Mechanics: Phase Space. The probability of a distribution. The most probable distribution and its narrowing with increase in number of particles. Maxwell- Boltzmann statistics. Molecular speeds, Distribution and mean. R.m.sand most Probable velocity.Constraints of accessible and inaccessible states. Quantum Statistics: Partition Function Relation between Partition Function and Entropy, Bose- Einstein Statistic. Black- body radiation, The Rayleigh –Jeans formula, The Plank radiation formula, Fermi-Dirac statistics, Comparison of result,.Concept of phase transition.

Unit – V: Contribution of Physics **Total- 4 Hours**

S.N. Bose, M.N. Saha, Maxwell, Clausius, Boltzmann, Joule, Wien, Einstein, Planck, Bohr. Heisenberg, Fermi, Dirac. Max Born. Bardeen.

Text and Reference Books:

- Heat and Thermodynamics: Marks W. Zemansky, Richard H. Dittman. Seventh Edition, McGraw- Hill International Editions.
- Thermal Physics (Heat and Thermodynamics): A.B. Gupta, H.P. Roy, Books and Allied (P) Ltd. Calcutta.
- Laboratory Manual of Physics for Undergraduate classes. D.P. Khandelwal, Vani Publishing House, New Delhi.

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Contents:

List of Practical's

- To verify laws of parallel and perpendicular axes for moment of inertia
- To determine acceleration due to gravity using compound pendulum.
- To determine damping coefficient using a bar pendulum.
- To determine Young's Modulus by bending of beam method.
- To determine Young's Modulus using Cantilever Method.
- To determine coefficient or rigidity by state method.
- To determine coefficient or rigidity by dynamic method.
- To determine Surface Tension by Jaegar's method.
- To determine Surface Tension of a liquid by capillary rise method.
- To determine Viscosity of fluid using Poisellie' method.
- To study conversion of mechanical energy into heat using calendar &Barne's method.
- To determine heating efficiency of electrical kettle with various voltages.
- To determine heating temperature coefficient of resistance using platinum resistance thermometer.
- To determine thermo electromotive force by a thermocouple method.
- To determine heating efficiency of electrical kettle with various voltages.
- To determine heat conductivity of bad conductors of different geometry by Lee's method.
- To verify Newton's Laws of cooling.
- To determine specific heat of Coefficient of thermal conductivity by Searl's method.
- To determine specific heat of a liquid.
- To compare Maxwell- Boltzmann, Bose Einstein and Eermi-Dirac Distribution Function vs temperature using M.S. Excel, C++
- To Plot equation of state and Vander-wall equation with temperature using M.S. Excel/C++

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BSCC (Y-103A) Algebra and Trigonometry

BSCC (Y-103A)	**PAPER- I**	**Algebra and Trigonometry**	**4L:0T:0P**	**40 Hrs**	**4 Hrs/Week**

Course Objective:
The primary objective of this course is to introduce the Rank Of matrix, Relation between the roots and coefficients. De-Moivre'stheorem and its application. Switching circuits and its applications.Logic gates and circuits.

Course Learning Outcomes:
This course will enable the students to:
CO1. Employ De Moivre's theorem in a number of applications to solve numerical problems.
CO2. TO Explain Boolean Algebra-definition and properties. Switching circuits and its applications
CO3. To Explain Application of matrix to solve a system of linear (homogenous and non-homogeneous) equations.
CO4. Find eigenvalues and corresponding eigenvectors for a square matrix.

Unit –I **Total -07 Hours**
Rank Of matrix, Normal & Echelon from of a matrix. Characterstic equation of a matrix. Eigen values. Eigen vectors. Linear Independence of row and column matrix.

Unit-II **Total -10 Hours**
Cayley Hamilton theorem and its use in finding inverse of a matrix.Application of matrix to solve a system of linear (homogenous and non-homogeneous) equations. Theorems on consistency and inconsistency of a system of linear equations. Solving linear equation up to three unknowns.

Unit – III **Total -06 Hours**
Relation between the roots and coefficients of a general polynomial equation in one variable. Transformation of equations. Reciprocal equations. Descarte's rule of signs.

Unit –IV **Total -10 Hours**
Logic- Logical connectives.Truth Tables.Tautology.Contradiction, Logical Equivalences, Algebra of propositions.Boolean Algebra-definition and properties.Switching circuits and its applications.Logic gates and circuits.

Unit-V **Total -10 Hours**

De-Moivre'stheorem and its application.Direct and inverse circular and hyperbolic functions.Expansion of trigonometric functions.Logarithm of complex quantities.Gregory's series.Summation of trigonometrically series.

Text Books:

1. S.I. Loney- Plane Trigonometry Part - II
2. K.B. Datta- Matrix and Linear Algebra. Prentice Hall of India Pvt. Ltd. New Delhi 2000.
3. Chandraika Prasad - A Text Book on Algebra and theory of Equations, Pothishala Pvt. Ltd. Aabad.
4. C. L. Liu-Eliments of Discrete Mathematics (Second Edition). McGraw Hill, International Edition, Computer Science Series, 1986.
5. म.प्र. हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Book:

1. H.S.Hall and S.R. Knight-Higher Algebra H.M Publication.1984
2. N.Jocobson-Basic Algebra Vol. I and II. W.H Freeman.
3. N.Saran and R.S. Gupta- Analytica; Geometry of three Dimension. PothishalaPvt.Ltd.Allahabad

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords

Rank Of matrix, Eigen values. Eigen vectors. Cayley Hamilton theorem and its use in finding inverse of a matrix. Relation between the roots and coefficients of a general polynomial equation in one variable. Logic- Logical connectives. Boolean Algebra-definition and properties. De-Moivre'stheorem and its application.

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BSCC (Y-103B) Calculus and Differential Equations

BSCC (Y-103B)	**PAPER- II**	**Calculus and Differential Equations**	**4L:0T:0P**	**40+10 Marks**	**4 Hrs/Week**

Course Objectives:
This course helps the students to develop skills and knowledge of standard concepts in ordinary and partial differential equations and also provide the standard methods for solving differential equations. Successive Differentiation, Curvature, tests for concavity and convexity. Linear differential equation with constant coefficients

Course Learning Outcomes: The student will be able to:
CO1. Learn about Maclaurin's series expansion of elementary functions.
CO2. Apply the method of Linear differential equations and equations reducible to the linear form
CO3. Formulate and solve various types of first and second order partial differential equations.

Unit –I **Total -06 Hours**
Successive Differentiation, Leibnitz theorem. Maclaurin's and Taylor's series expansions. Asymptotes.

Unit -II **Total -07 Hours**
Curvature, tests for concavity and convexity. Points of inflexion.Multiple points.Tracing of curves in Cartesian and polar coordinates.

Unit -III **Total -08 Hours**
Integration of transcendental function, Definite Integrals. Reduction Formulae, Quadrature, Rectification.

Unit - IV **Total -10 Hours**
Linear differential equations and equations reducible to the linear form, exact differential equations. First order and higher degree equations solvable for x, y and p, Clairaut, s equation and singular solutions.Geometrical meaning of a differential equation.Orthogonal trajectories.

Unit -V **Total -10 Hours**
Linear differential equation with constant coefficients, Homogeneous Linear ordinary differential equations.Linear differential equations of second order, transformation of equations by changing the dependent variable Independent variable.Method of variation of parameters.

Text Books:

1. Gorakh Prasad -Differential Calculus. Pothishala Private Ltd. Allahabad.
2. Gorakh Prasad - Integral Calculus. Pothishala Private Ltd. Allahabad.

3. D. A. Murray - Introductory Course in Differential Equations. Orintlongman (India) 1967.
4. मध्यप्रदेश हिन्दी ग्रंथ अकादमी की पुस्तकें ।

Reference Books:

1. G.F. Simmons-Differential Equations. Tata McGraw Hill, 1972.
2. E.A. Codington- an Introduction to ordinary defferntial Equation. Printice Hall of India. 1961.
3. H.T.H Piaggio- Elementary Treatise on Differential Equations and their Application. C.B.S Publisher & Distributors. Delhi. 1985

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords

Leibnitz theorem. Maclaurin’s and Taylor's series. Curvature, tests for concavity and convexity. Tracing of curves in Cartesian. Linear differential equations. Reduction Formulae, Quadrature, Rectification. First order and Linear differential equations of second order, Linear differential equation with constant coefficients, Homogeneous Linear ordinary differential equations.

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BSCC(Y-103C) Vector Analysis and Geometry

BSCC(Y-103C)	**PAPER- III**	**Vector Analysis and Geometry**	**4L:0T:0P**	**40+10 Marks**	**4 Hrs/Week**

Course Objective

The objectives of this course are to Vector differentiation.Gradient, Divergence and curl. Vector Integration.Theorms of Gauss. Tracing of conies. Right circular cone, equation of cylinder and its properties. conicoids, Paraboloids,

Course Learning Outcomes: This course will enable the students to:

CO1. Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference.

CO2. find Scalar and vector product of three vectors, product of four vectors.

CO3. iii) To explain Be well-versed with conics and quadric surfaces so that they should able to relate the shape of real-life objects with the curves/conics.

CO4. verify Condition for three mutually perpendicular generators.Right circular cone, equation of cylinder and its properties.

Course Contents

Unit- I **Total -10 Hours**

Scalar and vector product of three vectors, product of four vectors.Reciprocal vectors.Vector differentiation.Gradient, Divergence and curl.

Unit -II **Total -06 Hours**

Vector Integration.Theorms of Gauss.Green. Stoke (without Proof) and Problems based on them.

Unit-III **Total -07 Hours**

General equation of second defrees. Tracing of conies.System of conics, polar equation of a conic.

Unit-IV **Total -10 Hours**

Equation of cone with given base.Generators of cone. Condition for three mutually perpendicular generators.Right circular cone, equation of cylinder and its properties.

Unit- V **Total -08 Hours**

Central conicoids, Paraboloids, plane sections of conicoids. Generating lines.

Text Books:

1. N. Saran and S.N. Nigam- Introduction to Vector Analysis. Pothishala Pvt. Ltd. Allahabad.
2. Gorakh Prasad and H.C. Gupta-Text Book on Coordinate Geometry. Pothishala Pvt. Ltd. Allahabad
3. N. Saran and R.S Gupta- Analytical Geometry of Three Dimensions. Pothishala Pvt. Ltd Allahabad (Unit- IV)

Reference Books:

1. R.J.T. Bell- Elementary Treatise on Coordinate Geometry of Three Dimensions, Macmillan India Ltd. 1994 (Unit-V)
2. Murray R. Spiegel-Theory and Problems of Advance Calculus. Schaum Publishing Company. New York.
3. Murray R.Spiegel- Vector Analysis. Schaum Publishing Company. New York.
4. Shanti Narayan- a Text Book of Vector Calculus, S. Chand & Co. New Delhi.

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords

Scalar and vector product of three vectors, Gradient, Divergence and curl. Vector Integration. Theorems of Gauss.Green. Tracing of conies.System of conics, polar equation of a conic. Generators of cone. Right circular cone, Central conicoids, Paraboloids, Generating lines.

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B.SC Computer Science II year

BSCC(Y-201A) OBJECT ORIENTED PROGRAMMING USING C++

BSCC(Y-201A)	**PAPER- I**	**OBJECT ORIENTED PROGRAMMING USING C++**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Objective:

Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs. Learn syntax, features of, and how to utilize the Standard Template Library. Learn other features of the C++ language including templates, exceptions, forms of casting, conversions, covering all features of the language. Learn features of the language which can be problematic with execution time or space and some techniques to resolve them. Learn features of the language which are non-deterministic, should not be utilized in hard real-time systems, and techniques for replacing those features. Learn the C++ language changes and Boost library.

Course Outcomes:

CO1. Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.

CO2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc

CO3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.

CO4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.

CO5. Demonstrate the use of various OOPs concepts with the help of programs.

Content :

UNIT I

Principles of OOPS, procedure oriented programming vs. object oriented programming, basic concepts, advantages, application of OOPS, object oriented languages. Beginning with C++: What is C++, structure of C++ program, creating, compiling, linking & executing a C++

program, Tokens, expressions & control structures, keywords, identifiers, basic data types, user-defined data types, derived data types, symbolic constants, type compatibility, variable declaration, dynamic initialization of variables, reference variables.

UNIT II

Operators in C++: scope resolution operator, mepory management operators, manipulators, type cast operators, operators, operator precedence, control structures. Functions in C++:_Main function, function prototyping, call by reference vs. call by value, inline functions, default arguments, const arguments, function overloading, friend functions. Classes and objects: specifyingo a class, defining member functions, making an outside functions inline, private member function; array within a class, memory allocation for object; static data members, static member functions, array of objects, objects as function arguments, returning objects.

UNIT III

Constructors and Destructors: Constructors, Parametric Constructors, Multiple Constructors in a class, constructors with default arguments. Dynamic initialization of objects, copy constructors, dynamic constructors, destructors. Operator Overloading & Type Conversions: Definition of Overloading, & Operator Overloading, rules for Overloading Operators, Overloading Unary Operators; Binary Operators, Binary Operators using Friends.

UNIT IV

Inheritance: defining derived classes, single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, virtual base class, abstract classes, constructors in derived classes, member class, nesting of class.

UNIT V

Pointers, virtual functions and polymorphism, pointers to objects, this pointer, pointers to derived class, pure virtual functions, exception handling in C++, managing console I/O operations, working with files :open, close, basic read-write operations on tiles.

BOOKS:

1. Object Oriented Programming with C++ by E Balagurusamy.

2. Programming in C++ by Robert Lafore

3. C++ - The complete Reference - by Herbert Schildt (TMH)

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PROGRAMMING USING C++

PRACTICAL

1. Write a program to convert decimal (integer) number into equivalent binary number.
2. Write a program to print Fibonacci series.
3. Write a program to find factorial of a given number using recursion.
4. Write a program to swap the contents of two variables with functions value parameters, address parameters and pointer parameters.
5. Write a program to check given string is palindrome or not.
6. Write a max function which accepts two numbers and find the maximum of two numbers. The two given numbers can be integer, float, or double so that the functions may call the overloaded functions.
7. Write a program to perform multiplications of two matrices.
8. Write a program to design a class distance with feet and inches as data members. Use a data function to set and show the distance.
9. Write a program to design a class with length and height as data member. Use a data function to get value of length and height from the keyboard and display area of right angle triangle.
10. Write a program to overload the binary operator to add two complex numbers.
11. Write a program to find the area and volume of a rectangular box using constructor.
12. Write a program to design a class time with hours, minutes and seconds as data members. Use a data function to perform the addition of two times objects in hours, minutes and seconds.
13. Write a program to implement single inheritance.

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BSCC(Y-201B) DATA STRUCTURE AND ALGORITHMS

BSCC(Y-201B)	**PAPER- I**	**DATA STRUCTURE AND ALGORITHMS**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Objective :

- Be familiar with basic techniques of algorithm analysis
- Be familiar with writing recursive methods
- Master the implementation of linked data structures such as linked lists and binary trees

- Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure
- Be familiar with several sub-quadratic sorting algorithms including quicksort, mergesort and heapsort
- Be familiar with some graph algorithms such as shortest path and minimum spanning tree
- Master the standard data structure library of a major programming language (e.g. java.util in Java 5)
- Master analyzing problems and writing program solutions to problems using the above techniques

Course Outcomes:

CO1: develop programs using basic data structures: sets, lists, stacks, queues, trees, graphs and advanced data structures like balanced trees and skip lists.

CO2: understand the behaviour and application of advanced data structures like Tries, Prefix- and Suffix-trees.

CO3: identify best suited data structure for the problem at hand.

CO4: identify the programming constructs to optimize the performance of the data structure in different scenarios.

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Content :

UNIT-I **10HOURS**

Basic concepts and notations: Types of data structures, Data structure operations, Algorithmic complexity, Big 'O' notation. Arrays: Linear array, representation of single dimensional & multi-dimensional array in memory, address calculation of single dimensional & multi dimensional array in memory, traversing l linear array, insertion and deletion in an array, Two-dimensional array, applications of Array.

UNIT-II **10HOURS**

Stacks: Representation of stacks in memory (linked and sequential), operations on stacks, Applications of Stacks infix& Postfix expression, postfix expression evaluation. Queues: Representation of queues in memory (linked and sequential) circular queue, DE queue, priority queue, operations on queues: insertion, deletion from queue, application of Queue.

UNIT-III **08HOURS**

Linked list: single and doubly linked list, description and operations on single and doubly linked list, Linked representation of stake and queue.

UNIT-IV **08HOURS**

Trees: Definition and basic concepts, binary tree, Binary search tree, Operation on binary tree: insertion & deletion, binary tree traversal: in order, preorder & post order, Binary search tree, searching, insertion and deletion in binary search tree.

UNIT-V **08HOURS**

Searching and sorting algorithms: Linear and binary search, bubble sort, insertion sort, selection sort, quick sort, merge sort. Graphs: Related concepts and its representations, Graph traversal Schemes: Depth First Search (DFS), Breadth First Search(BFS).

Suggested Reference Books:

1.Data Structure by Schaum Series

2.Data Structure by Tanenbaum

3.Data Structure using C++ by YashvantKani

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DATA STRUCTURE AND ALGORITHMS

PRACTICAL

1. Write a program to traverse an array.
2. Write a program to insert item at kth position in an array.
3. Write a program to delete kth position item from array.
4. Write a program to push and pop operations on a stack using array.
5. Write a program to insert and delete operation on a queue using array.
6. Write a program for selection sort.
7. Write a program for bubble sort.
8. Write a program for linear (sequential) Search.
9. Write a program for binary search.
10. Write a program to implement linked list.

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BSCC (Y- 202A) OPTICS

BSCC (Y- 202A)	**Paper-I**	**OPTICS**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives This course reviews the concepts of waves and optics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with explaining ideas of superposition of harmonic oscillations leading to physics of travelling and standing waves. The course also provides an in depth understanding of wave phenomena of light, namely, interference and diffraction with emphasis on practical applications of the same.

Course Learning Outcomes On successfully completing the requirements of this course, the students will have the skill and knowledge to: 38

- Understand Simple harmonic oscillation and superposition principle.
- Understand different types of waves and their velocities: Plane, Spherical, Transverse, Longitudinal.
- Understand Concept of normal modes in transverse and longitudinal waves: their frequencies and configurations.
- Understand Interference as superposition of waves from coherent sources derived from same parent source.
- Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from aperture, understand Fraunhoffer and Fresnel Diffraction.
- In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. Resolving power of optical equipment can be learnt first hand. The motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves can be learnt in this laboratory course.

Contents:

UNIT I **Total- 6 Hours**

Geometrical optics:Reflection and refraction, Fermat's principle, Refraction at a spherical surface, aplanatic points and its applications. Lens formula. Combination of thin lenses and equivalent focal length. Dispersion and dispersive power, chromatic aberration and achromatic combination, different types of aberration(Qualitative) and their remedy, Need for multiple lenses in eyepieces, Ramsden and Huygens eye-piece.

UNIT II **Total- 6 Hours**

Interference of light:The principle of superposition two slit interference, coherence requirement

for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer and other applications, localized fringes, thin films, Interference by a film with two non0 parallel reflecting surfaces. Newton's rings, Haidinger fringes (Fringes of equal inclination), Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Intensity distribution in multiple beam interference, fabry – perot interferometer and Etalon.

UNIT III **Total- 8 Hours**

Diffraction:Fresnel's theory of half period zone. Diffraction at straight edge. Rectilinear propagation. Diffraction at a slit, phasor diagram and integral calculus methods. Diffraction at a circular aperture and a circular disc, Rayleigh criterion of resolution of images. Resolving power of telescope and and microscope. Outline of phase contrast microscopy. Diffraction at N-parallel slits, Intensity distribution, plane diffraction grating, Resolving power of a grating and comparison with resolving power of prism and of a fabry parot etalon.

UNIT IV **Total- 8 Hours**

Polarizations: Transverse nature of light waves, Polarization of electromagnetic waves, Plane polarized light – production and analysis, Description of linear, circular and elliptical polarization Propagation ofelectromagnetic waves in anisotropic media, uniaxial and biaxial crystals, and symmetric nature ofdielectric tensor, Double refraction, and Hagen's principle. Ordinary and extraordinary refractive indices. Fresnel's formula, light propagation in uniaxial crystal, Nicole prism, Production of circularly andelliptically polarized light, Babinet compensator and applications, optical rotation, optical rotation inliquids and its measurement through polarimeter.

UNIT V : **Total- 6 Hours**

Laser and photo sensors:A brief history of laser. Characteristics of laser light. Einstein prediction, Relationship between Einstein's coefficients (Qualitative discussion). Pumping schemes. Resonators, Ruby laser. He-Ne laser. Applications of laser. Principle of holography. Photodiodes, Phototransistors and photomultipliers.

SUGGESTED READIING;

FUNDAMENTAL OF OPTICS: F.A. JENKINS AND H.E. WHITE, 1976 MC GRAW HILL
PRINCIPLES OD OPTICS: B. K. MATHUR 1995 GOPAL PRINTING

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BSCC (Y- 202B) (ELECTRO-STATICS, MAGNETO STATICS AND ELECTRODYNAMICS)

BSCC (Y- 202B)	**Paper-II**	**ELECTRO-STATICS, MAGNETO STATICS AND ELECTRODYNAMICS**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives This course reviews the concepts of electromagnetism learnt at school from a more advanced perspective and goes on to build new concepts. The course covers static and dynamic electric and magnetic fields, and the principles of electromagnetic induction. It also includes analysis of electrical circuits and introduction of network theorems. The students will be able to apply the concepts learnt to several real world problems.

Course Learning Outcomes At the end of this course the student will be able to
- Demonstrate the application of Coulomb's law for the electric field, and also apply it to systems of point charges as well as line, surface, and volume distributions of charges.
- Demonstrate an understanding of the relation between electric field and potential, exploit the potential to solve a variety of problems, and relate it to the potential energy of a charge distribution.
- Apply Gauss's law of electrostatics to solve a variety of problems.
- Calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot- Savart and Ampere laws)
- Understand the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws.
- Understand the basics of electrical circuits and analyze circuits using Network Theorems.
- In the laboratory course the student will get an opportunity to verify network theorems and study different circuits such as RC circuit, LCR circuit. Also, different methods to measure low and high resistance, capacitance, self-inductance, mutual inductance, strength of a magnetic field and its variation in space will be learnt

Contents:

UNIT I **Total- 8 Hours**

Electrostatics: Coulombs law in vacuum expressed in vector forms. Calculations of electric field E forsimple distributions of charge at rest, dipole and quadruple fields. Work done on a charge in anelectrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between electric field and electric potential ($E = -\nabla V$), torque on a diploe in a uniform electric field and its energy. Flux of the electric field. Gauss's law and its application for finding E for symmetric charge distributions. Capacitors. Conducting sphere in a uniform electric field.

Point charge in front of agrounded infinite conductor. Dielectric parallel plate capacitor with a dielectric. Dielectric constant.Polarization and polarization vector P. Relation between displacement vector D. E and P molecular interpretation of claussius – mossotti equation.

UNIT II **Total- 7 Hours**

Magneto statics: Force on a moving charge. Lorentz foree equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field. Torque on a current loop, magnetic dipolemoment, angular momentum and gyromagnetic ratio. Biot and savart's law, calculation of H for simple geometrical situations such as solenoid, Anchor ring, Ampere's law, $\nabla \times V = \mu$ □ J, $\nabla.B = 0$. Field due to magnetic dipole, free and bound currents. Magnetization vector (M), relationship between B, H and M. derivation of the relation $\nabla \times M = J$ for non-uniform magnetization.

UNIT III **Total- 6 Hours**

Current Electricity and Bio electricity: Steady current, current density J, non-stedy currents and continuity equation, Kirchhoff's laws and analysis of multiloop circuits growth and decay of current in LR and CR circuits. Decay constants, LCR circuits, AC circuits, complex numbers and their applications in solving AC circuits problems, complex impedance and reactance, series and parallel resonance, Q-factor, power consumed by an AC circuit, power factor, Y and Δ networks and transmission of electric power, Electricity observed in living systems, origin of bioelectricity.

UNIT IV **Total- 6 Hours**

Motion of charged particles in Electric and magnetic fields: (Note: The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved.) E as an accelerating field, electron gun, discharge tube, linear accelerator, E as deflecting velocity selector, Curvatures of tracks for energy determination for nuclear, Mass spectrograph and principle and working of cyclotron. Mutually perpendicular and parallel E & B fields positive ray parabolas, discovery of isotopes. Elements of Mass spectrographs. Principle of magnetic focusing (lenses).

UNIT V **Total- 7 Hours**

Electrodynamics: Electromagnetic induction, Faraday's Laws, Electromotive force, Integral and differential forms of Faraday's laws. Self and mutual inductance. Transformers. Energy in a static magnetic field. Maxwell's displacement current, Derivations of Maxwell's equations. Electromagnetic field energy density. Pointing vcctor, electromagnetic wave equation. Plane electromagnetic waves in vacuum and dielectric media. Reflection at a plane boundary of dielectrics, Fresnel's Laws, Polarization by reflection and total internal reflection. Waves in a conducting medium, Reflection and refraction by the ionosphere.

SUGGESTED READINGS :

- PHYSICS VOLUME 2: D. HALLIDAY AND R. RESNICK
- INTRODUCTION TO ELECTRODYNAMICS : D. J. GRIFFITHS, 4TH EDITIN

Contents :
List of Practicals :

1. Study of interference using biprism.
2. Study of diffraction at straight edge.
3. Use of plane diffraction grating to determine D1, D2 lines of sodium lamp.
4. Resolving power of telescope.
5. Polarization by reflection and verification of Brewster's law,
6. Study of optical rotation in sugar solution.
7. Refractive index and dispersive power of prism using spectrometer.
8. Absorption spectrum of material using constant deviation spectrograph.
9. Beam divergence of He-Ne laser.
10. Determination of wavelength of laser by diffraction.
11. Determination of radius of curvature of Plano-convex lense by newton's rings.
12. Characteristics of Ballistic galvanometer.
13. Setting up and using an electroscope or electrometer.
14. Measurement of low resistance by carey-foster bridge or otherwise.
15. Measurement of inductance using impedance at different frequencies.
16. Measurement of capacitance using, impedance at different frequencies.
17. Response curve for LCR circuits and response frequencies.
18. Sensitivity of cathode-ray oscilloscope.
19. Use of a vibration magnetometer to study a field.
20. Study of magnetic field due to current using tangent galvanometer.
21. Study of decay of currents in LR and RC circuits.
22. Study of lissajous figures using CRO.
23. Verification of network theorems.

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BSCC (Y-203A) ABSTRACT ALGEBRA

BSCC (Y-203A)	PAPER- I	ABSTRACT ALGEBRA	4L:0T:0P	40 Hrs	4 Hrs/Week

Course Objectives: The objective of the course is to introduce the fundamental theory of groups and their homomorphisms. Symmetric groups and group of symmetries are also studied in detail. basic properties of groups. Fermats theorem as a consequence of the Lagrange's theorem on finite groups.

Course Learning Outcomes: The course will enable the students to:
CO1. Recognize the mathematical objects that are groups, and classify them as abelian,cyclic and permutation groups, etc.
CO2. Link the fundamental concepts of groups and symmetrical figures.
CO3. Cauchy's theorem for finite abelian groups and non- abelian groups.
CO4. Explain the significance of the notion of cosets, normal subgroups and factor groups.
CO5. Learn about Lagrange's theorem and Fermat,s theorem.
CO6. Know about group homomorphisms and group isomorphisms.

Unit – I **Total -08 Hours**

Definition and basic properties of groups. Subgroups. Subgroups generated by a subset , Cyclic groups and simple properties.

Unit-II **Total -07 Hours**

Coset decomposition. Lagrange's theorem and its corollaries including Fermat's theorem. Normal subgroups. Quotient groups.

Unit –III **Total -10 Hours**

Homomorphism and Isomorphism of groups. Fundamental theorem of homomorphism. Transformation and Permutation group. Sn (various subgroups of Sn,n<5 to be studied). Cayley's theorem

Unit – IV **Total -10 Hours**

Group Automorphism. Inner Automorphism. Group of Automorphisms. Conjugacy relation and Centraliser. Normaliser. Counting principle and class equation of a finite group. Cauchy's theorem for finite abelian groups and non- abelian groups.

Unit –V **Total -09 Hours**

definition and basic properties of rings. Ring homomorphism subrings. Ideals and Quotient rings. Polynomial rings & its properties. Integral domain and Field.

Text Books:

1. I.N. Herstein- Topics in Algebra Wiley Eastern Ltd. New Delhi. 1977.
2. PB Bhattacharya. S.K. Jain and S R Nagpaul – Basic Abstract Algebra. Wiley Eastern. New Delhi.1977

Reference Books:

1. Shantinarayan- A text Book of Modern Abstract Algebra. S. Chand and Company. New Delhi.
2. Surjeet Singh – A Text Book of Modern Algebra.
3. N. Jacobson- Basic Algebra. Vol. I and II. W. II. Freeman.
4. I.S. Luther and I.B.S Passi- Algebra. Vol I and II, Narosa Publishing House.

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keyword

Definition and basic properties of groups. Subgroups. Cyclic groups. Coset decomposition. Lagrange's theorem. Fermat's theorem. Normal subgroups. Quotient groups. Homomorphism and Isomorphism of groups. Fundamental theorem of homomorphism. Group Automorphism. Inner Automorphism. Normaliser. Cauchy's theorem for finite abelian groups and non- abelian groups. rings. Ring homomorphism subrings. Integral domain and Field. Quotient rings.

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BSCC (Y-203B) ADVANCED CALCULUS

BSCC (Y-203B)	**PAPER- II**	**ADVANCED CALCULUS**	**4L:0T:0P**	**40 Hrs**	**4 Hrs/Week**

Course Objective : The primary objective of this course is to introduce the basic tools of calculus Theorem on limits of sequence. Bounded and monotonic sequences. Cauchy's convergence criterion. Partial differentiation, Change of variables. Euler's theorem on homogeneous functions. Maxima and Minima of functions of two variables.

Course Learning Outcomes
The students who take this course will be able to:
CO1. Understand continuity and differentiability in terms of limits.
CO2. Describe Comparison test. Cauchy's integral test. Cauchy's root test. Ratio tests, Raabe's tests. Logarithmic test. Alternating series. Leibnitz's test.
CO3. Understand the importance of mean value theorems.
CO4. Describe the Maxima and Minima of functions of two variables.

Unit- I **Total -10 Hours**

Definition of a sequence. Theorem on limits of sequence. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of non-negative terms. Comparison test. Cauchy's integral test. Cauchy's root test. Ratio tests, Raabe's tests. Logarithmic test. Alternating series. Leibnitz's test. Absolute and conditional convergence.

Unit-II **Total -10 Hours**

Continuity of function of single variable. Sequential continuity. Properties of continuous functions. Uniform continuity. Chain rule of differentiability. Mean value theorems and their geometrical interpretations. Darboux's intermediate value theorem for derivatives.

Unit –III **Total -07 Hours**

Limit and continuity of functions of two variables. Partial differentiation, Change of variables. Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.

Unit-IV **Total -08 Hours**

Envelopes, Evolutes. Maxima and Minima of functions of two variables. Lagrange's multiplier method. Beta and Gamma Functions.

Unit – V **Total -09 Hours**

Double and triple integrals. Volumes and surfaces of solids of revolution Dirichlet's integrals. Change of order of integration in double integrals.

Text Books:

1. R.R. Goldbeg- Real Analysis. Oxford & I.B.H. Publishing co. New Delhi
2. Gorakh Prasad- Differential Calculus. Pothishala Pvt. Ltd Allahabad.
3. Gorakh Prasad- Integral Calculus. Pothishala Pvt. Ltd. Allahabad.

Reference Books:

1. Gabreil Klaumber – Mathematical Analysis. Marcel Dekkar. Inc.New York.1975
2. T.M. Apostol- Mathematical Analysis. Narosa Publishing House. New Delhi. 1985
3. D. Soma Sundaram and B. Choudhary – A first Course in mathematical Analysis. Narosa Publishing, House. New Delhi. 1997.
4. Murray R. Spiegel- Theory and problems of advance Calculus. Schauma Publishing Co. New York
5. O.E. Stranaitis- An Introduction to Sequences. Series and improper Integrals.
6. **Teaching Learning Process**

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords

Theorem on limits of sequence. Cauchy's convergence criterion. Comparison test. Continuity of function of single variable. Mean value theorems. Limit and continuity of functions of two variables. Euler's theorem on homogeneous functions. Jacobians. Maxima and Minima of functions of two variables. Beta and Gamma Functions. Double and triple integrals. Dirichlet's integrals.

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BSCC(Y-203C) DIFFERENTIAL EQUATION

BSCC(Y-203C)	**PAPER- III**	**DIFFERENTIAL EQUATION**	**4L:0T:0P**	**40 Hrs**	**4 Hrs/Week**

Course Objective : The main objectives of this course are to teach students to form Laplace Transformation. Inverse Laplace transforms. Power series method. Bessel and Legendre equations and solve partial differential equations and use them in solving some physical problems.

Course Learning Outcomes:
The course will enable the students to:
CO1. Know about power series solution of a differential equation and learn about Legendre's and Bessel's equations.
CO2. Use of Laplace transform and inverse transform for solving initial value problems.
CO3. Learn about method of characteristics and separation of variables to solve first order PDE's.
CO4. Classify and solve second order linear PDEs.
CO5. Learn about Cauchy problem for second order PDE and homogeneous and nonhomogeneous wave equations.

Unit- I **Total -10 Hours**

Series solutions of differential equations. Power series method. Bessel and Legendre equations. Bessel's and Legendre's functions and their properties- recurrence and generating function. Orthogonality of functions.

Unit- II **Total -10 Hours**

Laplace Transformation. Linearly of the Laplace transformation. Existence theorem for Laplace transforms. Laplace transforms of derivatives and integrals. Shifting theorems. Differentiation and integration of transforms.

Unit-III **Total -07 Hours**

Inverse Laplace transforms. Convolution theorem. Application of Laplace transformation in Solving linear differential equations with constant coefficients.

Unit-IV **Total -08 Hours**

Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method.

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Unit- V **Total -10 Hours**

Partial differential equations of second and higher orders. Classification of partial differential equations of second order. Homogeneous and non-homogeneous equations with constant constant coefficients. Partial differential equations reducible to equations with constant coefficients.

Text Books:

1. Sharma and Gupta- Integral Transform. Pragati. Prakashan Meerut.
2. Sharma and Gupta- Differential Equation. Pragati. Prakashan Meerut.
3. Raysinghania-Differential Equation. Pragati. Prakashan Meerut.

Reference Book:

1. D.A. Murray- Introductory course in differential equation. Orient Longman. India 1967
2. G.F. Simnons – Differential Equations.Tata Megraw Hill. 1972.
3. E.A.Codington – An introduction to Ordinary differential equations . Prentice Hall of India. 1961
4. H.T.H. Piaggio – Elementary Treatise on Differential equations and their applications. C.B.S Publisher and Distributors. Delhi.1985.
5. E.D. Rainville – Special Functions . The Macmillan Company. New York.

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords

Power series method. Bessel and Legendre equations. Laplace Transformation. Existence theorem for Laplace transforms. Inverse Laplace transforms. Convolution theorem. Partial differential equations of the first order and second and higher orders.Lagrange's solution. Charpit's general method. Homogeneous and non-homogeneous equations with constant constant coefficients.

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B.SC Computer Science III year

BSCC(Y-301A) Database Management system

BSCC (Y-301A)	**PAPER- I**	**Database Management system**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Objective :

The main objectives of database management system are data availability, data integrity, data security, and data independence. ... It also refers to how data can be drawn from different sources, different types and different formats.

Course Outcomes:

CO1: understand basic database concepts, including the structure and operation of the relational data model.

CO2: apply logical database design principles, including E-R/EE-R diagrams, conversion of ER diagrams to relations.

CO3: understand the concepts of integrity constraints, relational algebra, relational domain & tuple calculus, data normalization.

CO4: construct simple and moderately advanced database queries using Structured Query Language (SQL).

CO5: understand the concept of a database transaction including concurrency control, backup and recovery, and data object locking.

CO6: design and implement database projects.

Content :

UNIT I

Introduction: Evolution of DB and DBMS, need for Data Management, Introduction and Application of DBMS, File System versus Database System. Concepts of DBMS: Data, Information, Database, Components of DBMS, Architecture of a database system – Physical, Conceptual and User level, Data Independence – Logical and Physical, DBMS terminology, Data Dictionary.

Concepts of Multitier Architecture in databases, Brief idea about distributed databases, parallel databases, mobile databases, temporal databases, spatial databases, geographic databases, data warehousing, data mining, data visualization, OODB and XML Databases, Multimedia and Web Databases.

UNIT II

Database Models: Network, Hierarchical and Relational Models, Features and Comparison of the three models.. **RDBMS:** Introduction to Relational Database, Structure of Relational Database, Relational Model terminology- domains, Attributes, Tuples, Relations, Relational DB Schema, ER-Model, ER-Diagram, ER-concepts, and types of relationships. Codd‟s 12 rules.

Normalization: Functional Dependency, definition, Trivial and Non-Trivial Functional Dependencies, Steps involved in normalization, 1NF, 2NF, 3NF, Decomposition using Functional Dependency preservation, BCNF, Multi-valued Dependency, 4NF, Join Dependency, 5NF.

UNIT III

Idea about Generalization, Aggregation, Specialization. Indexing & Hashing : Basic Concepts, Indexing:b+ tree & B- tree index files, Hashing: static & dynamic hashing . Elementary Concepts of DatabaseSecurity: System failure, Backup and Recovery Techniques, Authorization and Authentication. RelationalAlgebra: Formal Definition, Fundamental Operations – select, project, union, set, difference, Cartesian product & rename, additional operations & extended operations.

UNIT IV

Concept of SQL sublanguages – DDL, DML, DCL, TCL, SCL etc., Embedded SQL.

Interactive SQL: Oracle data types, table creation, modifying the structure of tables, dropping and renaming tables. DML commands: Insertion, updation, deletion operations, many faces of select command, data constraints, logical operators, range searching, pattern matching, oracle functions, use of Alias, grouping data from tables, manipulating dates in sql.

UNIT V

Joins: Equi Join, Self Join, Cross Join. Sub queries, Indexes, Views, Sequences, Roles, and Synonyms. TCL Commands: use of save point, rollback, and commit commands. DCL Commands: creating user accounts, granting permissions, revoking permissions. Concept of importing and exporting database files.

Text Books & Reference Books:

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database System Concepts" McGraw Hill
2. Rajesh Narang "Database Management System" PHI
3. C.J. Date , "An introduction to database system "
4. Bipin C. Desai, "An Introduction to Database System" .
5. Ramakrishnan Gehrke, "Database management system".

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BSCC(Y-301B) Operating System

BSCC (Y-301B)	**PAPER- I**	**Operating System**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Objective :

Making a computer system convenient to use i.e. hides details of Hardware resources from the programmer and provides him with a convenient interface of using computer system. It acts as an intermediary between hardware and software providing a high level interface to low level hardware and making it easier for the software to access the use of those resources. And Managing computer resources. This involves performing such tasks as keeping track of who is using which resource, granting resource requests, accounting for resource usage, and mediating conflicting requests from different programs and users.

Course Outcomes:

CO1: Analyze the structure of OS and basic architectural components involved in OS design

CO2: Analyze and design the applications to run in parallel either using process or thread models of different OS

CO3: Analyze the various device and resource management techniques for timesharing and distributed systems

CO4: Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system

CO5: Interpret the mechanisms adopted for file sharing in distributed Applications CO6: Conceptualize the components involved in designing a contemporary OS.

Content :

UNIT I **10 HOURS**

Introduction: Definitions, functions and types of operating system, System components, Operating system Structure, System Calls, System Programs, Interrupts, Microkernel .

Process Management: Process Concepts, Process states & Process Control Block, Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non- Preemptive) – FCFS, SJF, RR, Priority, Multiple-Processor, Real-Time, Multilevel Feedback Queue Scheduling

UNIT II **10 HOURS**

Process Synchronization: Critical Section Problem, Semaphores, Classical Problems of Synchronization and their Solutions, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

Memory Management: Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation

UNIT II **08 HOURS**

Virtual Memory: concept, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms

File Management: Concept of File System(File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree- Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed).

UNIT IV **08 HOURS**

Disk Management: Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery, Security: Security Threats, Protection, Trusted Systems, Windows Security

UNIX : Introduction to UNIX, UNIX System Organization (the Kernel and the Shell), Files and Directories, Library Functions and System Calls, Editors (vi and ed). Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux File System (inode, Super block, Mounting and Un-mounting), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System Call, System Call for Files, Processes and Signals.

UNIT V **10 HOURS**

Shell Programming: Types of Shells, Shell Meta Characters, Shell Variables, Shell Scripts, Shell Commands, the Environment, Integer Arithmetic and String Manipulation, Special

Command line Characters, Decision Making and Loop Control, Controlling Terminal Input, Trapping Signals, Arrays, I/O Redirection and Piping, Vi and Emacs Editors, Shell Control Statements, Find, Shell Meta- Characters, Shell Scripts, Shell Keywords, Shell Procedures and Reporting, Handling Documents, Changing Process Priority with Nice, Scheduling of Processes at Command, cron, Batch commands.

Process Management and Process Synchronization: Command line argument, Background processes, process synchronization, Sharing of data, user-id, group-id, pipes, fifos, message

queues, semaphores, shared variables, Coding, Compiling, Testing and Debugging. AWK programming – report printing with AWK.

Textbooks & Reference Books:

1.Abraham Silberschatz and Peter Baer Galvin, ―Operating System Concepts, Addison-Wesley.

2.Andrew Tanenbaum, ―Modern Operating Systems, Prentice Hall.
3. Harvey M. Deitel, ―An introduction to Operating Systems, Addison-Wesley.
5.Milan Milankovic, ―Operating Systems, Concepts and Design, TMH
6.William Stallings, ―Operating Systems: Internal and Design Principles, 3rd Edition, PHI.
7.Gary Nutt, ―Operating Systems, A modern Approach, Third Edition, Addison Wesley, 2004
8.D.M. Dhamdhere, ―Operating Systems: A Concept Based Approach. Second Edition,
Tata McGraw-Hill, 2007.

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SUGGESTED SYLLBUS OF PRACTICALS

Database Management system

1. Create tables named Employee, Department, and Salary. Implement all DDL commands on it.

2. On the Employee Table use the many faces of SELECT command.

3. On a table perform WHERE CLAUSE, HAVING, GROUP BY, ORDER BY, IN, NOT IN,BETWEEN.
4. Create a Database implementing Primary and Foreign Key.
5. Implement I/O Constraints and Business Rule constraints on the database created as in 4 above.
6. Perform Nested Queries on table STUDENT.

7. Perform different types of JOINS on any two tables.

8. Create VIEWS, SEQUENCES and SYNONYMS on a table.
   Use of SAVEPOINT, ROLLBACK and COMMIT command.

Operating System

UNIX, UNIX System Organization (the Kernel and the Shell).

Files and Directories, Library Functions and System Calls.

Editors (VI and Ed). Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux File System (inode, Super block, Mounting and Un-mounting).

Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System Call, System Call for Files, Processes and Signals.

Command line Characters, Decision Making and Loop Control.

Controlling Terminal Input, Trapping Signals, Arrays, I/O Redirection and Piping, Vi and Emacs Editors, Shell Control Statements.

Find, Shell Meta- Characters, Shell Scripts, Shell Keywords, Shell Procedures and Reporting, Handling Documents, Changing Process Priority with Nice, Scheduling of Processes at Command, cron, Batch commands.

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Department of Computer Science

BSCM(Y- 301) Quantum Mechanics and Spectroscopy

BSCC (Y- 301)	**Paper-I**	**Quantum Mechanics and Spectroscopy**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives After learning the elements of modern physics, in this course students would be exposed to more advanced concepts in quantum physics and their applications to problems of the sub atomic world.

Course Learning Outcomes The Students will be able to learn the following from this course:

- Methods to solve time-dependent and time-independent Schrodinger equation.
- Quantum mechanics of simple harmonic oscillator.
- Non-relativistic hydrogen atom: spectrum and Eigen functions. 64
- Angular momentum: Orbital angular momentum and spin angular momentum.
- Bosons and fermions - symmetric and anti-symmetric wave functions.
- Application to atomic systems
- In the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical one-dimensional and three dimensional potentials.

Contents:

Unit-I **Total- 8 Hours**

QUANTUM MECHANICS-1

Particles and Waves: Photoelectric effect. Black body radiation. Compton Effect. De Broglie hypothesis. Wave particle duality. Davisson-Germer experiment. Wave packets. Concept of phase and group velocity. Two slit experiment with electrons. Probability. Wave amplitude and wave functions. Heisenberg's uncertainty principle with illustrations. Basic postulates and formalism of Schrodinger's equation. Eigenvalues. Probabilistic interpretation of wave function. Equation of continuity. Probability current density. Boundary conditions on the wave function. Normalization of wave function.

Unit-II **Total- 9 Hours**

QUANTUM MECHANICS-2

Time independent Schrodinger equation: One dimensional potential well and barrier. Boundary

conditions. Bound and unbound states. Reflection and transmission coefficients for a rectangular barrier in one dimension. Explanation of alpha decay. Quantum phenomenon of tunneling. Free particle in one-dimensional box, Eigen functions and Eigen values of a free particle. One-dimensional simple harmonic oscillator, energy eigenvalues from Hermite differential equation, wave function for ground state. Particle in a spherically symmetric potential. Rigid rotator. Orbital angular momentum, azimuthal quantum numbers and space quantization. Radial solutions and principle quantum number.Hydrogen atm.

Unit-III **Total- 8 Hours**

ATOMIC SPECTROSCOPY

Atoms in electric and magnetic fields: Quantum numbers, Bohr model and selection rules. Stern-Gerlach experiment. Spin as an intrinsic quantum number. Incompatibility of spin with classical ideas. Orbital angular momentum. Fine structure. Total angular momentum. Pauli Exclusion Principle. Many particles in one dimensional box. Symmetric and anti-symmetric wave functions. Atomic shell model. Spectral notations for atomic states. Spin-orbit coupling, Vector model L-S and J-J coupling. Doublet structure of alkali spectra. Zeeman Effect. Continuous and characteristic X-rays. Mosley's law.

Unit-IV **Total- 6 Hours**

MOLECULAR SPECTROSCOPY

Spectra: Various types of spectra. Rotational spectra. Intensity of spectral lines and determination of bond distance of diatomic molecules. Isotope effect. Vibrational energies of diatomic molecules. Zero point energy. Anharmonicity. Morse potential. Raman Effect, Rotational Raman spectra and Vibrational Raman spectra. Stokes and anti-Stokes lines and their intensity difference. Electronic spectra. Born-Oppenheimer approximation. Frank Condon principle, singlet and triplet states. Fluorescence and phosphorescence.

Unit-V **Total- 9 Hours**

NUCLEAR PHYSICS

Interaction of charged particles and neutrons with matter, working of nuclear detectors, G-M counter, proportional counter, Scintillation counter, Cloud chamber. Basic properties of nucleus: Shape, Size, Mass and Charge of the nucleus. Stability of the nucleus and Binding energy. Alpha particle spectra – velocity and energy of alpha particles. Geiger-Nuttal law. Nature of beta ray spectra. The neutrino. Energy levels and decay schemes. Positron emission and electron capture. Selection rules. Beta absorption and range of beta particles. Kurie plot. Nuclear reactions, pair

production. Q-values and threshold of nuclear reactions. Nuclear reaction cross-sections. Examples of different types of reactions and their characteristics. Compound nucleus, Bohr's postulate of compound nuclear reaction, Semi empirical mass formula, Shell model, Liquid drop model, nuclear fission and fusion (concepts).

References:

1 Quantum Mechanics: V. Deva Nathan, Narosa Publishing House, New Delhi, 2005.

2 Quantum Mechanics: B. H. Brans den, Pearson Education, Singapore, 2005.

3 Quantum Mechanics: Concepts and Applications, Nouredine Zettili, Jacksonville State

University, Jacksonville, USA, John Wiley and Sons, Ltd, 2009.

4 Introductory Quantum Mechanics & Spectroscopy: K.M. Jain, South Asian Publications.

5 Physics of Atoms & molecules: B.H. Brans den & C.J. Joachim, Pearson Education, Singapore, 2003 6 Fundamentals of Molecular Spectroscopy: C.M. Ban well & M. McCash, McGraw Hill (U.K.edition)

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BSCC (Y- 302) Solid State Physics and Devices

BSCC (Y- 302)	**Paper-II**	**Solid State Physics and Devices)**	**6L:0T:2P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids. It enables the students to appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents. The gained knowledge helps to solve problems in solid state physics using relevant mathematical tools. It also communicates the importance of solid state physics in modern society.

Course Learning Outcomes On successful completion of the module students should be able to

- Elucidate the concept of lattice, crystals and symmetry operations.
- Understand the elementary lattice dynamics and its influence on the properties of materials. 68
- Describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behavior.
- Explain the origin of dia-, para-, and ferro-magnetic properties of solids.
- Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability.
- Understand the basics of phase transitions and the preliminary concept and experiments related to superconductivity in solid.
- In the laboratory students will carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.

Contents:

Unit-1 **Total- 7 Hours**

Solid state physics-I Crystal structure and bonding: crystalline and amorphoussolids.translational symmetry.Tattice and basis. Unit cell. Reciprocal lattice.Foundamental types of lattices (Bravias Lattice).Miller indices Lattice planes. Simple cubic. Face centered cubic. Body centered cubic lattices. Laue and Bragg's equation. Determination of crystal structure with X-rays, X-ray spectroment.lonic, covalent, metallic, Vander walls and hydrogen bonding. Bond theory of solids. Periodic potential and Bloch theorem.kronig-penny model (Qualitative).

Unit-II **Total- 7 Hours**

Solid state physics-2 Lattice structure and properties: dulong petit. Einstein and Debye theories of specific heats of solids. Elastic and atomic force cinstants.Dynamics of a chain of similar

atoms and chain of two types of atoms. Optical and acoustic modes. Electrical resistivity. Specific heat of electron.Wiedemann-Franz law. Hall Effect. Response of substances in magnetic field, diapara and ferromagnetic materials. Classical langevin theory of dia and paramagnetic domain.Curie's Law Weiss theory of ferromagnetism and ferromagnetic domains. Discussion of BH hysteresis.

Unit-III **Total- 8 Hours**

Semiconductor devices-1 Electronic devices: types of semiconductors (p and n).Formation of Energy Bands. Energy level diagram. Conductivity and mobility. Junction formation. Barrier formation in p-n junction diode. Current flow mechanism in forward and reverse biased diode (recombination).drift and saturation of drift velocity. Derivation of mathematical equation for barrier potential, barrier width. Single p-n junction devices (physical explanation, current voltage characteristics and one or two application).Two terminal device.Rectification.Zener diode .photo diode. Solar cell. Three terminal devices. Junction mechanism of current flow. Characteristics of transistor.

Unit-IV **Total- 7 Hours**

Semiconductor devices-2 Amplifiers (only bipolar junction transistor).CB, CE and CCconfiguration. Single stage CE amplifier (biasing and stabilization circuits).Q-point .equivalent circuit. Input impedance, output impedance, voltage and current gain. Class A, B, C amplifiers (definitions).RC coupled amplifiers (frequency response).Class B push-pull amplifier. Feedback on input impedance. Output impedance and gain.Stability.distortion and nois.Principle of an Oscillator, Barkhausen criterion, Colpitts, RC phase shift oscillators. Basic concepts of amplitude, frequency and phase modulations and demodulation.

Unit-V **Total- 8 Hours**

Nano materials Nanostructures: Introduction to nanotechnology, structure and size dependent properties,3D,2D,1D,0D nanostructure materials and their density of states, Surface and interface effects.Modelling of quantum size effect. Synthesis of nanoparticles-Bottom Up and Top Down approach ,wet chemical method.Nanolithography.metal and semiconducting nanomaterials.Essential differences in structural and properties of bulk and Nano materials (qualitative description).Naturally occurring Nano crystals. Application of nanomaterial's.

References:

1. Introduction to Solid state physics Kittel, VIIIth Edition, John Wiley and sons, New York 2005.

2. Intermediate Quantum theory of Crystalline Solids, A.O.E, Animalu, and Prentice-Hall of

India private Limited, New Delhi 1977

3. Solid state Electronic devices.B.G.Steetman, II Edition Prentice Hall India.

4. Microelectronics, J.Millman and A.Grabel McGraw Hill New York.

5. The Physics and Chemistry of Nano solids: frank Owens, and Charles P.Poole jr.Wiley Inter Science, 2008

6. Physics of Low Dimensional semiconductors: An introduction: J.H.Davies.Cambridge University Press, U.K.1998

7. Electronic fundamentals and applications, j.D.Ryder, Prentice Hall. India.

List of Practical's:

1. Specific resistance and energy gap of a semiconductor.
2. Study of half wave and full wave rectification.
3. Characteristics of zener diode.
4. Characteristic of a tunnel diode.
5. Characteristics of JFET.
6. Characteristics of transistor.
7. Study of regulated power supply.
8. Study of RC coupled amplifiers.
9. Determination of Planck's constant.
10. Determination of e/m using Thomson's method.
11. Determination of e by Millikan's method.
12. Study of spectra of hydrogen and deuterium (Rydberg constant ratio of masses of electron to proton).
13. Absorption spectrum of iodine vapour.
14. Study of Zeeman Effect for determination of Lande g-factor.
15. Study of Raman spectrum using laser as an excitation source.
16. To draw B-H curve of Ferro-magnetic material with the help of CRO.
17. Hysteresis curves a transformer core.
18. Hall probe method for measurement of resistivity.

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BSCC(Y-303A) Linear Algebra and Numerical Analysis

BSCC(Y-303A)	**PAPER- I**	**Linear Algebra and Numerical Analysis**	**4L:0T:0P**	**40 Hrs**	**4 Hrs/Week**

Course Objectives:
This course introduces the basic concepts of Linear span. Linear dependence. Independence and their basic properties. Basis. Existence Theorem for basis. Extension Theorem. Algebra of linear transformations. Rank-Nullity theorem. Gauss elimination. LU decomposition. Cholesky decomposition Bisection. Secant. Regula Falsi. Newton's Methods

Course Learning Outcomes: The course will enable the students to:
CO1. Compute the characteristic polynomial, eigenvalues, eigenvectors, as well as the geometric and the algebraic multiplicities of an eigenvalue and apply the basic diagonalization result.
CO2. Compute inner products and determine orthogonality on vector spaces, including Gram - Schmidt orthogonalization to obtain orthonormal basis.
CO3. Find the adjoint, normal, unitary and orthogonal operators.
CO4. Know about methods to solve system of linear equations, such as Runge- Kutta's method

Unit – I **Total -10 Hours**

Definition and examples of Vector spaces, subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence. Independence and their basic properties. Basis. Existence Theorem for basis. Extension Theorem. Invariance of the number of elements of a basis. Dimension. Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space. Dimension of sum of subspaces. Quotient space and its dimension.

Unit – II **Total -10 Hours**

Linear transformations and their representation as matrices. Algebra of linear transformations. Rank-Nullity theorem. Change of basis. Dual space. Bj-dual space and natural isomorphism. Adjoint of a linear transformation. Eigen values an Eigen vectors of a linear transformation. Diagonalisation . Bilinear. Quadratic and Hermitian forms.

Unit –III **Total -07 Hours**

Inner Product Space- Cauchy- Schwartz inequality-orthogonal vectors. Orthogonal complements, orthogonal sets and bases, Bessel's inequality for finite dimensional spaces. Gram-Schmidt orthogonalization process

Unit-IV **Total -08 Hours**

Solution of Equations : Bisection. Secant. Regula Falsi. Newton's Methods. Roots of second degree polynomials. Interpolation: Lagrange interpolation. Divided differences. Interpolation formula using Differences. Numerical Quadrature. Newton- Cote's formulae Gauss Quadrature formulae

Unit-V **Total -10 Hours**

Linear equations direct methods for solving system of linear equations (Gauss elimination. LU decomposition. Cholesky decomposition). Iterative methods (Jacobi. Gauss- Seidel reduction methods). Ordinary differential equations: Euler method. Single step method, Runge- Kutta's method, Multistep methods. Milne Simpson methods based on Numerical integration , Methods based on numerical differentiation

Text Books :-

1. K.B. Datta- Matrix and Linear Algebra, Pretice hall of India Pvt. Ltd. New Delhi.2000
2. S.S.Sastry- Introductory Methods of Numerical Analysis. PHI learning Pvt.Ltd.

Reference Books :-

1. K.Hoffiman and R. Kunze- Linear Algebra. 2nd Edition. Prentice Hall Englewood Cliffs.
2. S.K. jain . A Gunawardena & P.B.Bhattacharya- Basic linear Algebra with MATLAB Key College Publishing (Springer-Verlag) 2001
3. S. Kumarsaran- Linear Algebra. A Bermetric Apprae Prentice-Hall of india.200
4. Balaguruswamy – Numerical Methods. Tata Me Graw Hill Publication. New York

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

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Keywords
Vector spaces, subspaces. Linear span. Linear dependence. Extension Theorem. Quotient space and its dimension. Algebra of linear transformations. Rank-Nullity theorem. Eigen values an Eigen vectors of a linear transformation. Bisection. Secant. Regula Falsi. Newton's Methods. Newton- Cote's formulae Gauss Quadrature formulae. Gauss elimination. LU decomposition. Cholesky decomposition. Runge- Kutta's method,

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BSCC (Y-303B) Real and Complex Analysis

BSCC (Y-303B)	**PAPER- II**	**Real and Complex Analysis**	**4L:0T:0P**	**40 Hrs**	**4 Hrs/Week**

Course Objective
Up to this stage, students do study the concepts of analysis Riemann integral, Integrability of continuous and monotonic functions. Implicit function theorem. Continuity. Derivability and integrability of an integral of a function of a parameter. Neighborhoods. Limit points. Interior points.

Course Learning Outcomes
The course will enable the students to:
CO1. Find Schwarz's and Young's theorem. Implicit function theorem.
CO2. Find Fourier series of half and full intervals.

CO3. Find Cauchy sequences. Completeness, Cantor's intersection theorem, Contraction principle, Real number as a complete ordered field.

CO4. Find Extension theorem. Uniform continuity. Compactness, Sequential compactness.
CO5. To Explain Analytic functions. Cauchy- Riemann equations. Harmonic functions. Mobius transformations

Unit- I **Total -10 Hours**

Riemann integral, Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus, Partial derivatives and differentiability of real- valued functions of two variables. Schwarz's and Young's theorem. Implicit function theorem.

Unit- II **Total -10 Hours**

Improper integrals and their convergence . Comparisn test. Abel's and Dirichlet's tests. Frullani's integral as a function of a parameter. Continuity. Derivability and integrability of an integral of a function of a parameter. Fourier series of half and full intervals.

Unit-III **Total -10 Hours**

Definition and examples of metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets closure and interior . Boundary points. Subspace of metric space, Cauchy

sequences. Completeness, Cantor's intersection theorem, Contraction principle, Real number as a complete ordered field. Dense subsets. Baire Category theorem. Separable, second countable and first countable spaces.

Unit-IV **Total -08 Hours**

Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Totally bounded spaces. Finite intersection property. Continuous functions and compact sets.Connectedness.

Unit-V **Total -07 Hours**

Complex numbers as ordered pairs. Geometric representation of complex numbers. Continuity and differentiability of complex functions. Analytic functions. Cauchy- Riemann equations. Harmonic functions. Mobius transformations. Fixed points. Cross ratio. Inverse points, Conformal Mappings .

Text Books:

1. Mathematical analysis by S.C. Malik and Savita Arora. New age publication.Delhi.
2. G.F.Simmons – Introduction to Topology and Modern Analysis. Me Graw Hill. New York 1963
3. L.V. Alhfors. Complex Analysis Me Graw Hill. New York

Recommend Books

1. Walter Rudin-Real and Comples Analysis. Me Graw Hill. New York
2. Ponnuswamy- Complex Analysis. Narosa Publication. New Delhi.
3. R.V. Churchill & J.W. Brown Complex Variables and Application. 5th Edition. Mc Graw Hill New York. 1990

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords
Riemann integral, fundamental theorem of integral calculus. Mean value theorems of integral calculus, . Schwarz's and Young's theorem. Implicit function theorem. Continuity. Derivability and integrability of an integral of a function of a parameter. Fourier series of half and full intervals. metric spaces. Neighborhoods. Limit points. Interior points. Open and closed sets closure and interior . Separable, second countable and first countable spaces. Continuous functions. Extension theorem. Uniform continuity. Compactness, Sequential compactness. Analytic functions. Cauchy- Riemann equations. Harmonic functions. Mobius transformations.

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BSCC (Y-303C) Statistical Methods

BSCC(Y-303C)	**PAPER- III**	**Statistical Methods**	**4L:0T:0P**	**40 Hrs**	**4 Hrs/Week**

Course Objective
The course aims at building a strong foundation of theory of statistical distributions as well as understanding some of the most commonly used distributions. The course also aims to equip the students to analyze, interpret and draw conclusions from the given data.

Course Learning Outcomes
The course will enable the students to:
CO1. Determine Frequency Distribution - Measures of central tendency.
CO2. To Explain Continuous probability- probability density function and its applications for finding the mean, mode.
CO3. Know about correlation and regression for two variables,
CO4. Test validity of hypothesis, using Chi-square, F and t-tests, respectively in sampling distributions.

Unit-I **Total -08 Hours**

Frequency Distribution-Measures of central tendency. Mean, Median, Mode, G.M, H.M. Partition values. Measures of dispersion- Range. Interquartile range. Mean deviation. Standard Deviation. Moments. Skewness and Kurtosis.

Unit-II **Total -10 Hours**

Probability-Event, Sample space. Probability of an event. Addition and multiplication theorems, Baye's theorem, Continuous probability- probability density function and its applications for finding the mean, mode. Median and standard deviation of various continuous probability distributions. Mathematical expectation. Expectation of sum and product of random variables. Moment generating function.

Unit-III **Total -07 Hours**

Theoretical Distribution – Binomial- Poisson. Rectangulars and exponential distributions, their properties and uses.

Unit- IV **Total -06 Hours**

Methods of least squares. Curve fitting. Co-relation and regression. partial and multiple correlations(upto three variables only)

Unit-V **Total -10 Hours**

Sampling- Sampling of large samples. Null and alternative hypothesis. Errors of first and second kind. Level of significance. Critical region. Tests of significance based on chi- square.t.F and Z-statistics.

Text Books:-

1. H.C. Saxena and j.N kapoor. Mathematical statistics S.Chand and Company
2. M.Ray- Statistical Methods.

Teaching Learning Process

- Each topic to be explained with examples.
- Students to be involved in discussions and encouraged to ask questions.
- Students to be given homework/assignments.
- Students to be encouraged to give short presentations.
- Illustrate the concepts through CAS.

Assessment Methods

- Presentations and participation in discussions.
- Assignments and class tests.
- Mid-term examinations.
- End-term examinations.

Keywords

Probability-Event, Sample space. Probability of an event. Addition and multiplication theorems, Baye's theorem, Mean, Median, Mode, Theoretical Distribution – Binomial- Poisson. Co-relation and regression. . Tests of significance based on chi- square.t.F and Z- statistics. Null and alternative hypothesis.