COURSES AND THEIR OUTCOME OF B.COM PROGRAMME:

SEMESTER	COURSE CODE	PAPER TITLE	COURSE OUTCOME
I	1COMTH1	ACCOUNTING-I	After completing the course the student will be able to: 1.Acquire conceptual knowledge of basics of accounting 2. Identify events that need to be recorded in the accounting records 3 Develop the skill of recording financial transactions and preparation of reports in accordance with GAAP 4. Describe the role of accounting information and its limitations 5. Describe the role of govt. accounting and lease accounting. 6.Use of royalty accounts 7. Define hire purchase system and installment payment method including its accounting Process and difference.
	1COMTH2	BUSINESS LAW-I	On completion of the course the student will be able to: 1- Define The Indian Contract Act, 1872 and Including Sections 1 to 31, 56, 64,65,68,70 to 75, 124, 126, 148 to 151, 170, 172, 182 to 189, 201 and 211 to 225. 2.Define -Sale of Goods Act, 1930 and Cover all Sections of this Act Contract of Sale- Essentials of a Contract of Sale, Sale and Agreement to Sell; sale and gift, Sale and Barter, Sale and Bailment; Subject Matter of contract of sale, Types of goods, Effect of destruction of subject matter; Price-Mode of fixing the price; Conditions and Warranties, Implied Condition and warranties; Doctrine of Caveat Emptor; Transfer of ownership and title, Performance of contract of sale; Unpaid seller-Rights of unpaid seller; Suit for breach of contract; Sale by Auction.

			3. Define The Limited Liability Partnership Act, 2008 and Cover all sections of this Act. Salient Features, Difference between LLP and Partnership, LLP Agreement, Partners and Designated Partners- Duties and Responsibilities, Incorporation and Registration, Extent of liability of LLP and Partners, Dissolution.
	1COMTH3	**BUSINESS ECONOMICS-I**	The students will be able : 1. To familiarize with the basic concept of Business Economics. 2. Understand the law of diminishing marginal utility, equi-marginal utility and demand analysis in business applications. 3. Understand the concept of production and its relationship to Business operations.
	1COMTH4	**BUSINESS COMMUNICATION-I**	Student will be able to: 1. Discuss the importance of effective communication and understand the different aspects of communication using the four macro skills – LSRW (Listening, Speaking, Reading, and Writing). 2. Differentiate between different methods of communication 3. Discuss the importance of ethical communication 4. Develop and Expand Writing Skills through Controlled and Guided Activities 5. Developing and delivering effective presentation.
	1COMTH5	**MONEY,BANKING& FOREIGN EXCHANGE-I**	The student will be able to understand : 1. Explain the various functions of money, and how money has evolved over time. 2. Analyze the theories of the demand for and supply of money. 3. List what is included in the various measures of the money supply.

			4. To understand the basic concepts of money market, it's functioning and the tools used.
	1COMTH6	BUSINESS ORGANISATION &MANAGEMENT-I	The student will be able to: 1. Explain the concept of business 2. Distinguish between for-profit and nonprofit businesses 3. List and explain the four factors of production required to sustain a business 4. Identify the primary functional areas within a business and describe their contribution to the organization 5. Identify business stakeholders and describe their relationship with business organizations 6. Identify the external forces that shape the business combinations 7. Explain social Responsibility and Ethics.

SEMESTER	COURSE CODE	PAPER TITLE	COURSE OUTCOME
II	2COMTH1	ACCOUNTING-II	On completion of the course, the student will be able to: 1.Explain Reserves and Funds: 2. Define Accounting of. Insurance Claims to students 3. To understand how to 4.Amalgamate the Companies: 5.Accounting of Holding Companies: 6. To explain the students how to Liquidate the Company: Voluntary & Compulsory

	2COMTH2	BUSINESS LAW-II	The student will: 1. Study various definition Negotiable Instruments Act, 1881 and important section of this Act. 2. Study the concept of Law of Insurance 3. Discuss the various types and principles of Insurance. 4. Study the concept and important definition of U.P. Shops and Commercial Establishments Act, 1962: 4. Discuss the important provision of this Act.
	2COMTH3	BUSINESS ECONOMICS-II	On course completion, the student will be able: 1. To familiarize students with the cost and revenue concepts and its relationship in Business operations. 2. To understand the pricing and output decisions under various market structure. 3. To help students understand and apply the various decision tools to understand the market structure. 4. To apply marginal analysis to the "firm" under different market conditions. 5. To integrate the concept of price and output decisions of firms under various market structure.
	2COMTH4	BUSINESS COMMUNICATION-II	The student will be able to: 1. Develop a resume for oneself and Ability to handle the interview process confidently 2. To write impressive official correspondence and also learn to make and give effective presentations in a professional manner 3. To understand the role and significance of technology in business communication 4. To develop modern technological skills like video conferencing, social networking, etc.

	2COMTH5	MONEY,BANKING & FOREIGN EXCHANGE-II	The student will be able to: 1. Explains the main objective of monetary and fiscal policy in under developed countries. 2. Describes the process of credit creation of a commercial bank, describe the balance sheet of a commercial bank, and explain the functions of commercial bank. 3. The functions and role of Reserve Bank of India. 4. The modern banking services e.g. e-banking, m-banking and internet banking. 5. Basic understanding of IMF and WTO
	2COMTH6	BUSINESS ORGANISATION &MANAGEMENT-II	The student will be able to : 1. Describe what management is. 2. Explain the primary functions of management. 3. Describe the primary types of managers and the roles they play. 4. Explain the advantages that arise from managing people well. 5. To describe major theories of management.

SEMESTER	COURSE CODE	PAPER TITLE	COURSE OUTCOME
III	3COMTH7	COST ACCOUNT-I	The student will understand: 1.Cost accounting systems and the purposes of cost accounting 2.Defines the concepts of cost, expense, loss and revenue 3.Explains the relationships between cost and financial accounting 4.Prepare production cost statement and cost of goods sold statement 5.Explains main manufacturing cost elements 6.Calculates inventory costs according to the inventory valuation techniques and makes journal entries of them 7.Calculates labor costs and records them

			8.Calculates factory overhead costs and records them and make costs allocations (first and second) 9.Explains cost from the view point of the relationship with cost centers 10.Makes cost allocations according to the direct step down and mathematical techniques and records them 11.Calculates production cost according to the job cost system 12.Calculates production cost according to the job cost system 13. Explain contract costing.
	3COMTH8	BUSINESS STATISTICS-I	On completion the student will be able to: 1.Explain statistics its importance in all fields ,tabulation and presentation of data & its collection 2. Compute and interpret measures of central tendency and spread (variation), e.g., mean, median, mode, range, variance, standard deviation, percentiles and quartiles, correlation, rank correlation.
	3COMTH9	AUDITING-I	The student will be able: 1. To understand the Concept of Auditing and familiarize the Process, Classification, standards and Guidelines. 2. To give practical aspect of Commencement Conducting an Audit. 3.To describe role of Test Checking and Routine Checking 4. To understand Basic Concept of Internal Check and its Implications. To familiarize withiest Internal Control and Internal Audit. 5. To discuss how to conduct internal Check System with regard to specific areas. 6.To understand the basic concept of Vouching of Transactions 7.To describe the procedure for conduct of Vouching of Specialized Transactions 8.To understand the basic concept Verification and Valuation 9. To discuss the Guidelines on Verification of Assets issued by ICAI.

			10. To familiarize the procedure of Verification and Valuation of various Assets and Liabilities
	3COMTH10	**COMPANY LAW-I**	After course completion the student will: 1. Learn about the basic concept of company law 2013. 2. Develop the understanding of various types of company and to understand the differences between them 3. Understand the AOA, MOA and prospectus of company 4. Learn about the various types of shares and debentures 5. Learn about the qualifications, appointments, removal and remuneration of directors and managerial professionals of the company
	3COMTH11	**FINANCIAL MANAGEMENT-I**	On the completion of course, the student will be able to: 1. Demonstrate an understanding of the overall role and importance of the finance function. 2. Demonstrate basic finance management knowledge. 3. Communicate effectively using standard business terminology. 4. To understand the form and character of Profit Loss account and Balance sheet. 5. To understand the concept of time value of money 6. To learn basic ratios used in business.
	3COMTH12	**BUSINESS ENVIRONMENT-I**	The student will be able to: 1. Analyze the environment of a business from the legal l & regulatory, macroeconomic, cultural, political, technological and natural perspectives. • Critically assess the business environment of an organization using selected strategic tools. 2. Conduct an in-depth analysis of a specific component of the business environment and relate it to your own organization. 3. Construct and present scenarios that synthesize business environment information. 4. Describe Consumer Protection Act, 1986

SEMESTER	COURSE CODE	PAPER TITLE	COURSE OUTCOME
IV	4COMTH7	COST ACCOUNT-II	The student can: 1. Explain the principles of job order costing system 2. Prepare the documents that are with job cost system 3. Make the accounting records and calculate product cost according to the process costing 4. Explain the flow of costs in process system 5. Explain the steps that will be used in process costing 6. Explain budgetary costing and standard costing 7. Define different variances 8. Material ,labor variances
	4COMTH8	BUSINESS STATISTICS-II	After the course completion, the student will be able to: 1. Understand the concept of probability and its applications in a business context. 2. Understand the concept of probability and the properties that probabilities must satisfy. Perform computations using the rules of probability; addition and multiplication rules. 3. Use conditional probability to understand the association between two categorical variables in two-way cross-tabulation tables. Interpret statistical independence of two variables. 4. Explain interpolation by parabolic curve method, newton's method, binomial method, and index number and Analysis of Time series.
	4COMTH9	AUDITING-II	The student will be able to: 1. Study the role of Company Auditor and its related provision as per Companies Act, 2013. 2. Study the meaning and types Auditor's Report.

			1. Describe the Specimen of Audit Reports. 2. Study the procedure of Audit of Banking and Insurance Companies. 3. Describe special points relating to Audit Of Banking Company and Insurance Company. 4. Study the concept and procedures of Cost Audit and Management Audit. 5. Study the concept and process Tax Audit and Secretarial Audit.
	4COMTH10	**COMPANY LAW-II**	The student will be able to: 1.Learn about convening and conduct of meeting of shareholders and board of directors and about the types of meeting 2. Develop understanding about the ascertainment and distribution of profits of the company 3. Develop the idea of corporate social responsibility and it's applicability 4. Learn about winding up of company and e-governance
	4COMTH11	**FINANCIAL MANAGEMENT-II**	On the completion of this course, the student will be able to understand: 1.The concepts, methods and techniques of Capital Budgeting. 2. Various types of budgets with their usage in financial decision making and control. 3. The importance of corporate securities and sources of long term finance. 4. How to use Short term finance and working capital in organization. 5. Understand the basic of leverage analysis.
	4COMTH12	**BUSINESS ENVIRONMENT-II**	The student will be able to: 1. Discuss about the salient feature of Competition Act, 2022 2. Discuss about the Environment Protection Act, 1986 & its feature 3. Explain food safety and standards authority of India, TRAI, IRDA. Some part of WTO , FDI

SEMESTER	COURSE CODE	PAPER TITLE	COURSE OUTCOME
V	5COMTH13	INCOMETAX LAW &ACCOUNTS- I	After course completion it will: 1. Enable the students to identify the basic concepts, definitions and terms related to Income Tax. 2. Enable the students to determine the residential status of an individual and scope of total income. 3. Enable the students understand about agricultural income and exempted income. 4. Enable the students to compute income under various heads namely income from salaries, house property, and income from business & profession.
	5COMTH14	CORPORATE ACCOUNT-I	The students will: 1. Able to Study the concept of Share and Debentures. 2. Describe the procedure of Issue of share and debenture. 3. Study the practical aspects of Share and Debenture 4. Understand the concept and working of underwriting 5. Familiarize the students about the SEBI guidelines for Underwriting. 6. Study the Practical aspects Problems. 7. Study the concept Profit or Loss Prior to Incorporation 8. Study the Practical aspects Problems. 9. Study the concept of Final Accounts of Companies 10. Describe the format Presentation of Final Accounts of Companies. 11. Study the Practical aspects Problems. 12.Study the concept of Liquidation of Company 13. Describe the Preparation of Statement of Affairs and Deficiency Account and Liquidator's Final Statement of Account.

			14. Study the Practical aspects Problems.
	5COMTH15	HUMAN RESOURCE MANAGEMENT-I	The student will be able to: 1. Understand and apply Human Resource Management Perspective Ability. 2. Draft HR planning Ability to Design Job Description and Job Specifications. 3. Apply Techniques of Job to recruit Select and interview job candidates. 4. Train employees using various methods of Training & development.
	5COMTH16	CONCEPT OF MARKETING MANAGEMENT	On course completion the student will be able: 1. Understand the concepts of marketing management 2. Learn about marketing process for different types of products and services. 3. Understand the pricing policies and its application in the businesses. 4. Perform a market segmentation analysis, determine the organization's target market and define the consumer behavior of each segment.
	5COMTH17A	Principles and practices of Life and Property Insurance-I	On the completion of the course, the student will be able to: 1. Identify what insurance is, why insurance works and how to determine insurance needs. 2. Explain insurance operation, including functions of insurance, Insurance markets, insurance regulations and the use of insurance as a tool to avoid losses and reduce risk. 3. Familiarize themselves with major insurance products, such as life Insurance, health insurance, property and liability insurance. 4. Compare various kinds of insurance plans as well as the contract selection criteria from a cost-benefit point of view.

	5COMTH17B	BANKING LAW AND PRACTICES-I	The course will : 1. Enable the students understand about the bank- customer relationship and its termination. 2.Enable the students learn about various types of customer's account and precautions taken by bank 3. Enable the students learn about employment of bank funds and mode of securing advances. 4. Enable the students understand about Negotiable Instruments Act, 1881
	5COMTH18A	INSURANCE LAW,SALESMANSHIP &RISK MANAGEMENT. -I	It will help the student: 1. Understand the basic concept of insurance, principles of insurance and insurance contract. 2. Learn about the present insurance laws in India. 3. Understand the appointment, functioning of Insurance salesman, agent and branch manager
	5COMTH18B	FOREIGN EXCHANGE PRACTICES &PROBLEMS.-I	1. Study the concept Foreign Exchange. 2. Describe the Need and Differences between Foreign Exchange and Normal Transaction. 3. Study the concept of Various Documents used in Foreign Trade 4. Study the concept of Balance of Trade and Balance of Payments. 5. Discuss the disequilibrium in the BOP: Causes, Consequences and Remedies. 6. Study describe the Mechanism of International Payment. 7. Study the Equilibrium Rate of Exchange and its type. 8.Study the concept of Foreign Exchange Market and its Operations.

			9. Study the concept of Foreign Trade Risks and Insurance. 10. Study the working and role of ECGC.

SEMESTER	COURSE CODE	PAPER TITLE	COURSE OUTCOME
VI	6COMTH13	INCOMETAX LAW &ACCOUNTS- II	The course will enable: 1. The students to compute income from capital gain and income from other sources. 2. The students to discuss the various deductions under Chapter VI- A of the Income tax act, 1961. 3. The students to compute the net total taxable income of an individual. 4. The student to assess the net total taxable income of HUF and Firm. 5. The students understand about TDS, TCS, filling of return, rebates and relief, powers and duties of CBDT, clubbing of income and advance payment of tax
	6COMTH14	CORPORATE ACCOUNT-II	The student will: 1. Study the concept and its practical problems of Amalgamation and Reconstruction of Companies. 2. Study the concept and practical aspect of Holding Companies. 3. Study the concept and accounting aspects of Banking Companies: 4. Describe the format and practical problems of Final Accounts in Form A and Form B – A Detailed Study 5. Study the concept and accounts of Insurance Companies: 6. Describe the format of Balance sheet (Form A) and its practical problems.
	6COMTH15	HUMAN RESOURCE	It will help the student: 1. To Study Management Development Techniques Ability

		MANAGEMENT-II	to appraise the Performance of the employees. 2. To apply the factors determining pay rates. 3. Will be able to implement Employee benefits and Welfare measures & to implement Employee safety and Health Measures Ability of efficient Salary Administration 4. Will Explain Leadership & Motivation ,Industrial Relations , Industrial Disputes 5. Will be able to define Human resource Audit & Research.
	6COMTH16	**Practices of marketing management-II**	The student will be able to: 1. Understand Rural marketing 2. To understand the channel of distribution and its functioning 3. Help to understand the concept of promotional mix 4. Learn about digital and social marketing and the social responsibility of business towards the society and the marketing ethics.
	6COMTH17A	**Principles and practices of Life and Property Insurance-II**	The student will be able : 1.To learn about the settlement of claims under life insurance 2. To understand other general insurance policies (fire and marine) 3. To understand the process of settlement of claims in general insurance
	6COMTH17B	**BANKING LAW AND PRACTICES-II**	The course will: 1. Enable the students understand about the Banking regulations act, 1949 2.Make students understand about RBI guidelines and regulations 3. Enable the students understand about insolvency and bankruptcy code, 2016 4. Enable the students understand about recommendations of Tandon committee, K. Kannan committee and chore committee. 5. Make students learn about Liberalized Exchange Rate Mechanism (LERM)

			And special banking problems in India.
	6COMTH18A	INSURANCE LAW,SALESMANSHIP &RISK MANAGEMENT. -II	The student will: 1. Learn about the appointment, training, functioning of a development officer. 2. Understand the concept of risk management practices in insurance.
	6COMTH18B	FOREIGN EXCHANGE PRACTICES &PROBLEMS.-II	1. To study the concept of Various Export Credit and Shipping Finance. 2. To study working and role of EXIM Bank. 3. To study the concept and process of Liberalized Exchange Rate Mechanism (LERM). 4. To study and discuss various report on Capital Account Convertibility. 5. To discuss Legal and Procedures of Travel Remittances regarding Inward and Outward. 6. To study the concept, procedure and various facilities of Non-Resident Accounts. 7. To study the concept and working Arithmetic of Exchange Rate. 8.To discuss the calculation and practical aspects of Spot and Forward Rates.

Date: 26.3.2022

(Signature and seal)
Head/Coordinator of Department

Coordinator (B.Com)
Ewing Christan College
Prayagraj

9.	Amount of Purchase of books/ e-books and subscription to journals/e-journals during the year 2020-2021 in departmental Library	
10.	Does the department have Departmental Library and access to e-books or e-journals? Yes/No	Yes

Note: If the response to any of the statements above is in the affirmative, please fill up the Google forms sent to you ***in the official Whatsapp group of Heads/Coordinators*** *in the Soft copy.*

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	Bachelor of Education (B.Ed.)	B.Ed.	2003 (2 years)	100 (2 Units)
2.				
3.				

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc./B.Ed. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	TE 601	Philosophy & Sociology of Education	Students will be able to know about the nature, scope and the impact on education by Educational Sociology, Social Mobility Modernization, And the role of education in social reconstruction. Students will be able to know about the concept, factors influencing and effects on education of social stratification, social change and socialization.
	TE 602	Development Of Learner	Students will be able to know about nature, scope & methods of educational psychology. Students will be able to know about developmental characteristics of secondary school students. Students will learn about individual differences. Students will be able to know about mental health. Students will be able to learn how to maintain their mental health. Students will be able to know about the adjustment mechanism. Intelligence and Personality: Meaning, nature and theories Students will be able to define and explain the meaning of intelligence and personality, discuss its nature and theories. Children with Special Needs : Identification of gifted, mentally retarded, delinquent and handicapped children, special versus inclusive education.
	TE 603	School Curriculum Development	Receive the knowledge about different approaches and steps in curriculum development. Discuss the different principles of curriculum construction. Organize the curriculum in terms of selection, experience, objectives, sequence and integration. Discuss about professional support and role of N.C.E.R.T., C.B.S.E., S.C.E.R.T. and S.I.Es. Learn how to prepare curriculum hand book, modules, source materials and innovative instructional materials. Discuss the role, importance and evaluation of textbooks in learning. Explain salient features of N.C.F. (2005)
	TE 604	Principles And Methods Of Teaching	Students will be able to understand the Process of Teaching Meaning, phases and level of teaching. Students will be able to understand the Basic Teaching model. Students will be able to understand the Communication process – meaning, factors affecting it, means of communication. Students will be able to understand various Teaching Skills: Skills of introducing a lesson, questioning, stimulus variation, illustration, explanation, closure, reinforcement, demonstration, microteaching and skill integration.

	TE 631	Personality Development & Yoga	Understand various forms of Visual Art and utilize them to make teaching art based. Develop art based Teaching-Learning Material to teach students effectively Develop aesthetic sensibilities Acquire knowledge of Visual Arts, retain it and transform it in future course of teaching learning. Students will be able to identify themes of drama, learn the selection of songs, script and execute the stages of drama, know the meaning, importance of communication and tips for good AV presentation. Students will be able to learn how to organize a cultural programme at school level Students will be able to participate in play, music, dance, debate/speech, elocution/recitation and group discussion. Students will be able to know about the concepts of Health & Physical fitness. Students will be able to learn about the impact of sport activities on the health of students. Students will be able to do physical fitness exercise, rhythmic activities and self-defence. Students will be able to learn about working rules and laws of different games such as Football, Hockey, Cricket, Volleyball, Badminton, Kabaddi, Table tennis, Khokho, Basketball, etc. YOGA
II	TE 651 – 661 (Optional)	Subject Knowledge Subjects taught at secondary level in any two of the teaching subjects opted by the candidate – (TE 651) English, (TE 652) Hindi, (TE 653) Sanskrit, (TE 654) Mathematics, (TE 655) Physical Science, (TE 656) Biological Science, (TE 657) History, (TE 658) Geography, (TE 659) Economics, (TE 660) Civics, (TE 661) Commerce,	Students will be able to teach their respective subjects at secondary level.

	TE 662 – 672 (Optional)	Pedagogy of School Subject I and II (Any two of the following TE 662 – 672 other than opted for School Subject I and II) (TE 662) Pedagogy of English Language & Literature (TE 663) Pedagogy of Hindi Language & Literature (TE 664) Pedagogy of Sanskrit Language & Literature (TE 665) Pedagogy of Mathematics (TE 666) Pedagogy of Physical Science (TE 667) Pedagogy of Biological Science (TE 668) Pedagogy of History (TE 669) Pedagogy of Geography (TE 670) Pedagogy of Economics (TE 671) Pedagogy of Political Science (TE 672) Pedagogy of Commerce	Students will be able to understand various teaching methods of their respective subjects at secondary level.
	TE 632	School Internship – I (Management of School Activities)	Students will be able to know about the concept of, importance and need of various types of registers, records and result. Students will be able to learn how to make various types of registers, records and results. Students will be able to know about the concept of, needs and importance of School Assembly. Students will be able to organize School Assembly. Students will be able to know about the concept of, needs and importance of a School Time Table Students will be able to make a School Time Table.
	TE 633	School Internship – I (Learner Assessment)	Students will be able to learn about the concept of personality and will be able to measure one's personality by the method of sociometric test.

III	TE 605	Assessment of Learning	Define the concept of evaluation, measurement and differentiate between formative and summative evaluation. Discuss the strength & weaknesses of present examination system at secondary level and the various examination reforms. Know about the characteristics of various good measuring tools. Students will be able to know about the process, characteristics, types of achievement tests and will be able to construct an achievement test by using various test items.
	TE 606	Educational Technology & ICT	Understanding Mass Media its Uses, advantages and limitations of radio, television, films, current status of mass media in education. Students can understand the Role of teacher in using mass media and how to select media for instruction. Students will be able to understand various Open Educational Resources. Students will be able to Know regarding working of various hardware- overhead projector, LCD, Computer, CCTV, Online Learning & networking, e-mail, tele- conferencing. Students will be able to understand the Role of CIET, UGC and IGNOU in production of educational television programmes and software
	TE 634	School Internship - II Subject I (20 Lesson Plans + 1 Final lesson plan teaching)	Students will be able to understand the basic knowledge of lesson planning, and developing behavioural objectives. Students will be able to understand the classroom teaching method and styles. Students will be able to understand the structure of teaching skills and its application in school setting.
	TE-635	School Internship - II Subject II (20 Lesson Plans + 1 Final lesson plan teaching)	Students will be able to understand the basic knowledge of lesson planning, and developing behavioural objectives. Students will be able to understand the classroom teaching method and styles. Students will be able to understand the structure of teaching skills and its application in school setting.

	TE 636	School Internship - II (Community Work)	**Organization of a rally or campaign on any social issue e.g. Polio, HIV, Electoral Rights, Gender sensitization etc.** **Gardening.** Students will be able to know the importance and need of gardening Students will be planting one sapling each **Cleanliness of the campus and beautification** ○ Students will be able to know the importance of campus cleanliness and beautification. ○ Students will be cleaning and beautifying the B.Ed campus. **Cleaning of furniture** ○ Students will be able to understand the value of cleaning and learn the importance of clean furniture. ○ Students will be able to develop certain values through community work. **Assembly** ○ Students will be able to learn how to conduct a school assembly. **Community Games** ○ Community Games ○ Students will be able to know about the need and importance of community games ○ Students will be able to know about the effect of community games on the health of students. **Cultural Programmes** ○ Students will be able to know the importance and need of cultural programmes and will be able to organize them at secondary school level. **S.U.P.W.** ○ Students will be able to create items using waste materials. ○ Students will be able to develop aesthetic values through this activity. **Scout & Guide** **Celebration of National Festivals, Teachers Day etc.** ○ Students will be able to know the importance of and celebrate various National Festivals, Teachers Day etc **First Aid** ○ Students will be able to understand the need, importance of First aid in schools. ○ Students will be able to understand the types of procedures in first aid ○ Students will be able to understand the common ailments and its medicines. ○ Students will be able to understand various types of bandages and its use. • **Aesthetic development activities- decoration of classroom etc.**

IV	TE 607	Psychology of Learning	Students will be able to understand various psychological aspects of learning and learners
	TE 608	Education in Contemporary Indian Society	Students will learn about: Contemporary Indian Society, constitutional provisions of education for SC, ST, OBC, Girl Child), RTE, Value Crises, Education for conservation of environment. Students will do a critical review of: the present school system, the public-private divide and the stratified government school system (Education Guarantee Scheme Alternative Schools, Non-formal Education, Kendriya, Navodaya and Pratibha Vikas Vidyalayas, KGBV, Vision of Common School System.
	TE 609	School Management	Students will be able to learn about concept and function of school management and school supervision. • Students will be able to know about concept and process of institutional planning, school records and school finance. • Students will be able to understand the nature and type of School plant: School building – its site, types and construction. • Understand the importance of lighting and ventilation in classroom. • Understand the importance of furniture and its impact on posture. • Students will be able to gain knowledge about School personnel: Qualities and roles of principal and teacher, procedure for recruitment of principals and teachers, code of professional conduct for teachers. • Students can understand the Functions and responsibilities of teachers with reference to School Develops knowledge of Health Service- common ailments of children, common, physical defects, conditions of healthy physical life in school, nutrition, school meals, recreation, safety education among pupil teachers.
	TE 610	Action research	Defines the concept of action research and differentiate between fundamental and action research. Discuss needs, identification and evaluation of problems for action research.

	TE 637	Language Across the Curriculum	Students will know about Presentation Techniques, it's meaning, importance and use of presentation. Students will be able to deliver Audio visual and Power point Presentation. •Students will be able to discuss tips for good oral delivery. •Students will be able to learn about various forms of Technical communication, different types of letters, Job applications and Resumes, Reports. •Students will be able to distinguish among various types of communication. •Students will be able to explain about the significance structure, style and writing of Reports.

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome

*Add more rows if required.

Date:

(Signature and Seal)

Head/Coordinator of Department

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	Bachelor of computer Application	BCA	2016	60

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title /Paper Title	Course Outcome
I	BCA101	Mathematics-I	CO1: Able to solve qualitative problems based on vector analysis and matrix analysis such as linear independence and dependence of vectors, rank etc. CO2: Understand the concepts of limit theory and nth order differential equations and their applications to our daily life CO3: Able to solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables.
	BCA102	Statistics	CO1: Student understand the concept of Elementary Probability, Random Variables, Bayes' theorem, Probability Mass Function (PMF) of Discrete Random Variables, Probability Density Function (PDF) CO2: Student understand the concept of Discrete uniform distributions, Bernoulli distribution, Poisson distribution, Binomial distribution, Continuous uniform distribution, Normal distribution. CO3: Measures of Central Tendency, Dispersion, Simple linear regression, Method of least squares, Correlation Coefficients, Point and interval estimation, Unbiased, sufficiency, likelihood function and maximum likelihood estimator, Confidence interval for the mean of normal distribution and Statistical Inferences
	BCA103	Basic Circuit Analysis	
	BCA104	Fundamentals of Programming	CO1: Develops basic understanding of computers, the concept of algorithm and algorithmic thinking. CO2: Develops the ability to analyse a problem, develop an algorithm to solve it. CO3: Develops the use of the C programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.
	BCA105	Communication Skills	CO1: Basics of communication. Importance of communication, Communication in primitive societies, Better Linguistic Knowledge. Verbal and non-verbal, One way and two way communication, Objectives of communication: Information. Advice. Order. suggestion Persuasion

			Education, Warning, Raising morale, Motivation CO2: Presentation skills & Interview skills, Clarity, Completeness, Conciseness, Consideration, Courtesy, Correctness, Choice of the right word, the art of listening-learning through listening- body language. CO3: Communication Aids: Prose Text Book, Precis writing, Grammar, Words, Idioms, Antonyms and synonyms, Using Microsoft Office Suite, Antonyms change of words into different parts of speech, Correspondence: Drafting personal letters, CV, Application for jobs, Business letters, Official letters, Project preparation. It develops confidence in students overall personality.
	BCA106	Business Systems	CO1: Demonstrate foundational knowledge in accounting, economics, finance, management, and marketing in application of concepts and theories. Demonstrate effective skills in written and oral communications using appropriate technologies. CO2: Demonstrate an ability to integrate the concepts of the core areas of business. Demonstrate awareness of the importance of the ethical requirements of business activities. CO3: Demonstrate an ability to conduct methodological, secondary research into business issues, which may relate to general business or to a specific business function, which requires familiarity with a range of data, research sources and appropriate methodologies.
	BCA171	Lab in Analog Electronics	CO1: Design, construct, and take measurement of various analog circuits to compare CO2: Experimental results in the laboratory with theoretical analysis.
	BCA172	Lab in C Programming	CO1: Use the fundamentals of C programming in trivial problem solving CO2: Enhance skill on problem solving by constructing algorithms CO3: Identify solution to a problem and apply control structures and user defined functions for solving the problem CO4: Demonstrate the use of Strings and string handling functions CO5: Apply skill of identifying appropriate programming constructs for problem solving
	BCA201	Mathematics-II	CO1: Understand the concept of Infinite series, Convergence and divergence of infinite series, Integral test, Comparison test, Ratio test, Cauchy's root test, Complex Variables, Cauchy-Riemann equations CO2: Understand the concept of Scalar and vector fields, Directional derivative & Gradient operator, Conservative fields and potential functions, Divergence and Curl of vector fields, Applications to different coordinate systems

			CO3: Knowledge about Fourier Series , Convergence of Fourier Series and their integration and differentiation, Euler formulae for Fourier coefficients, Operational Properties of the Laplace Transform, Linearity property, Transform of elementary functions, Laplace transforms of derivatives and integrals
	BCA202	Basic Electronics	CO1: Properties of semiconductors, Intrinsic and extrinsic semiconductors, P and N type of impurities and doping, Bridge Rectifier and their calculation for ripple, Efficiency and PIV; Clipper, Clamper and voltage doublers, Zener and Avalanche breakdown diodes, Tunnel diode, Varactor diode, Thermistor. CO2: Working and basic characteristics, CB, CE & CC configuration of transistor amplifiers, Analysis for CB and CE basic amplifiers, Analysis of CB and CE circuits using h-parameters for gains and impedances CO3: Basic configuration of JFET, Biasing, Pripciple of operation and basic characteristics, Basics of MOSFET, Block diagram of Power Supply (PS) and it's constituent circuits , Electronics voltage stabilizer, Zener and transistor circuits for stabilization
II	BCA203	Digital Electronics and Computer Organization	CO1: Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency. CO2: illustrate reduction of logical expressions using boolean algebra, k-map and tabulation method and implement the functions using logic gates CO3: realize combinational circuits for given application. design and analyses synchronous and asynchronous sequential circuits using flip-flops
	BCA204	Data Structures	CO1: Learn the basic types for data structure, implementation and application. C02: Know the strength and weakness of different data structures. CO3: Use the appropriate data structure in context of solution of given problem.
	BCA205	Linux and Shell Programming	CO1: Identify and use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks. CO2: Effectively use the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks. CO3: Monitor system performance and network activities.
	BCA206	Principles of Programming Languages	CO1: Student know about Factors influencing the evolution of programming language, Development in programming methodologies, elementary and structured data type. CO2: Student also know about how to hide data, reuse data, parameter passing, referential transparency etc

			CO3: GUI vs CUI; Event Driven Programming; Visual Programming; VB Environment: Steps in creating & using controls; Notion of Scripting; Scripting via Perl
	BCA271	Lab in Digital Electronics	CO1: Learn the basics of gates. Construct basic combinational circuits and verify their functionalities CO2: Apply the design procedures to design basic sequential circuits, Learn about counters CO3:Learn about Shift registers, To understand the basic digital circuits and to verify their operation
	BCA272	Lab in Linux and Shell Programming	CO 1: To provide introduction to UNIX Operating System and its File System, to gain an understanding of important aspects related to the SHELL and the process CO2: To develop the ability to formulate regular expressions and use them for pattern matching. CO3 : To provide a comprehensive introduction to SHELL programming, services and utilities.
	BCA301	Discrete Structures and Graph Theory	CO1: Understand the concept of Propositional Logic, Functionally complete set of connectives, Normal forms, Inference, Theory of statement calculus, Consistency of premises CO2: Predicates, Statement functions, Quantification, Interpretation of predicate formulas, Inference theory for predicate calculus, Informal & formal proofs, Prenex normal form, Set Theory CO3: Know about Graphs, Directed graph, Matrix representations, Paths, Distances, Connectedness of digraphs, Path and reachability matrices, Partially ordered sets, Hasse diagrams, Lattices, Distributive and Modular lattices, Complements,
	BCA302	Design and Analysis of Algorithm	CO1: Argue the correctness of algorithms using inductive proofs and invariants. CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. CO3: Explain what amortized running time is and what it is good for. Perform amortized analysis.
	BCA303	Introduction to System Software	CO1: understand the general concept, machine language programming, distinction between system software and application software, Language processors CO2: Know about the compilers, Analysis of a source program, the phases of a compiler, Lexical analysis: -The role of the lexical analyzer, Input buffering, specification of tokens Recognition of tokens, Finite automata, Conversion of an NFA to DFA, From a regular expression to an NF CO3: the role of the parser, Context free grammars, writing a grammar, Top down parsing Bottom up parsing, syntax directed translation-syntax directed definition, Peephole optimization Code Generations

III	BCA304	Object Oriented Programming using C++	CO1: Understand the difference between the top-down and bottom-up approach. CO2: Able to understand and apply the concepts of Classes &Objects, friend function, constructors &destructors in program design. CO3: Ability to Design class diagram, event diagram, activity diagram, use case diagram and many more.
	BCA305	Database Management System	CO1: Understand terms related to database design and management, the objectives of data and information management, the database development process, Understand the relational model and relational database management system, Assess data and information requirements CO2: Construct conceptual data models, develop logical data models, Evaluate the normality of a logical data model, and correct any anomalies, develop physical data models for relational database management systems. CO3: Retrieve data using SQL, understand database performance issues, understand the basics of data management and administration, the basics of data warehousing. Work as a valuable member of a database design and implementation team.
	BCA306	Computer Architecture and Microprocessors	CO1: Introduction to computer and CPU, Stored Program concepts. Introduction to Registers, Micro operations, Common Bus System. CO2: Introduction to Instruction, Instruction Cycle, Interrupt and Interrupt Cycle. CO3: Addressing Modes, Concept of I/O bus, DMA Controller. Memory Hierarchy, Cache Memory, Replacement Algorithms, Mobile Devices Architecture & Synchronous and Asynchronous Data Transfer.
	BCA371	Lab in C++	CO1: Develop solutions for a range of problems using objects and classes. Programs to demonstrate the implementation of constructors, destructors and operator overloading. CO2: Apply fundamental algorithmic problems including type casting, inheritance, and polymorphism. CO3: Understand generic programming, templates, file handling.
	BCA372	Lab in DBMS	CO1: Students get practical knowledge on designing and creating relational database systems. CO2: Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL. CO3:Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
	BCA401	Operating Systems	CO1: Identify the role of Operating System. To understand the design of control unit. Understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems

			CO2: Describe the role of paging, segmentation and virtual memory in operating systems. Description of protection and security and also the Comparison of UNIX and Windows based OS. CO3: Defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.
IV	BCA402	Operation Research	CO1: Formulate and solve problems as networks and graphs. Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and trans-shipment problems. CO2: Solve the problems using special solution algorithms. Use CPM and PERT techniques, to plan, schedule, and control project activities. Propose the best strategy using decision making methods under uncertainty and game theory. CO3: Select the best strategy on the basis of decision criteria under risk. Select the best strategy on the basis of decision criteria under the uncertainty. Determine the best choice using decision tree. Solve the zero-sum two- person games.
	BCA403	Data Communications and Networks	CO1: Understand the rudiments of how computers communicate. Be familiar with the architecture of a number of different networks. CO2: Understand the principles of protocol layering. Be familiar with modern communication systems. CO3: Understand the basic aspects of packet-based protocol design and implementation.
	BCA404	Software Engineering	CO1: Understand the process to be followed in SDLC. Define formulate and analyse a problem. CO2: Apply design and testing principles to software project development & Design Methodologies. CO3: Apply the project management and analysis principles to software project development. Knowledge about software development life cycle and problem articulation
	BCA405	Web Programming using JAVA	CO1: Able to understand java and OOPS concept. Able to create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings, apply event handling on AWT and Swing components. CO2: Able to access database through Java programs, using Java Data Base Connectivity (JDBC) CO3: Able to create dynamic web pages, using Servlets and JSP. Able to make a reusable software component, using Java Bean.
	BCA406	Numerical Methods	CO1: Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems. Apply numerical methods to obtain approximate solutions to

			CO2: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations. CO3: the solution of differential equations. Analyse and evaluate the accuracy of common numerical methods.
	BCA471	Lab in JAVA Programming	CO1: Write Java application programs using OOP principles and proper program structuring. CO2: Develop Java program using packages, inheritance and interface. CO3: Write Java programs to implement error handling techniques using exception handling
	BCA472	Lab in Data Communication and Network	CO1: Understand fundamental underlying principles of computer networking. Understand details and functionality of layered network architecture. CO2: Apply mathematical foundations to solve computational problems in computer networking CO3: Analyze performance of various communication protocols. Compare routing algorithms. Practice packet /file transmission between nodes.
V	BCA501	.Net Framework & C#	CO1: The features of Dot Net Framework along with the features of C# Acquire a working knowledge of the .NET programming model and .NET Security CO2: Learn how to implement database applications using .NET CO3: Learn how to debug .NET applications using .NET diagnostic classes and tools
	BCA502	Embedded System	CO1: Design and develop the hardware and software components of an embedded system. Make use of the enabling technologies for implementing embedded systems with emphasis on Microcontrollers from various vendors. CO2: The techniques for programming their integrated peripherals using IDE programming tools in high level languages as C. Apply contemporary techniques for Hardware-Software co-design of embedded systems for Real time applications using RTOS. CO3: Understand the interdisciplinary nature of various application fields of Embedded Systems. Design and implement an embedded system of their choice as a final project.
	BCA503	Computer Graphics	CO1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. CO2: Use of geometric transformations on graphics objects and their application in composite form. Extract scene with different clipping methods and its transformation to graphics display device. CO3: Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. Render

			projected objects to naturalize the scene in 2D view and use of illumination models for this.
	BCA504	Secure Computing	CO1: Examine and apply the fundamental techniques of computer security. Applies to Program Outcome Examine and apply the fundamental techniques of computer security. Identify and explain potential security issues. CO2: Identify and explain risk and potential security issues. Applies to Program Outcome Examine and apply the fundamental techniques of computer security. Identify and explain potential security issues. CO3: Demonstrate foundation knowledge of information security/assurance within the organization. Applies to Program Outcome Plan for the future and design a solution based on user requirements. Explain business continuity, back up and disaster recovery. Understand troubleshooting and quality consumer support.
	BCA505	Advanced DBMS	CO1: Identify advance database concepts and database models. CO2: Apply and analyse various terms related to transaction management in centralized and distributed database. CO3: Produce data modelling and database development process for object –oriented DBMS. Learn Distribute Database System and Specialized Databases.
	BCA571	Lab in C#	CO1: Read, write, execute, and debug C# applications. Understand variables and data types CO2: Code decision and control structures (if, if/else, switch, while, do/while, for) and use primitive data types. Write user-defined methods CO3: Write and manipulate arrays. Write programs using object-oriented programming techniques including classes, objects, inheritance, and polymorphism. Use graphical user interface (GUI) components. Understand C#'s Event Handling Model
	BCA572	Mini Project	CO1: Students will be able to practice acquired knowledge within the chosen area of technology for project development. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. CO2: Reproduce, improve and refine technical aspects for engineering projects. Work as an individual or in a team in development of technical projects. CO3: Communicate and report effectively project related activities and findings.
VI	BCA601	Image Processing	CO1: Review the fundamental concepts of a digital image processing system. Analyse images in the frequency domain using various transforms. CO2: Evaluate the techniques for image enhancement and image restoration. CO3: Categorize various compression techniques. Interpret Image compression standards.

		Systems	compression standards. Basic concepts of internet streaming media.
	BCA602	Multimedia Systems	CO2: Fundamentals of multimedia content description and presentation. Fundamentals of content based image and video retrieval techniques. CO3: Basic knowledge of multimedia database system -- indexing, browsing and retrieval and familiarity at an introductory level with examples of audio, image and video processing techniques in multimedia systems.
	BCA671	Main Project	CO1: Students should be able to design and construct a software system, component, or process to meet desired needs. CO2: Students are provided to work on multidisciplinary Problems. Students should be able to work as professionals, with portfolio ranging from data management. CO3: Student are understand how to design database and software to manage and administrate of entire systems.

Date: 26.3.2022

(Signature and Seal)
Head/Coordinator of Department

Coordinator (B.C.A. & B.COM)
Ewing Christian College
Prayagraj

Details of Programmes offered in the Department

S. No.	Name of Program	Program Code	Year of Commencement and Duration	Sanctioned Seats
1.	B. Sc.	BBTC	2016 (3 year)	40
2.				
3.				

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome

I	**1BIOTH1**	**Principles of analytical techniques in biotechnology -1 (Chemical)**	1. To educate the students with the basic principles of analytical chemistry techniques /tools that are commonly used in Biotechnology to compare and analyze the experimental data qualitatively and quantitatively. 2. Familiarity with working principles, tools and techniques of pH meter. Understand the concept of Indicators and their working, common ion effect. Use and preparation of buffers. Understand the composition and working of biological buffers. 3. To aware students with the concepts for the preparation of solutions through calculations and applications of colloidal chemistry and water chemistry in molecular biology.
	1BIOTH2	**Principles of analytical techniques in biotechnology -2 (Physical)**	1. To educate the students with the basic principles of physical techniques /tools that are commonly used in Biotechnology to compare and analyze the experimental data qualitatively and quantitatively. 2. Able to critically analyze the principle, working and precautions of the commonly biophysical analytical instruments 3. Able to separate the molecules through chromatography and understand the complexity in scale up of unit operations. Familiarity with working principles, tools and techniques of analytical techniques and To understand the strengths, limitations and creative use of techniques for problem-solving.

	1BIOPR	**Practical based on 1BIOTH1 and 1BIOTH2**	1. Equips students with a vast array of tools and techniques aimed at examining biological specimens at the level of single molecule, cell, tissue, and whole organism. 2. Familiarity with working principles, tools and techniques of analytical techniques. 3. To understand the strengths, limitations and creative use of techniques for problem-solving.
II	**2BIOTH1**	**Human biology**	1. To ensure and imbibe the students with the knowledge of human physiology and how the body works, to understand the physiology of heart, kidney, liver, endocrine glands and integration of different physiological responses etc. 2. Understanding of the levels of organization and related functions in animals. 3. Identify the characteristics and basic needs of living organisms and ecosystems and use them for betterment of humankind.
	2BIOTH2	**Cell and Inheritance Biology**	1. To imbibe the students with the knowledge of cell as fundamental unit of life, functions of cell organelles and integration of cellular activity, cell cycle, apoptosis and cancer, 2. Understand the basis of heredity and mechanism of transmission of hereditary information in the biological world. 3. Grasp the concept of mutation and natural selection w.r.t population genetics

	2BIOPR	**Practical based on 2BIOTH1 and 2BIOTH2**	1. To be able to view different cells under microscope and identify their stages of cell division 2. Be able to arrest cell division and observe cell at metaphase stage. Understand the basis of inheritance via various problems based on genetics 3. Learn to differentiate between the karyotype of normal and diseased individual
III	**3BIOTH1**	**Microbiology**	1. To aware the students with the intricacies of the microbial world, organization and diversity of prokaryotic and eukaryotic microbes, growth, culture and identification of important microbes. 2. Microbes to be used as fundamental experimental object in biotechnological experiments /research. 3. To study the microbes and their behavior beneficial in treatment of disease and production of products involved in pharmaceuticals.
	3BIOTH2	**Biomathematics and Biostatistics**	1. To imbibe the student with the knowledge of fundamental mathematics (set theory, logarithm, basic calculus, matrix theory, probability) 2. To inculcate the knowledge of fundamental/ experimental statistics

			3. To inculcate numerical ability to analyze the biological data using principle of biomathematics and biostatistics.
	3BIOPR	**Practical based on 3BIOTH1 and 3BIOTH2**	1. To understand students with different culture medium for the growth of microorganisms and morphological study of microbes based on the colony's appearance. 2. To make aware with the handling and culturing strategies needed in microbiology. Awareness of different techniques and instruments involved in microbial research. 3. Numerical ability to analyze the biostatistical and biomathematical data.
IV	**4BIOTH1**	**Molecular Biology**	1. It will help the learner to understand the interaction of molecules like DNA, RNA and Proteins within the cell in the living world 2. To be aware and imbibe the students with the knowledge of molecular basis of life, structure, properties and replication of genetic material, expression of gene 3. Explain the regulation of expression of genes in prokaryotes and eukaryotes.

	4BIOTH2	**Biochemistry and Bioenergetics**	1. To understand the implications of thermodynamics law on living systems, Structure of bio- molecules like carbohydrates, fats, proteins, vitamins and their roles in shaping the living world. 2. To emphasize the nature and bonding of biomolecules in different pathways and enzyme kinetics. 3. To familiarize students with the concept of biomolecules in regulating physiological processes.
	4BIOTPR	**Practical based on 4BIOTH1 and 4BIOTH2**	1. To imbibe students with the practical aspect of biomolecules with biochemical reactions. 2. To aware students with different tests involved in the determination of biomolecules from the samples. 3. Demonstration of various instruments and preparations of reagents involved in biochemical analysis.
V	**5BIOTH1**	**Animal Biotechnology**	1. To imbibe the student with basic knowledge of culture of animal cell and organ, role of biotechnological manipulations and innovations in the development of improved races of useful animals. 2. In-vitro maintenance and generation of human organ and tissue, transgenic organism, recombinant drugs. 3. To understand and be aware of the technologies involved

			in animal biotechnology and familiar with recent research and techniques in cloning, gene therapy and pharmaceuticals. To aware the students with the concept of bioethics and IPR.
	5BIOTH2	**Environmental and industrial Biotechnology**	1. To aware the students with the environmental problems and biotechnological intervention in sewage treatment. Generation of clean fuel, monitoring and management of environmental sustainability, bioremediation through biotechnological aspects. 2. Biodegradation, implication of microbial biotechnology, in industry, pharmacy and mining, protection of environment through biotechnological innovations. Identify and debate the ethical, legal, professional, and social issues in the field of biotechnology and design and deliver useful modern biotechnology products to the Society. 3. Generate ideas about biotechnological intervention to develop biotechnological solutions to address environmental issues including pollution, mineral resource winning, renewable energy and water recycling.

	5BIOTH3	**Immunology and medical Biotechnology**	1. Trace the history and development of immunology. Describe surface membrane barriers and their protective functions, roles of different types of T cells, B cells and APCs, the importance of phagocytosis and natural killer cells in innate body defense. 2. Compare and contrast the origin, maturation process, and general function of B and T lymphocytes, MHC, Antigens, Antibody 3. To imbibe the knowledge of principles of immunology, human immune system and immunogenic reactions, immunodeficiency disorders of man, Understand the principles of immunological techniques of disease diagnosis.
	5BIOPR	**practical and project work based 5BIOTH1 and 5BIOTH2 and 5 BIOTH3**	1. To imbibe students with the techniques and tools used in environmental, immunology, animal biotechnology. 2. To incorporate the analyzing factors important for sustainable environment. To aware students with the practical aspect of the theoretical concepts by demonstration and laboratory experiments. 3. Examination of various environmental problems through biotechnology-based practical.

VI	**6 BIOTH1**	**Plant Biotechnology**	1. To understand the concept of cellular totipotency and its implication in plant tissue culture, basic techniques of in-vitro culture of plant cell, tissue, organ through dedifferentiation and redifferentiation, 2. Genetic manipulation in plant system to enhance its qualitative and quantitative traits. 3. Develop skills for application of tissue culture techniques in plant breeding and horticulture. To get knowledge about the plant tissue culture and transgenic plants.
	6 BIOTH2	**Recombinant DNA technology and Genetic engineering**	1. To imbibe the students with the knowledge of principles, tools and techniques of recombinant DNA technology and genetic engineering, 2. understanding the techniques of in-vivo and in-vitro gene cloning, gene libraries, artificial gene synthesis, analysis of gene manipulation through different techniques. 3. Explain key concepts of genome organization and manipulation, such as assembly of physical maps of genomes.
	6BIOTH3	**Bioinformatics and Nanobiotechnology**	1. to aware students, with the principle and concept of nanotechnology and nanoparticles, sequence alignment. To know the preparation and characterization of

			appropriate nano materials with precision conceptualize the insertion of nano size in the relevant field of interest 2. Develop the understanding of application of bioinformatics for retrieving, extracting and comparison of biological data. An ability to analyze and interpret computational data 3. An ability to plan and conduct and computational program and evaluate the results. To aware the students with basics of signaling pathway and their role in the interaction of the cell with its environment. Would demonstrate a clear understanding of the signal transduction, secondary messengers.
	6BIOTPR	**practical and project work based 6BIOTH1 and 6BIOTH2 and 6 BIOTH3**	1. Demonstrate working knowledge in a defined skill set of molecular biology and biotechnology protocols, genetic mapping, gene isolation and cloning, and demonstration of techniques involved in growing cell tissue and organs of plants. 2. Understand the different tools of bioinformatics and use them for data alignment, phylogenetic tree construction (basic bioinformatics). 3. independently perform key biotechnology and molecular biology benchwork protocols and can use popular computational software packages for DNA sequence analysis
	SEC	Bioprocessing and its Applications	1. To expose the fundamental of kinetics of homogeneous reaction in bioprocess

			engineering. Design of ideal bioreactor for pharmaceutical and molecular biology 2. Describe, compare and contrast the business driving forces in biopharma, industrial enzyme, biological food industries and describe the components of a business plan and how business forces can impact engineering activities. 3. Demonstrate the use of unit scale-up strategies, equipment sizing and specification, and process in the design of a biological process. To imbibe students with the concept of entrepreneurship and their futuristic scope in sustainable and developing society.

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME: N. A.

Semester	Course Code	Course Title/Paper Title	Course Outcome
NA	NA	NA	NA

Date: 12/5/2022

(Signature and Seal)
Head/Coordinator of Department

Dr. S.K. Mishra
Co-ordinator
Centre for Biotechnology
EWING CHRISTIAN COLLEGE
Prayagraj

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	BSc-Comp. Appl.	—	2000 - 3 yrs.	60
2.	B.Voc (IT & ITes)	—	2016 - 3 yrs	50
3.	PGDCA	—	2001 - 1 yrs.	50

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	1COATH1	Intro. to Computing System	Fundamental Knowledge
	1COATH2	Programming in 'C'	Programming Skills
II	2COATH1	Digital Logic & Comp. Archi.	Knowledge of Internal Architecture
	2COATH2	Data Structure	Advance Programming Skill
III	3COATH1	OOP with C++	Programming Skill
	3COATH2	N.SM	Mathematical approach in CS.
IV	4COATH1	Computer Comm. & N/W	Knowledge of Networking
	4COATH2	DBMS.	Database Implementation.
V	5COATH1	SAD	New System Design.
	5COATH2	Computer Graphics	Graphics designing.
	5COATH3	Java & Internet Prgm.	Programming Skill.
VI	6COATH1	Web. Technology	Web. designing.
	6COATH2	Dot. Net with C#	Software development.
	6COATH3	Software Engineering	System Designing.
	SEC	Comp. Awareness.	

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME: NA

Semester	Course Code	Course Title/Paper Title	Course Outcome

*Add more rows if required.

Date:

Course Coordinator
Centre for Computer Sciences
Ewing Christian College
Allahabad

(Signature and Seal)
Head/Coordinator of Department

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	B.Sc.	-	1951	480
2.	M.Sc.	-	2016	30
3.	Ph.D.	-	2019	2 per eligible faculty

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	1CHETH1	Theory Paper 1- Inorganic Chemistry	• With Bohr and Sommerfeld's atomic model, students will understand the idea of the development of atomic structure and can easily understand the absorption and emission spectra. • With Quantum Numbers, Periodic Table and Electronic configuration of elements, students will get the complete chemistry of elements so that they can apply it in various applications. • The knowledge of the qualitative analysis of various ionic radicals will be very much helpful for understanding the behaviour of various elements in aqueous medium.
	1CHETH2	Theory Paper 2- Organic Chemistry	• To understand the basic facts and concepts in Organic Chemistry • To develop a better understanding and reasoning of facts. • To describe preparation and application of hydrocarbon. • To discuss the preparation of benzene with their chemical properties. • Explain the aromaticity and Huckel's rule of aromatic compounds
		Chemistry Practical	• By analyzing the inorganic mixture qualitatively, students will get the knowledge of the behaviour of various cationic and anionic radicals in mixture analysis so that it would be possible for them to know the chemicals present in natural true samples.
	2CHETH1	Theory Paper 1- Physical	• To explain the behaviour of real and

			• To describe condition required for liquefaction of gases. • To know the Maxwell Law of distribution of velocities. • To have the idea of extent of reaction and application of equilibrium in homogeneous and heterogeneous equilibria. • To understand effect of pressure, temperature, concentration and inert substances on the state equilibrium and Le Chatliers principles. • To explain Buffer solution and its action. • To differentiate Acid, Base indicators; Ostwald and Quinonoid theories. • To apply solubility product in various real-life situations. • To use various thermodynamic terms and First law of Thermodynamics. • To understand reaction pre-requisites i.e., feasibility of any chemical reaction; conditions of various factors like pressure, temperature, etc. • To explain various heat energies.
	2CHETH2	Theory Paper 2- Inorganic Chemistry	• The knowledge of various types of chemical bonding will help the students to understand the various types of interactions between the elements and shapes of inorganic molecules and ions. • The order of reactivity of elements can be evaluated with electrode potential. • By knowing the principles of volumetric analysis, students will become well versed in preparing solution of various strengths and perform various types of titrations.
		Chemistry Practical	• By knowing the principles of volumetric analysis, the students will be able to analyze the various compounds quantitatively with the help of titration. With this knowledge we will be able to prepare various solutions of different strength which may be useful for the redox or iodometric titrations.
III	3CHETH1	Theory Paper 1- Organic Chemistry	• Detection of elements and functional

			aldehydes, ketones and Carboxylic acids. • Study about the basic concept of isomerism and concept of chirality.
	3CHETH2	Theory Paper 2- Physical Chemistry	• To give the idea of rate of reaction. • To derive Arrhenius equation and energy activation • To determine the order of reaction. • To have the idea of various theories of reaction rates. • To understand the terms Phase, Component and degree of freedom. • To explain mono-component and bi-component system. • To apply second law of Thermodynamics. • To understand Enthalpy, Entropy, Helmholtz and Gibbs free energies, and various factors which effect Enthalpy and Entropy. • To describe Clapeyron- Clausius equation and its application. • To explain the concepts of Galvanic cells. • To understand the application of E.M.F. measurements.
		Chemistry Practical	• By knowing the elements and functional groups present in organic compounds or mixture, students will be able to analyze the organic compounds to know their behaviour and accordingly these can be utilized for various applications. • With the knowledge of surface tension and viscosity, students will know the behaviour of various liquids so that comparative studies of various liquids can be done.
IV	4CHETH1	Theory Paper 1- Inorganic Chemistry	• By studying general characteristic properties of P-block and d-block elements, students will get a thorough knowledge about the behaviour, bonding and reactivity of elements belonging to these groups which will help them in extraction of these elements. • Gravimetric analysis principles help to separate elements in the form of

	4CHETH2	Theory Paper 2- Organic Chemistry	• To understand the synthesis process and properties of Nitro and Amino compounds • To study the methods of preparation of organic compounds via enolates
		Chemistry Practical	• Gravimetry is an important technique for quantitative analysis of elements and compounds and it is considered as one of the most reliable methods for quantitative measurements. Knowing the principles of gravimetric analysis, students will be able to know the amount of element or amount of compound in a mixture accurately.
V	5CHETH1	Theory Paper 1- Inorganic Chemistry	• It is very important to know the dual nature of electron for knowing the nature of bonds between atoms and various theories helps to provide proper knowledge of bonding. • With the knowledge of types and characteristics of crystalline and amorphous solids, students would be able to understand different types of structures of ionic solids accordingly they can apply it for various applications. • With statistical evaluation of various data, students will be able to analyze their results precisely and accurately. • Knowledge of Environment pollution is the need of the hour so that they may take precaution in various fields for the benefits of society and our environment.
	5CHETH2	Theory Paper 2- Organic Chemistry	• Use basic principles UV-visible and IR spectroscopy as a tool for functional group identification in organic molecules. • To study the methods of preparation and structure of organometallic compounds.
	5CHETH3	Theory Paper 3- Physical Chemistry	• To explain the concepts of Galvanic cells. • To determine E.M.F. of electrode concentration cells and electrolyte concentration cells, and transport number. • To understand Fuel cells and their applications.

			• To explain unit and bi molecular surface reactions, and factors which affect them. • To understand about chemical potential and its applications. • To treat colligative properties thermodynamically. • To understand radioactivity in detail. • To understand the atomic energy usage in the welfare of mankind and electricity production.
		Chemistry Practical	• To determine the order of reaction by isolation method and thus study the zero order reactions and its rate constant determination. • To verify the order determined by isolation method graphically. • To determine the heat of neutralization of a strong acid by a strong base. • To determine the heat of solution by solubility method. • To determine the permanent and temporary hardness of water. • To determine the degree of hardness of water by estimating Ca^{+2} and Mg^{+2} using EDTA solution. • To synthesize and purify various organic compounds like Naphthalene picrate, 1-Phenylazo-2-Naphthol, Methyl Orange and Acetanilide. • To determine the saponification value of vegetable oil. • To determine the molecular weight of a volatile substance by Duma's method. • To perform the distinction between primary, secondary and tertiary alcohols experimentally.
VI	6CHETH1	Theory Paper 1- Inorganic Chemistry	• The theories of coordinate linkages give a thorough idea of various complexes viz. Tetrahedral and Octahedral complexes. • With the study of transition and inner transition elements, students come to know the importance of these elements for various purposes • Material chemistry is a newly emerging branch and its study is very important for the latest applications.

			stable conformations for substituted cyclic compounds. Explain the mechanistic pathway for nucleophilic substitution reactions .To differentiate the various types of aliphatic nucleophilic substitution reactions.
	CHE1TH03	Theory Paper-3	• CO-1 To introduce quantum chemistry. • CO-2 To explain various laws of blackbody radiation. • CO-3 To know Postulates of quantum mechanics. • CO-4 To explain three dimensional time independent Schrodinger wave equation. • CO-5 To explain one dimensional harmonic oscillator both in classical and quantum mechanical aspects. • CO-6 To understand Tunnel effect, Eigen function and eigen value of H-atom and shapes of s, p, d and f-orbitals. • CO-7 To apply Variation principle on H-atom. • CO-8 To explain Nernst Heat Theorem and its application to non-condensed systems. • CO-9 To know in detail about third Law of Thermodynamics. • CO-10 To determine entropy from third Law of Thermodynamics. • CO-11 To understand the basic concepts of molecular spectroscopy. • CO-12 To characterize the electromagnetic radiations. • CO-13 To explain rigid and non-rigid rotation spectra-selection rule. • CO-14 To understand the terms viz., centrifugal distortion, Isotopic shift, Spectra of polyatomic molecules, Rotational constant. • CO-15 To explain principle of vibration-rotation spectra. • CO-16 To understand PQR branches, vibration in polyatomic molecules, effect of nuclear spin, Isotopic shift and group frequency. • CO-17 To explain Step polymerization and its kinetics. • CO-18 To describe statistical approach to Gelation and molecular weight distributions. • CO-19 To determine the molecular weight of polymers by various methods.

			qualitative analysis with the help of various instruments is helpful in analyzing and studying different elements and chemical compounds. • The statistical analysis of results gives the degree of correctness of the probe.
	CHE1PR01	Practical- Inorganic Chemistry	• By analyzing the inorganic mixture qualitatively, students will get the knowledge of the behaviour of various cationic and anionic radicals in mixture analysis so that it would be possible for them to know the chemicals present in natural true samples. • Along with the normal group elements, at this level, the students learn to determine some cations of some rare element also. • Along with qualitative determination, students by performing quantitative separation by both gravimetrically and volumetrically they know how to determine the metal ions both by weighing and by measuring volumes.
	CHE1PR02	Practical-Organic Chemistry	• Learn the techniques of separation of binary organic mixtures. • Familiarize with the test involving identification of extra elements {N, S, Cl, Br, I, & N+S} • Learn the confirmatory test and specific test for various functional groups. • To learn about the estimate, the Glucose, aldehyde and ketone.
	CHE1PR03	Practical-Physical Chemistry	• CO-1 To evaluate and determine the various constituents taking part in the reaction. • CO-2 To determine the order of reaction by isolation method and thus • study the zero order reactions and its rate constant determination. Study the first order reaction and its rate constant. Understand the role of catalyst. • CO-3 To verify the order determined by isolation method graphically.
	CHE1PR04	Practical- Analytical Chemistry	• In analytical chemistry experiments, by determining various parameters through various methods viz. Volhard's method, Fajan's method etc, students learn how to determine various analytes through various types of titrimetric methods (Complexometric, Redox,

			elements provides the knowledge of various metal ions in our biological system.
	6CHETH2	Theory Paper 2- Organic Chemistry	• To study NMR Spectroscopy and determine structure of compound by spectroscopic methods • To study the classification and properties of carbohydrates. • Working through this course, students are expected to apply their knowledge to problem-solve, deduce structures of organic molecules, and synthesize simple organic molecules using the studied reactions
	6CHETH3	Theory Paper 3- Physical Chemistry	• To explain various models of atomic structure. • To understand dual nature of matter and Heisenbergs uncertainty principle. • To know about Schrondinger wave equations and physical significance of the wave function. • To determine energy of a particle in one dimensional box. • To understand photochemical and thermal reactions. • To explain various laws of photochemical reactions. • To understand kinetics of photochemical reactions. • To use the terms fluorescence, photosensitization, phosphorescence, chemiluminescence. • To explain colligative properties. • To describe condition for equilibrium between phases.
		Chemistry Practical	• To determine that the acid catalyzed hydrolysis of methyl acetate is a first order reaction. • To determine the effect of the concentration of HCl or H_2SO_4 on the rate constant for the hydrolysis of methyl acetate. • To determine the strength of the given HCl solution

			unknown $K_2Cr_2O_7$ and $CuSO_4$ by calibration graph method, colorimetrically • To perform the one step preparation of some organic compounds. • To determine the iodine value of given vegetable oil. • To perform the synthesis of some coordinate compounds like Na-Trioxalato ferrate, Potash alum, Carnalite and Potassium hexacyano ferrate.
	6SEC004	SEC	• Student will be able to interpret UV-Visible spectroscopy, explain basic principles and relevant terms of UV-visible spectroscopy, explain working principles, record spectra and give outline of UV-Spectroscopy

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	CHE1TH01	Theory Paper-1	• The advance study of the nature of bonding in complexes gives the students a wide panorama for evaluating their magnetic properties and their spectral analysis. • The knowledge of stability constants of various complexes will be helpful in synthesizing various transition metal complexes. • The study of Rare Earth elements gives the idea for their advanced applications. • The knowledge of acid base behaviour is very much helpful in understanding the reactivity and behaviour of different ions in aqueous solutions. • Molecular luminescence gives the idea of spectra in UV and Visible regions. The knowledge of this is very much useful in various applications.
	CHE1TH02	Theory Paper-2	• Ensures the students to understand, acquire knowledge on asymmetric synthesis, determining the reaction mechanisms by different methods, criteria for aromaticity in nonbenzenoid molecules. Identify stereogenic centres, recognize enantiomers, diastereomers, meso compounds, draw stereochemical

II	CHE2TH01	Theory Paper 1	• The knowledge of symmetry and Group Theory is very much helpful in studying various spectra of different molecules and compounds. • The Terms and Term symbols of various configurations of elements are the basics for understanding various electronic transitions which are in turn helpful in studying the spectra of complexes. • Types and mechanisms of various reactions will be helpful for synthesis of different metal complexes.
	CHE2TH02	Theory Paper 2	• Ensures the students to understand, acquire knowledge on Pericyclic reactions. To describe various reactions involved in addition to C-C and C-O double bond and explain the mechanistic pathway for addition and elimination reactions . Predict the stereochemistry of the products formed.
	CHE2TH03	Theory Paper 3	• CO-1 To explain probability and most probable distribution and indistinguishability. • CO-2 To explain various partition functions and expression of internal energy and heat capacity in terms of partition function. • CO-3 To apply Maxwell-Boltzmann statistics. • CO-4 To formulate rate constant thermodynamically. • CO-5 To explain collision, absolute, transition state and absolute reaction rate theories. • CO-6 To explain primary and secondary salt effects. • CO-7 To understand influence of ionic strength and dielectric constant on rate of a reaction. • CO-8 To imagine the rates of explosive reactions. • CO-9 To explain the primary and secondary processes in photochemistry. • CO-10 To use the terms like photolumineseence, photostationary state, photosensitization, etc. • CO-11 To explain various photochemical chain reactions and non-chain photochemical reactions. • CO-12 To understand the limitation of Arrhenius theory of electrolytic dissociation.

			activity coefficients, determination of activity coefficients. • CO- 14 To explain Debye- Huckel Theory of the structure of dilute ionic solution. • CO-15 To apply Debye-Huckel Theory to more concentrated solutions. • CO-16 To determine partial molar volume. • CO-17 To understand crystal structures, symmetry, bonding in solids, Miller indices and Bragg's equation. • CO-18 To explain X-ray analysis of NaCl.
	CHE2TH04	Paper 4 –Analytical Chemistry	• Analytical techniques (Coulometry, Conductometry, Voltammetry, etc.) are very important to study different chemical compounds. With the study of these techniques the student will be able to analyze the compounds quantitatively and qualitatively with precise accuracy up to ppb limit.
	CHE2PR01	Practical-Inorganic Chemistry	• By preparing various coordination compounds and their characterization by Melting point and Molar conductometric measurements, students will know the synthetic methods for preparation and the purity of the compounds. By recording their UV-Visible and IR spectra, the study of various electronic transitions and the presence of functional groups will be known.
	CHE2PR02	Practical -Organic Chemistry	• Analyze the preparation process such as Aldol condensation, cannizarro, oxidation and molecular rearrangement reactions formation • Able to Understand the synthesis by monitoring through TLC • Learn purifications methods of synthesized compounds • Learn the isolation procedures and separate the caffeine & Eugenol and characterized by spectral techniques
	CHE2PR03	Practical-Physical Chemistry	• CO-1 To evaluate and determine the various thermodynamic parameters viz., activation energy, temperature coefficient, etc. • CO-2 To determine the order of

			and its rate constant. • CO-3 To verify the order determined by the substitution method graphically.
	CHE2PR04	Practical-Analytical Chemistry	• By doing Spectrophotometric, PHmetric, Conductometric and Potentiometric titrations, students learn to determine various elements and ions in the given mixture or compound
III	CHE3TH01	**Inorganic Chemistry** Paper 1 (Bioinorganic Chemistry)	• Bioinorganic chemistry deals with biological systems their significance and the students will be able to understand the implications of such biochemical processes in Biological systems. Study of Metalloproteins and Metallo enzymes will enable the students to understand their biochemical functions, electronic structures, bonding and stereochemistry of active sites. • Special emphasis in on naturally occurring oxygen proteins namely Hemoglobin, Myoglobin etc., electron transport proteins namely Iron sulphur proteins, Cytochromes etc. and Mo, Fe, Cu and Zn containing metalloenzymes and their biochemical functions.
	CHE3TH02	Paper 2 (Organometallic Chemistry)	• Students will learn about Organometallic compounds and how they are different from Inorganic and Organic compounds. • Students will learn the various types of Organometallic compounds and also their important applications. They will also learn in detail about hapticity and how hapticity is different from denticity. • Students will also learn about various organic ligands and how they form bond with metals to form organometallic compounds • Students will learn about the various types of reaction an organometallic compound undergoes and their important reactions. • Students will get to know about catalytic cycle of various organic reactions in which organometallic compound act as catalyst. • Students will also learn about Fluxionality in organometallic compounds.
	CHE3TH03	Paper 3 (Coordination	• With the knowledge of Coordination

		Nanostructures)	understand how metal organic frameworks, Carbonyls, Polyhedral Boranes etc can be created for various applications. • The study of Nanomaterials is the need of the hour because it has wide range of applications. • Metal alkoxides has a wide range of industrial implications especially in field of catalysis. The properties can be fine tuned by varying the metal ions and altering the organic ligands.
	CHE3PR01	Practical-Inorganic Chemistry	• Chromatography is an important tool for analyzing various mixtures and compounds. Applying the principles of chromatography, using Paper and Column chromatography, students learn to separate ions and elements through partition, by measuring their Rf values in case of Paper chromatography and with the titrimetric analysis of eluents students know the concentration of various elements in a given mixture.
	CHE3TH04	**Organic Chemistry** Paper 1 (Rearrangement and Photochemistry)	• Know the various kinds of molecular rearrangements • Ring expansion &contraction by rearrangement and controlling rearrangements. • Learn the Photochemical excitation and Jablonski diagram • Gain an understanding of photochemical processes in organic synthesis. • Identify and write type of mechanisms involved in photochemical reactions • Photochemistry of carbonyl, olefin & aromatic hydrocarbons -photo reduction-photo cycloaddition
	CHE3TH05	Paper 2 (Oxidation, Reduction and Organometallic)	• Understand the synthetic usefulness of different reagents in oxidation and reduction reactions • To learn the basic mechanism of oxidation &reduction in organic compounds • Get knowledge about the reagents which causes oxidation&reduction in various compounds • Students are familiarized to different oxidizing and reducing reagents, their selectivity to different substrates. • Acquaint the Organometallic reaction mechanisms and its applications • Acquire a basic awareness about

	CHE3TH06	Paper 3 (Strategies in Organic Synthesis)	• Gain the simple understanding of disconnection approach • Study the outline of retrosynthetic study with some examples • Get an idea about the disconnection approach of organic molecules to frame a chemical synthesis. • Know about protecting groups. • Study the features of protecting groups. • Understand the functional group protection. • Know the protection& de protection of important functional groups • Understand the guidelines of retro synthetic approach in solving problems in the planning of target molecule. • Apply the concepts of protecting & deprotecting groups involved during functional transformation.
	CHE3PR02	Practical-Organic Chemistry	• To familiarize the solubility nature of organic substances of different functional group. • To learn the pilot separation of ternary mixtures. • To familiarize the test involving identification of special elements • To learn the confirmatory test for various functional groups. • To familiarize the systematic procedures in multistep organic synthesis • Understand the techniques involving drying & recrystallization • UV Spectroscopic-Instrumental handling for estimation of the carbohydrates, protein, amino acids, ascorbic acid, blood cholesterol and aspirin in APC tablets.
	CHE3TH04	**Physical Chemistry** Paper-1 (Physical Chemistry-1)	• CO-1 To estimate atmospheric pressure at high altitudes. • CO-2 To estimate molecular weights of macromolecules by using sedimentation equilibrium. • CO-3 To explain Maxwell's law of distribution of velocity and energy, Maxwell's law and Gaussian density function. • CO-4 To determine R.M.S., Mean and Most probable velocities. • CO-5 To understand collision frequency, collision between like and unlike molecules, Triple collision. • CO-6 To treat viscosity, thermal conductivity and diffusion coefficient

			Boltzmann law for gaseous system. • CO-8 To determine thermodynamic functions for gaseous systems. • CO-9 To derive Molar heat capacity of hydrogen at low temperatures and heat capacities of monoatomic crystals. • CO-10 To explain the Einstein model and Debye's theory of solid. • CO-11 To derive heat capacities of crystals at very low temperatures. • CO-12 To understand Third law of thermodynamics and Nernst Heat Theorem • CO-13 To express the equilibrium constant of simple systems like Ionization of metal atoms, Dissociation of diatomic molecules and Isotopic exchange equilibria in terms of partition functions. • CO-14 To compare M-B, B-E and F-D statistics. • CO-15 To explain thermodynamic properties of Fermi-Dirac gas (Electron gas in metals) and Bose—Einstein gas (liquid Helium).
	CHE3TH08	Paper 2 (Physical Chemistry-2)	• CO-1 To determine Magnetic susceptibility and explain susceptibility equivalents, • CO-2 To apply Pascal's law. • CO-3 To understand Diamagnetism of elements, compounds and its ions. • CO-4 To explain Langevin's theory of paramagnetism, Curie's law and Weiss molecular field theory of paramagnetism, • CO-5 To determine Curie point. • CO-6 To explain magnetic property of complex compounds in relation to their structure. • CO-7 To explain the terms like Bohr magneton, L-S and J-J couplings. • CO-8 To understand Born-Oppenheimer approximation and Franck-Condon principle. • CO-9 To have idea about Molecular photoelectron spectroscopy. • CO-10 To detail the Raman spectroscopy. • CO-11 To give the theory of NMR relaxation process, chemical shift, the coupling constant and nuclear spin interaction. • CO-12 To explain ESR. • CO-13 To understand Mossbauer spectroscopy and its principle.

			• CO-15 To apply Raman, ESR, NMR and Massbaur spectra, C^{13} NMR spectroscopy and P^{31} NMR spectroscopy. • CO-16 To understand the theory and application of Scanning Tunneling Microsocpy, Auger Electron Spectroscopy and Electron Energy Lom Spectroscopy. • CO-17 To explain the mechanism of electrode reactions, Overpotential, the current-potential relation. • CO-18 Toderive Tafel equation. • CO-19 To explain Hydrogen overvoltage and decomposition potential, Butler-Volmer equation and H_2-Evolution mechanism.
	CHE3TH09	Paper 3 (Physical Chemistry-3)	• CO-1 To understand the kinetics of fast reactions and techniques of study of fast reactions with reference to stop flow, T-Jump, Flash photolysis and relaxation phenomena. • CO-2 To explain the kinetics of oscillating reactions with special reference to Belousov-Zhabotinskii mechanism. • CO-3 To determine the thermodynamic functions for non-equilibrium states. • CO-4 To explain Linear laws, Gibbs equation, Entropy production and entropy flow. CO-5 TO give the phenomenological equations and explain microscopic reversibility and Onsager's reciprocity relations. • CO-5 To explain the transformations of the generalized fluxes and forces. • CO-6 To give the details of electrokinetic phenomena, diffusion and electric conduction. • CO-7 To explain the stationary non-equilibrium states and states of minimum entropy production. • CO-8 To understand the nature of intermolecular forces. • CO-9 To explain London theory of dispersion forces. • CO-10 To derive partition function for system of independent particles. • CO-11 To explain thermodynamics of atomic crystals. • CO-12 To derive partition function for system of dependent particles, • CO-13 To give a generalized model of imperfect gas and L-J potential. • CO-14 To evaluate second viral

	CHE3PR03	Practical-Physical Chemistry	• After completing the course, the students will be able • CO-1 To perform acid-base and precipitation conductometric titrations. • CO-2 To determine the rate constant of second order reaction conductometrically. • CO-3 To determine the viscosity average molecular weight of a linear water soluble homopolymer.
	CHE3TH14	**Elective** (Spectroscopy of Organic Compounds)	• Know the Important terms and theory of NMR spectroscopy. • Learn the basics and applications of NMR spectroscopy • Get the fundamental idea of ^{13}C NMR spectroscopy and 2D NMR spectroscopy. • Purpose of Mass spectroscopy is to understand the significance and properties of mass spectrometry • Be able to predict the fragmentation patterns expected to arise in the mass spectrum. • Be able to use the mass spectrum of a compound to find the molecular mass, and to help identify the structure of a compound. • Problems solved based on UV,IR, NMR & MS Spectroscopy to interpret structure.
IV	CHE4TH01	**Inorganic Chemistry** Paper 1 (Structural Methods in Inorganic Chemistry)	• Students will learn about NMR parameters like Chemical shift and Coupling – coupling constant, secondary processes for structural determination like Decoupling phenomenon, NOE, DEPT spectra etc. • Students will get the knowledge about auxiliary reagents used in NMR determination, 1H – NMR of paramagnetic substances, NMR of nuclei like ^{31}P, ^{9}F, ^{27}Al, ^{11}B, ^{119}Sn, etc. • Students will get to learn in detail about the basic principle, instrumentation assembly, working and structural application of Electron Spin Resonance (ESR), Infra-red Spectroscopy (IR) and Mass Spectroscopy.
	CHE4TH02	Paper 2 (Structural Methods in Inorganic Chemistry)	• With the knowledge of X-ray studies, in-depth study of an atom can be done precisely. • The knowledge of magnetic

			applications. • UV-Visible and Mossbauer Spectroscopy will give detail knowledge about electronic and nucleonic transitions and their interactions for studying various applicatory panorama.
	CHE4TH03	Paper 3 (Selected topics in Inorganic chemistry)	• Detailed study of Electron microscopy namely, SEM, TEM, AFM, STM and its technical and functional comparison with light Microscopy will enable the students to grasp a better understanding of deeper and finer structural specifications of living and non-living systems and structures. Electron Microscopy and the knowledge of these instrumentation techniques will enable the students to understand the application of physics and electronics and their role in structural determination. • The students will also learn the basics of photochemistry in specific reference to transition metal complexes, electrochemical methods including Cyclic Voltammetry, Differential Pulse Voltammetry and their use in analytical processes.
	CHE4PR01	Practical -Inorganic Chemistry	• With the help of UV-visible spectroscopy, students learn to determine compositions of various inorganic coordination complexes using Job's method of continuous variation, mole ratio method and slope ratio method.
	CHE4TH04	**Organic Chemistry** Paper 1 (Biosynthesis and chemistry of Natural Products)	• Predict the overview of the field of natural product chemistry. • Identify different types of natural products, their occurrence, structure, biosynthesis and properties. • Understand the key pathways for the biosynthesis of fatty acids, polyketides, terpenes, and alkaloids • be able to apply important biosynthetic reactions to predict how organisms make secondary metabolites (retro biosynthetic investigation and biosynthesis) • Understand and apply biomimetic strategies in organic synthesis for the preparation of various natural products. • Learn the different types of alkaloids,

			• Learn about the structure & synthesis of plant pigmentation • Learn advanced approaches of structural determination of compounds of natural source. • Understand isolation, purification &description of simple chemical constituents from the natural source
	CHE4TH05	Paper 2 (Heterocyclic and Vitamins)	• Learn vitamins Chemistry and Biological significance of Vitamin • Learn the fundamentals of asymmetric synthesis, modes of asymmetric induction, stereo chemical models etc. • Understand the simple strategy of asymmetric synthesis and the classification into chiral substrate, auxiliary, reagent and catalyst controlled processes. • Understand the significanceof substrate controlled stereo-selective reactions in the synthesis of complex targets from the natural materials or those easily available using asymmetric catalysis. • Learn numerous asymmetric transformations and employ such reactions in asymmetric organic synthesis of important chiral molecules. • Get the knowledge of Stereochemistry of some imported named reactions.
	CHE4TH06	Paper 3 (Biomolecules)	• Get exposed to importance of biological macromolecules • Acquire the knowledge of enzymes their properties andclassification, Mechanism of action, Michaelis-Menten initial rateequation, methods for the determination of $K_m$and V_{max} • the influence and role of structure in reactivity of biomolecules • Learn different immobilization techniques and Industrial &clinical scope of enzymes. • Learn kinetics of enzyme catalyzed reactions and enzyme inhibitions and regulatory process • Understand the basic structure of nucleic acids, polymorphic nature of DNA, solid phase synthesis and purification techniques • Distinguish between the different kinds of lipids and their chemistry. • Obtain the knowledge of lipid

			• Learn thebasics of antibiotics Chemistry and general aspects of design of some of drugs, their classification, synthesis, mechanism of action, therapeutic uses
	CHE4PR02	Practical-Organic Chemistry	• To learn about estimation of NO_2 in organic compound • Able toanalyze the structure of organic compound by using spectral data • To learn the procedure of literature survey of the concerned topic. • To develop a plan for fulfilling the work in the stipulated time with maximum efficiency and success. • To learn, familiarize, and practice the extensive bench work in a laboratory • Learn to write different scientific article, understanddescriptionof writing of project work, presentations and Learn writing of paper as per format
	CHE4TH07	**Physical Chemistry** Paper 1 (Physical Chemistry-1)	• CO-1 To explain ideal and non-ideal solutions. • CO-2 To give the inter-connection between Raoult's law and Henry's Law. • CO-3 To determine partial molar properties of solutions. • CO-4 To explain the thermodynamic functions of mixing of non-ideal solutions. • CO-5 To derive excess thermodynamic functions. • CO-6 To apply Gibbs-Duhem-Margules equation. • CO-7 To derive activity coefficients from excess thermodynamic functions. • CO-8 To give the theories of Van Laar, Scatchard Hildebrand , Wilson and Flory-Huggins. • CO-9 To give the concept of operators in quantum mechanics. • CO-10 To derive Heisenberg's uncertainty principle. • CO-11 To explain the solution for Hydrogen atom. • CO-12 To apply Born-Oppenheimer approximation on various systems. • CO-13 To apply Valence bond theory to homonuclear and heteronuclear diatomic molecules. • CO-14 To mention LCAO MO

			theories. • CO-16 To apply Huckel molecular orbital theory to ethylene, butadiene, allyls and benzene, CO-CO-17 To calculate delocalization energy, charge density and bond order and bond length. • CO-18 To apply Pauling and Wheland's modification in HMO theory and it application to heteromolecules. • CO-19 To explain extended Huckel molecular orbital theory and SCF-MO methods. • CO-20 To explain the properties of colloids, sol-Gul transformation formation, colloidal electrolytes, Micellization and surfactants.
	CHE4TH08	Paper 2 (Physical Chemistry-2)	• CO-1 To explain lattice energy of crystals, cohesive energy, conduction in solids and super conductance. • CO-2 To give the electronic structures of solids. • CO-3 To explain Free electron theory, Fermi-gas theory and band theory of solids. • CO-4 To explain the properties of metals, semi-conductors and insulators. • CO-5 To understand intrinsic extrtinsic p-type and n-type semi-conductors. • CO-6 To determine internal pressure and give its significance. • CO-7 To determine the free volume of liquids. • CO-8 To give the application of free volume and its relation with energy and heat of vaporization. • CO-9 To explain the equation of state in terms of partition function. • CO-10 To outline the simple cell theory (Eyring equation). • CO-11 To expain cell model theory of Lennard-Jones and Devonshire and Eyring's free volume theory of liquid viscosity. • CO-12 To explain thermodynamic functions of ideal and non-ideal liquid mixtures. • CO-13 To determine partial molar volume and partial molar enthalpy. • CO-14 To explain the triumph and limitations of Debye-Huckel theory of activity coefficients. • CO-15 To explain the ion size

			experiment. • CO-16 To explain Debye-Huckel-Onsager equation. • CO-17 To explain conductivity of weak electrolytes and conductance in nonaqueous solvents. • CO-18 To explain Fuoss-Onsager equations and Wien and Debye-Fakenhagen effects. • CO-19 To explain Jones-Dole equation and significance of A and B coefficients. • CO-20 To understand the ion association in an electrolyte solution, formation of pairs, triplets etc. • CO-21 To explain Bjerrum theory of ion association.
	CHE4TH09	Paper 3 (Physical Chemistry-3)	• After completing the course, the students will be able • CO-1 To give the kinetics and mechanism of reactions on surface. • CO-2 To explain Langmuir-Hinshelwood mechanism and Langmuir-Rideal mechanism. • CO-3 To explain the inhibition of surface reactions and absolute reaction rate theory of surface reactions. • CO-4 To compare of homogeneous and heterogenous reactions. • CO-5 To give the steady state treatment for Arrhenius and Vant Hoff's complexes. • CO-6 To explain the influence of substituents on reaction rates. • CO-7 To explain the linear free energy relationship, Taft equation, compensation effect, and Hemmett acidity tunetion. • CO-8 To explain the oxidation of sugars by $K_3Fe(CN)_6$ and Cu^{+2} in alkaiine medium, • CO-9 To explain the uncatalyzed and platinuem group metals catalyzed oxidation of organic and inorganic compounds by $K_3Fe(CN)_6$ and Ce (IV) etc in acidic / alkaline medium. • CO-10 To explain the kinetics of initiation retardation, chain polymerization and ionic polymerization, copolymerisation with special reference to monomer reactivites ratios. • CO-11 To explain the coordination polymerization. • CO-12 To explain the degradation of

			polymers and polyelectrolytesm.
	CHE4PR03	Practical-Physical Chemistry	• CO-1 To perform the kinetic study of the redox reaction of N-Bromoacetamide (NBA) and glucose using Ru (III) as catalyst. • CO-2 To improve his/her research skills and temperament by doing dissertation work on trending research topic.
	CHE4TH14	**Elective** (Reagents in Organic Synthesis)	• Obtain the knowledge on how different reagents can be useful in organic transformations. • Provide a survey of new synthetic approaches in organic chemistry. Reagents and reaction conditions, reaction mechanisms, and selectivity problems • Able to make important decisions about how to effect organic transformations, analyze chemo-, regio-, and stereoselectivity issues, use their understanding of the reaction mechanism to Xaqrationalize/predict outcomes, and interpret and realize the relevant synthetic literature. • be aware of the essence and learn the concept of green chemistry and its applications in organic synthesis.

*Add more rows if required.

Date: 6.4.22

Vikram Mushran

(Signature and Seal)
Head/Coordinator of Department

HEAD
CHEMISTRY DEPARTMENT
EWING CHRISTIAN COLLEGE
ALLAHABAD

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	D.Phil/Ph.D		2020, 5yrs	4
2.	M.A.		2016, 2yrs	30
3.	B.A.		1956, 3yrs	240

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	Paper 1	Principles of Education	• Introducing basic terms of Education. • Explaining Agencies of education • Understanding ideas, principles and technical literature on education
	Paper 2	History &Development of Indian Education	• Understanding development of Indian education. • Identifying nature of problem and its significance. • Evaluating the problems in relation to social and political context
II	Paper 1	Issues and Trends in Indian Education	• Identifying the issues in Indian Education. • Insight to the intricacies of contemporary educational problems. • Investigating the trends in • Indian Education
	Paper 2	New trends in Indian Education	• Giving Awareness about the new trends in education. • Identifying the effects, different agencies responsible for the new trends. • Analyse the ways and means for its application

III	Paper 1	Philosophical Foundations of Education	• Knowledge about educational philosophy • Evaluating different schools of philosophy • Identifying characteristics of Indian philosophy
	Paper 2	Educational Psychology	• Knowing Educational psychology • Examining its implications • Understanding the nature of learning and individual differences
IV	Paper 1	Sociological Foundations of Education	• Knowledge of educational sociology • Identifying technical terms of sociology • Understanding the relation between education and society
	Paper 2	Psychological Foundations of Education	• Application of psychological concepts in the field of education • Understanding intelligence, personality, creativity • Examining adolescence problems etc
V	Paper 1	Educational Evaluation & Curriculum	• Knowledge about evaluation • Understanding the new concepts of curriculum • Identifying curriculum, tests, co-curricular activities
	Paper 2	Indian Educators	• Evaluating main contributions of some Indian Educators • Identifying theory and practice of education of these Indian educators
	Paper 3	Guidance & Counselling in Education	• Awareness about the need of guidance and its process • Awareness about the need of counselling and its process

			• Evaluating techniques of guidance and counselling in the field of education
VI	Paper 1	Statistics in Education	• Understanding classification of data • Understanding the use of different statistical measures
	Paper 2	Western Educators	• Evaluating main contributions of some western Educators • Identifying theory and practice of education of these Western educators
	Paper 3	Educational Technology	• Identifying objectives and types of educational technology • Understanding its utility and importance • Identifying its uses in the teaching learning process
	SEC	Nutrition and Health Education	• Knowledge about physical wellness • Giving importance of nutrition

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	EDU 501	Philosophical foundation of Education: Western.	• Knowledge of educational philosophy • Analysing different schools of Philosophy • Insight to characteristics and implication of Western philosophy.
I	EDU 502	Sociological foundation of Education.	• Understanding Meaning and nature of educational sociology

			• Examining technical terms and relation between education and society • Evaluating Social mobility , Modernisation, Youth Movement ,De-schooling and Futurology
I	EDU 503	Development of learner	• Analysing Developmental Stages, Cognitive development • Understanding Social & Emotional competence • Insight to Personality &Measurement, Stress and Mental health.
I	EDU 504	Methods and Procedure of research in education.	• Knowledge of Meaning, Types & Methods of educational research, • Identifying Tools & technique of data collection • Comparing qualitative and quantitative research.
II	EDU 505	Philosophical foundation of Education: Indian.	• Knowledge of educational philosophy • Understanding different schools of philosophy • Evaluating Characteristics and implication of Indian philosophy.
II	EDU 506	Quantitative and Qualitative analysis of data.	• Knowledge of Descriptive statistics • Understanding N.P.C. characteristics and uses • Analysis of parametric and non-parametric test.
II	EDU 507	Psychology of learning.	• Knowledge of behaviourism and cognitive concept of psychology • Understanding theories of learning • Discussing Learning Styles ,Group dynamics
II	EDU 508	Field work and VIVA VOCE.	• Practical learning of Book review • psychological test

			• institution visit • statistical applications using MS Excel
III	EDU 601	Comparative Education.	• Knowing Meaning and nature of comparative education • Understanding Primary education of USA , UK ,Japan & India • Understanding Secondary &Vocational education of USA , UK , France ,Japan & India • Understanding international perspective of education.
III	EDU 602	Educational measurement and evaluation.	• Knowing concepts of measurement, evaluation • Understanding curriculum, tests, co-curricular activities • Understanding construction of achievement test etc
III	EDU 603	Contemporary issues in Education.	• Understanding Elementary Education • Understanding Secondary and Higher education in Indian perspective • Insight to Globalization and Human rights
III	EDU 604	Environmental Education.	• Understanding ecology and environment • Discussing types of pollution, its causes and effects • Knowing environmental laws, environment management
IV	EDU 605	Educational technology.	• Identifying objectives and types of educational technology • Understanding its utility and importance, • Evaluating its uses in the teaching learning process

IV	EDU 606	Educational administration and management.	• Identifying educational administration and management • Applying the educational administration and management in present system
IV	EDU 654	Guidance and Counselling.	• Awareness about the need of guidance and counselling • Observing its process and techniques in the field of education, occupational information, job analysis, • Understanding issues and trends in process of guidance and counselling
IV	EDU 631	Field work and VIVA VOCE.	• Practical Learning of Achievement Test • Research article review • Module preparation • MOOC video review

*Add more rows if required.

Date:23- 03 2022

(Signature and Seal)
Head/Coordinator of Department

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	B.A.	UG-ENG	1956, 3YEARS	240
2.	M.A. ENGLISH	PG-ENG	2016, 2YEARS	50
3.				

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	1ENGTH1	ENGLISH POETRY FROM SHAKESPEARE TO KEATS	
	1ENGTH2	ENGLISH PROSE FROM BACON TO STEVENSON	
II	2ENGTH1	INDIAN ENGLISH LITERATURE	
	2ENGTH2	MODERN DRAMA	
III	3ENGTH1	VICTORIAN POETRY	ANNEXURE - 1
	3ENGTH2	SHAKESPEAREAN DRAMA	
IV	4ENGTH1	MODERN BRITISH AND AMERICAN POETRY	
	4ENGTH2	ENGLISH PROSE AND SHORT STORY	
V	5ENGTH1	NEW ENGLISH POETRY	
	5ENGTH2	FICTION	
	5ENGTH3	UNDERSTANDING ENGLISH LITERATURE	
VI	6ENGTH1	MODERN POETRY: INDIAN AND AMERICAN	
	6ENGTH2	DRAMA	
	6ENGTH3	LITERARY HISTORY: FROM 14th CENTURY TO MODERN AGE	
	SEC 6SEC004		

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
			ANNEXURE - 2

*Add more rows if required.

Date: 22 MARCH 2022

(Signature and Seal)
Head/Coordinator of Department

COURSES AND THEIR OUTCOME

Department of English

Ewing Christian College, Prayagraj

BA Course Outcomes

SEM	Course Code	Course Name	Course Outcome
I	1ENGTH1	English Poetry from Shakespeare to Keats	#Students are able to map the growth and development of English poetry from the renaissance to the romantic period. #Students develop familiarity with the poetic works of Shakespeare, Milton, John Donne, Wordsworth, Shelley, etc. # Students are able to appreciate salient features of the poetry of some of the greatest poets from the 16th century to the early 19th century.
I	1ENGTH2	English Prose from Bacon to Stevenson	#Students approach the essay as a literary form #Students develop an understanding of the essay in different periods #Students are able to distinguish among types of essay: impersonal/aphoristic, confessional, periodical, etc.
II	2ENGTH1	Indian English Literature	#Students can write and speak on the growth and development of Indian English literature #Students develop an understanding of representative Indian English writers and can place them in their historical and cultural context #Students are thoroughly aware of the writers and works in their syllabi
II	2ENGTH2	Modern Drama	# Students gain a thorough understanding of GB Shaw's Arms and The Man #Students can critically analyse the issues in the plays in their syllabi #Students can distinguish between the features of one-act and three-act play
III	3ENGTH1	Victorian Poetry	# Attain in-depth knowledge of the salient features of Victorian Poetry # Read representative Victorian Poets such as Matthew Arnold, Tennyson, Robert Browning, etc. # Victorian attitudes and culture

III	3ENGTH2	Shakespearean Drama	#Develop sufficient ability in understanding Elizabethan English and culture. #Shakespeare as a product of his society. #Themes and issues in Shakespeare's tragedies. #Major literary characters in Shakespeare's work.
IV	4ENGTH1	English Prose and Short Story	# Students gain an understanding of essays and short stories as distinct genres in literature and the modern prose style #Students are familiar with the thematic and formal shifts in the writings of the authors in their syllabi from their counterparts in previous ages #Students are able to appreciate the English short story in its modernist avatar
IV	4ENGTH2	Modern British and American Poetry	#Students are well-acquainted with the nuances of 20th century British and American poetry #Students can discuss with confidence the formal techniques and thematic preoccupations of the poets in their syllabi
V	5ENGTH1	World English Poetry	#Develop in-depth understanding of the Black Arts movement # Understand the effects of colonial rule on native consciousness and culture # Know the salient features of

V	5ENGTH2	Fiction	#Students acquire understanding of features of Victorian novel. #Representative Victorian novelists such as Thomas Hardy, Charles Dickens, etc. #Students read important Victorian novels such David Copperfield, Far from the Madding Crowd, etc.
V	5ENGTH3	Understanding English Literature	#Students develop an understanding of the basic building blocks of academic literary studies #Students learn poetic devices and are able to distinguish one device from another # Students learn poetic forms and literary movements # Students are able to perform literary criticism at the practical level
VI	6ENGTH1	Modern Poetry: Indian and American	# Students have an understanding of the specificities of modern Indian poetry in English #Students develop a familiarity with the thematic issues of identity, displacement and hybridity in 20th century Indian and American poetry
VI	6ENGTH2	Drama	# Students cultivate an appreciation for the experimentalism of modern drama #Students can speak and write confidently on the representative modern dramatists in their syllabus #Students are able to locate dramatists in their times
VI	6ENGTH3	Literary History: From 14th century to Modern Age	# Students gain a foothold in the history of English literature #Students learn the distinguishing features of each age and are able to see the correspondence between the art and the times

COURSES AND THEIR OUTCOME
MA.

Course Code	Course Name	Course Outcome
ENG1TH01	Paper I - Literary Criticism from Aristotle to Eliot	•To acquaint the student with the work of sign critics from Aristotle to the present time. •To familiarize him/ her with important movements •To give him/her first-hand knowledge of some works of the great critics •To enable him/her to apply principles of critici literary texts •To enable him/her to undertake further read critical movements and critical theory.
ENG1TH02	Paper II - Core British Literature – I	•To provide a foundational course with British Lite as the originating literature for English Studies •To give the student a first-hand knowledge of literary works of the period. •To provide the students with knowledge of the pc economic, social and intellectual background so enable him to study the works as representatives various ages of British literature. •To acquaint the students with the literary mover favoured genres, and the evolution and developme literary forms and to encourage further reading sc obtain a fuller understanding of these. •To acquaint the student with contemporary Literature to bring them at par with the courses ru in the leading universities in the country.
ENG1TH03	Paper III - Core American Literature- I	•To introduce the student to the literature of the U States of America. •To familiarize him/her with the important li movements and development of various genr literature. •To give him/her a first-hand knowledge of major v

		and classics of American literature. •To encourage him/her to take interest in the v belonging to African American, Native Am Mexican, Hispanic, Chicano and Asian Am communities. (Marginalized Voices).
ENG1TH04	Paper IV - Core Indian Literature – I	•To familiarize the student with major Indian wri English and get their knowledge update contemporary Indian literature in English (Till th decade of 21stcentury). •To enable him/her to understand the growth of writing in English in the context of India's contac English •To introduce the students with the growth of v literary genres in socio-economic, political and re context of India. •To encourage students to understand the signif of Indian Literature in English and take up research •To make the students understand the conn between theory and literature in colonial postcolonial Indian context.
ENG1TH05	Paper V - Core New Literatures in English – I	•To introduce the students to a variar commonwealth literature – Australian, Canadia literature from New Zealand •To make him/her approach selected texts for literary value and cultural importance •To enable him/her to approach some texts fi cross-cultural perspective. •To provide the student with a broad perspective development of Canadian literature. •To initiate the process of cross cultural studie comparative literary studies.
ENG2TH01	Paper I – Contemporary Literary Theory	•To familiarize him/ her with important movements

		•To give him/her first-hand knowledge of some works of the great critics •To enable him/her to apply principles of critici literary texts •To enable him/her to undertake further read critical movements and critical theory.
ENG2TH02	Paper II - Core British Literature - II	• To give the students an opportuni familiarize themselves with the seminal te English Literature. • To provide an outline of the progres evolution of British Literature that has d the course of many forms of literature. • To give access to authors who have estab themselves as the pinnacle of literary excell
ENG2TH03	Paper III - Core American Literature - II	•To introduce the student to the literature of the U States of America •To familiarize him/her with the important li movements and development of various genr literature. •To give him/her a first-hand knowledge of major w and classics of American literature. •To encourage him/her to take interest in the w belonging to African American, Native Ame Mexican,Hispanic, Chicano and Asian Am communities. (Marginalized Voices)
ENG2TH04	Paper IV - Core Indian Literature - II	•To familiarize the student with major Indian writ English and get their knowledge updated contemporary Indian literature in English (Till Decade of 21st Century). •To enable him/her to understand the growth of I writing in English in the context of India's contact English

		•To introduce the students with the growth of v literary genres in socio-economic, political and re context of India. •To encourage students to understand the signif of Indian Literature in English and take up research •To make the students understand the conn between theory and literature in colonial postcolonial Indian context.
ENG2TH05	Paper V - Core New Literatures in English - II	•To enable the student to understand the main cu of development in English language writing i Anglophone parts of Africa and Caribbean islands •To introduce him/her to a few select writings in E from Africa and the West Indies and Guyana. •To familiarize him/her with the richness of ci heritage of Africa through major writers and v genres. •To initiate the process of cross cultural studie comparative literary studies.
ENG3TH01	Paper I - Core British Literature - III	To provide a foundational course with British Lite as the originating literature for English Studies •To give the student a first-hand knowledge of literary works of the period. •To provide the students with knowledge of the po economic, social and intellectual background so enable him to study the works as representatives various ages of British literature. •To acquaint the students with the literary mover favoured genres, and the evolution and developme literary forms and to encourage further reading so obtain a fuller understanding of these. •To acquaint the student with contemporary I Literature to bring them at par with the courses ru in the leading universities in the country.

	Paper II - Optional I	• Keeps changing according to the choice students
	Paper III – Optional II	• Keeps changing according to the choice students
ENG4TH01	Paper I - Core British Literature - IV	To provide a foundational course with British Lite as the originating literature for English Studies •To give the student a first-hand knowledge of literary works of the period. •To provide the students with knowledge of the pc economic, social and intellectual background so enable him to study the works as representatives various ages of British literature. •To acquaint the students with the literary mover favoured genres, and the evolution and developme literary forms and to encourage further reading sc obtain a fuller understanding of these. •To acquaint the student with contemporary Literature to bring them at par with the courses ru in the leading universities in the country.
	Paper II - Optional I	• Keeps changing according to the choice students
	Paper III - Optional II	• Keeps changing according to the choice students

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	BA			
2.	MA			50
3.				

Add more rows if required.

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	1HINTH1	हिन्दी साहित्य का इतिहास(आदिकाल एवं भक्तिकाल)	1. इतिहास की अवधारणा के साथ आदिकालीन और भक्तिकालीन हिन्दी साहित्य के स्वरुप से छात्र परिचय प्राप्त करते हैं. 2. आर्य भाषाओं के आरंभिक स्वरूप से परिचय प्राप्त होगा. 3. भक्तिकालीन हिन्दी साहित्य के स्वरूप से छात्रों को परिचय प्राप्त होगा।
	1HINTH2	प्राचीन हिन्दी काव्य, भाग -1	1. यहाँ छात्र विद्यापति, नरपति नाल्ह, कबीर सूरदास, तुलसीदास आदि कवियों के कुछ चयनित अंशों का अध्ययन करते हैं. 2. यहाँ आरंभिक हिन्दी साहित्य की मुख्य प्रवृत्तियों का अध्ययन किया जाता है। 3. यहाँ भक्तिकालीन हिन्दी साहित्य के अंतर्वस्तु और रूप संबंधी गहन अध्ययन अपेक्षित है।
II	2HINTH1	हिन्दी साहित्य का इतिहास (रीतिकाल एवं आधुनिक काल)	1. रीतिकाल के कालविभाजन, नामकरण और प्रवृत्तियों का यहाँ विस्तृत अध्ययन है। 2. रीतिकाल की विशिष्ट शैली से छात्रों का परिचय होगा। 3. आधुनिक हिन्दी साहित्य के आरंभिक स्वरूप का परिचय यहाँ प्राप्त होगा।
	2HINTH2	प्राचीन हिन्दी काव्य भाग – 2	1. यहाँ मीरा, बिहारी, घनानंद आदि साहित्यकारों के चयनित साहित्यिक अंशों का अध्ययन शामिल है.

			अध्ययन यहाँ अपेक्षित है। 3. तत्कालीन परिस्थितियों के साथ साहित्य के अंतर्संबंधों का ज्ञान यहाँ छात्रों को मिलेगा।
III	3HINTH3	हिन्दी भाषा का इतिहास	1. हिन्दी भाषा के क्रमिक विकास से छात्रों का परिचय कराना इस प्रश्नपत्र का मुख्य ध्येय है. 2. देवनागरी लिपि के क्रमिक विकास से छात्रों को परिचय प्राप्त होगा। 3. हिन्दी की शब्दावलियों के स्वरूप का यहाँ ज्ञान मिलेगा।
	3HINTH4	हिन्दी आधुनिक काव्य, भाग -1	1. यहाँ मैथिलीशरण गुप्त, जयशंकर प्रसाद, सुमित्रानंदन पन्त आदि साहित्यकारों के चयनित साहित्यिक अंश छात्रों के अध्ययन के विषय हैं. 2.आधुनिक हिन्दी कविता के आरंभिक स्वरूप का परिचय यहाँ छात्र प्राप्त करेंगे। 3. द्विवेदी युगीन और छायावादी युगीन काव्य की प्रवृत्तियों का सूक्ष्म अध्ययन यहाँ अपेक्षित है।
IV	4HINTH1	प्रयोजनमूलक हिन्दी	1. प्रयोजनमूलक हिन्दी का अर्थ, स्वरूप यहाँ स्पष्ट होगा। 2. प्रतिवेदन लेखन, पल्लवन और संक्षेपण का ज्ञान छात्रों को प्राप्त होगा। 3. जनसंचार माध्यम के विभिन्न स्वरूपों की जानकारी प्राप्त होगी।
	4HINTH2	हिन्दी आधुनिक काव्य, भाग -2	1.इस प्रश्नपत्र में प्रगतिवाद, प्रयोगवाद और नई कविता की कुछ चयनित कविताओं का अध्ययन किया जाता है. 2. साथ ही इन कवियों का आलोचनात्मक अध्ययन भी यहाँ शामिल हैं. 3. छायावादोत्तर काव्य प्रवृत्तियों का ज्ञान यहाँ छात्रों को प्राप्त होगा।
V	5HINTH1	पाश्चात्य काव्य शास्त्र और काव्य भाषा	1. पाश्चात्य साहित्य सिद्धांतों का परिचय यहाँ दिया गया है. 2. यहाँ भारतीय और पाश्चात्य साहित्य सिद्धांतों का तुलनात्मक अध्ययन यहाँ अपेक्षित है। 3.पाश्चात्य काव्य शास्त्रीय चिंतकों का अध्ययन यहाँ किया जाता है

		साहित्य चिंतन की नवीन दिशाएं	पद्धतियों का अध्ययन यहाँ किया जाता है। 2. आधुनिक हिन्दी आलोचकों की मुख्य समीक्षाओं का अध्ययन यहाँ किया जाता है. 3. पाश्चात्य और भारतीय नवीन विमर्शों का अध्ययन यहाँ किया जाता है।
	5HINTH3	हिन्दी नाटक एवं एकांकी साहित्य	1. हिन्दी नाटकों और एकांकियों के इतिहास का अध्ययन यहाँ किया जात है। 2. चयनित हिन्दी नाटकों और एकांकियों का विशेष अध्ययन यहाँ किया जाता है. 3. यहाँ छात्र कुछ चयनित नाटककारों और एकांकीकारों की विशिष्ट शैलियों का अध्ययन करेंगे।
VI	**6HINTH1**	भारतीय काव्य शास्त्र	1. भारतीय काव्यशास्त्र के मूलभूत सिद्धांतों का अध्ययन यहाँ शामिल है. 2. भारतीय साहित्य सिद्धांतकारों का अध्ययन यहाँ किया जाएगा. 3. काव्यभाषा के विभिन्न तत्वों का अध्ययन यहाँ किया जाएगा।
	6HINTH2	हिन्दी निबंध, उपन्यास एवं कहानी साहित्य	1. हिन्दी निबंध के विकास का क्रमिक परिचय यहाँ दिया जाएगा। 2. हिन्दी कहानी से संबंधित आंदोलनों का अध्ययन यहाँ किया जाएगा। 3. हिन्दी उपन्यासों के इतिहास का विशेष अध्ययन यहाँ शामिल है. 4. चयनित पाठों का अध्ययन यहाँ किया जाएगा।
	6HINTH3	साहित्य का सामाजिक शास्त्र	1. साहित्य के समाजशास्त्र से यहाँ छात्रों का परिचय होगा। 2. हिन्दी साहित्य में समाजशास्त्रीय अध्ययन की परंपरा का अध्ययन किया जाएगा। 3. चयनित हिन्दी उपन्यासों का समाजशास्त्रीय अध्ययन यहाँ सम्मिलित है।
	SEC	हिन्दी भाषा शिक्षण	1. हिन्दी व्याकरण का अध्ययन यहाँ किया जाएगा।

			लोकोक्तियों का विशेष अध्ययन यहाँ किया जाएगा। 3. जनसामान्य में प्रचलित हिन्दी भाषा से संबंधित त्रुटिगत प्रयोगों का अध्ययन यहाँ अपेक्षित है।

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
1.	HIN1TH01	प्राचीन काव्य एवं निर्गुण भक्तिकाव्य	1. आदिकालीन हिन्दी साहित्य के कुछ चयनित पाठ और कवियों का यहाँ अध्ययन किया जाता है जिससे छात्रों को आरंभिक हिन्दी साहित्य के स्वरूप को समझने में सहायता मिलती है। 2. यहाँ प्रारंभिक हिन्दी साहित्य के अतर्वस्तु और रूप का अध्ययन सम्मिलित है। 3. भक्तिकालीन निर्गुण साहित्य का विस्तृत परिचय यहाँ दिया गया है.
	HIN1TH02	हिन्दी गद्य की विभिन्न विधाएं	1. हिन्दी गद्य की विभिन्न विधाओं के स्वरूप का सैद्धांतिक अध्ययन यहाँ किया जाता है. 2. इन गद्य विधाओं में हो रहे हिन्दी लेखन से छात्रों का परिचय होगा. 3. हिन्दी नाटक और रंगमंच का विशेष अध्ययन यहाँ सम्मिलित है।
	HIN1TH03	भारतीय काव्यशास्त्र एवं हिन्दी आलोचना	1. भारतीय काव्यशास्त्र के मूलभूत सिद्धांतों का परिचय दिया गया है. 2. भारतीय और पाश्चात्य काव्य चिंतन का तुलनात्मक अध्ययन यहाँ सम्मिलित है। 3. यहाँ छात्र हिन्दी आलोचना का विस्तृत अध्ययन करते हैं.
	HIN1TH04	हिन्दी साहित्य का इतिहास (आरम्भ से रीतिकाल तक)	1. आदिकालीन हिन्दी साहित्य के स्वरूप से छात्रों का परिचय होगा. 2. भक्तिकालीन साहित्य की मुख्य [illegible] यहाँ

			सम्मिलित है। 3. रीतिकालीन साहित्य के विविध पहलुओं को समझने में छात्रों को सहायता मिलेगी.
	HIN1TH05	भारतीय साहित्य	1. यहाँ भारतीय साहित्य के कुछ महत्वपूर्ण पाठों का अध्ययन सम्मिलित है. 2. यहाँ भारतीय साहित्य की अवधारणा और इसके अध्ययन की समस्याओं का अध्ययन किया जाता है. 3. यहाँ हिन्दी के अतिरिक्त अन्य भाषाओं के अध्ययन से छात्रों में तुलनात्मक अध्ययन की प्रवृत्ति विकसित होती है.
2	**HIN2TH06**	सगुण भक्तिकाव्य एवं रीतिकाव्य	1. यहाँ छात्र कृष्ण भक्ति काव्य और राम भक्ति काव्य के प्रतिनिधि कवियों के चयनित पाठ का अध्ययन सम्मिलित है. 2. छात्र यहाँ रीतिकालीन साहित्य के कुछ चयनित पाठों का अध्ययन करते हैं. 3. यहाँ सगुण और रीतिकालीन साहित्य का रूपगत अध्ययन अपेक्षित है.
	HIN2TH07	नाटक, रंगमंच एवं अन्य गद्य विधाएँ	1. नाटक, जीवनी, आत्मकथा जैसे गद्य विधाओं के स्वरूप से छात्र परिचित होते हैं. 2. इन विधाओं के कुछ चयनित अंशों का अध्ययन यहाँ किया जाता है. 3. इन गद्य विधाओं में हो रहे हिन्दी लेखन से छात्रों का परिचय होगा.
	HIN2TH08	पाश्चात्य समीक्षा सिद्धांत	1. यहाँ छात्र पाश्चात्य काव्य चिंतन का विस्तृत अध्ययन करते हैं. 2. यहाँ पाश्चात्य और भारतीय साहित्य सिद्धांतों का तुलनात्मक अध्ययन सम्मिलित है. 3. समकालीन नवीन पाश्चात्य सिद्धांतों का अध्ययन यहाँ सम्मिलित है.
	HIN2TH09	हिन्दी साहित्य का इतिहास (आधुनिक काल)	1. आधुनिक हिन्दी साहित्य की महत्वपूर्ण प्रवृत्तियों का परिचय यहाँ दिया गया है. 2. हिन्दी साहित्यिक जगत में मौजूद विभिन्न साहित्यिक आंदोलनों का अध्ययन यहाँ सम्मिलित है. 3. यहाँ समकालीन साहित्य का अध्ययन भी सम्मिलित है.

			मौजूद लोक साहित्य का परिचय पाते हैं. 2. यहाँ लोकसाहित्य की सैद्धांतिक अवधारणा का परिचय दिया गया है. 3. लोकसाहित्य के विविध रूपों और पहलुओं का अध्ययन यहाँ अपेक्षित है.
3	**HIN3TH11**	आधुनिक काव्य (20वीं शताब्दी के आरम्भ से छायावाद तक)	1. इस प्रश्नपत्र में बीसवीं शताब्दी की आरंभिक हिन्दी कविता के स्वरुप से अवगत होते हैं. 2. यहाँ कुछ चयनित पाठों का अध्ययन सम्मिलित है. 3. यहाँ चयनित कवियों का आलोचनात्मक अध्ययन सम्मिलित है.
	HIN3TH12	प्रेमचंद	1. इस प्रश्नपत्र में छात्र प्रेमचंद के हिन्दी साहित्य का गहन अध्ययन करते हैं. 2. यहाँ उर्दू साहित्य में प्रेमचंद के लेखन का अध्ययन भी सम्मिलित है. 3. प्रेमचंद की कलागत विशिष्टताओं का अध्ययन भी यहाँ सम्मिलित है.
	HIN3TH13	हिन्दी पत्रकारिता	1. पत्रकारिता के अर्थ और महत्व से छात्र परिचय प्राप्त करेंगे। 2. हिन्दी पत्रकारिता के इतिहास से छात्रों का परिचय होगा। 3. पत्रकारिता
	HIN3TH14	भाषा विज्ञान और हिन्दी भाषा	1. भाषा विज्ञान के स्वरूप और विभिन्न शाखाओं का अध्ययन किया जाएगा. 2. हिन्दी भाषा के क्रमिक विकास का अध्ययन यहाँ किया जाएगा. 3. आधुनिक भाषा विज्ञान के सिद्धांतों से छात्र अवगत होंगे.
	HIN3TH15	निबंध : साहित्यिक एवं साहित्येतर	1. निबन्ध का अर्थ, स्वरुप, शैली का परिचय यहाँ दिया गया है. 2. साथ ही छात्रों को साहित्यिक एवं साहित्येतर विषयों में लिखने का अनुभव प्राप्त होता है. 3. हिन्दी निबंध लेखन का परिचय यहाँ प्राप्त होगा.
4	**HIN4TH16**	छायावादोत्तर काव्य (प्रगतिवाद से समकालीन तक)	1. प्रगतिवाद की प्रवृत्तियों और इससे संबंधित चयनित पाठों का अध्ययन किया जाएगा. 2. प्रयोगवाद की प्रवृत्तियों और इससे संबंधित चयनित पाठों का अध्ययन किया जाएगा। 3. नई कविता की प्रवृत्तियों और

			दिया जाएगा।
	HIN4TH17	समकालीन हिन्दी साहित्य	1. समकालीन हिन्दी साहित्य की अवधारणा का अर्थ यहाँ स्पष्ट किया जाएगा. 2. चयनित पाठों का यहाँ अध्ययन किया जाएगा। 3. नवीन विमर्शों से छात्रों का परिचय होगा.
	HIN4TH18	हिन्दी आलोचना	1. हिन्दी साहित्य में आलोचना के इतिहास के साथ वर्तमान में उसकी स्थिति को यह प्रश्नपत्र प्रस्तुत करता है. 2. छात्रों के आलोचनात्मक लेखन को विकसित करने में यह प्रश्नपत्र बहुत उपयोगी है. 3. महत्वपूर्ण हिन्दी आलोचकों की समीक्षा पद्धतियों का यहाँ अध्ययन किया जाएगा.
	HIN4TH19	हिन्दी और उर्दू साहित्य का तुलनात्मक अध्ययन	1. हिन्दी और उर्दू साहित्य भारत की साझी संस्कृति को दिखाती हैं. दोनों ही भाषाएँ एक ही स्थान से निकली हैं, इनका विकास भी साथ-साथ हुआ है. ऐसे बहुत से लेखक हैं जिन्होंने दोनों भाषाओं में समानाधिकार से लिखा भी हैं और प्रसिद्धि भी पाई हैं. ऐसे साहित्यकारों का विशेष अध्ययन यहाँ अपेक्षित है. 2. इन दोनों भाषाओं का तुलनात्मक अध्ययन इस प्रश्नपत्र का उद्देश्य है. 3. इन दोनों भाषाओं के साहित्य का तुलनात्मक अध्ययन किया जाएगा।
	HIN4TH20	सृजनात्मक लेखन	1. यह प्रश्नपत्र छात्रों को साहित्य की सृजन प्रक्रिया से अवगत कराता है. 2. यहाँ छात्र स्वयं व्यावहारिक स्तर पर इनमें से कुछ विधाओं में लिखने का प्रयास करते हैं. 3. काव्य भाषा और गद्य भाषा से संबंधित बारीकियों से छात्र अवगत होंगे।

*Add more rows if required.

प्रभारी
हिन्दी विभाग
यूइंग क्रिश्चियन महाविद्यालय
प्रयागराज

Date:

(Signature and Seal)
Head/Coordinator of Department

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	B.Sc. (Physics, Chemistry, Mathematics)		1950-1951 (6semesters)	240
2.	B.Sc. (Physics, Statistics, Mathematics)		1970-1971 (6semesters)	60
3.	B.A. (Physics, Statistics, Economics)		1975-1976 (6semesters)	30
4.	B.Sc. (Physics, Electronics, Mathematics)		1995-1996 (6semesters)	60
5.	B.Sc. (Physics, Computer Application, Mathematics)		1996-1997 (6semesters)	60
6.	B.Sc. (Physics, Bio-Physics, Mathematics)		2016-2017 (6semesters)	60
7.	M.A./M.Sc. (Mathematics)		2016-2017 (4semesters)	50

COURSES AND THEIR OUTCOME OF B.A./B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	1MATTH1	Ordinary Differential Equations	After successful completion of the course the students will be able to 1. Basic concepts of ODE of first order and its applications. 2. Clairaut's equations, singular solutions, orthogonal trajectories and isoclines. 3. Formulation and solution of Homogeneous and Non Homogeneous Differential Equations and their applications. 4. Formulation and solution of System of Linear Differential equations with constant coefficients. 5. Mechanical applications of ODE.
	1MATTH2	Elementary Analysis-1	After successful completion of the course the students will be able to 1. Understand the concepts of Mathematical statements, logical connectives, tautology and quantifiers. 2. Understand concept of relations and mapping and their applications. 3. Concept of Real number system by axiomatic approach. 4. Division algorithm, Euclidean algorithm and

			6. Solution of infinite series by various tests.
II	2MATTH1	Analytical Geometry of Three Dimensions	After successful completion of the course the students will be able to 1. Understand the concept of equation of Sphere, sphere passing through a circle, intersection of a sphere and a straight line, tangent plane, plane of contact, polar plane. 2. Understand the concept of power of a point, radical plane, co-axial system of spheres, orthogonal system of spheres. 3. Understand the concept of equation of a cylinder with given base, projective cylinder, right-circular cylinder and enveloping cylinder 4. Understand the concepts of cone, reciprocal cone, enveloping cone and right circular cylinders. 5. Understand the concepts of Central Conicoids, polar plane, polar lines, diametral planes and normal from a given point.
	2MATTH2	Elementary Analysis-2	After successful completion of the course the students will be able to 1. Understand the concepts of limit of a real valued function and algebra of limits. 2. Understand the concepts of Continuity of a function. 3. Understand the concepts of differentiability of a function and its applications. 4. Understand the concepts of Higher derivative and its applications. 5. Understand the concepts of Vector differentiation and its applications.
III	3MATTH1	Linear Algebra	After successful completion of the course the students will be able to: 1. Understand the concepts of vector space , subspaces, quotient spaces and its properties 2. Understand the concepts of linear transformations, rank nullity theorem, fundamental theorem of vector homomorphism, dual space of a vector space, annihilator of a subset of a vector space. 3. Understand the concepts of Matrix representation of a linear transformation, elementary row and column operations, invertible matrix, normal form and Echelon form. 4. Understand the concepts of Inner product space and its applications, Eigen values and Eigen vectors, Cayley- Hamilton theorem and its applications.
	3MATTH2	Advanced Analysis-1	After successful completion of the course the students will be able to 1. Understand the concept of step functions and their integration, Integrals of bounded functions, Properties of integrals of a step function. 2. Understand the concept of Mean value theorem for integrals, fundamental theorem of integral calculus, primitive of a function and change of variables. 3. Understand the concept of Double and triple integrals, change of order of integration, line, surface and volume integral and its application in area and volume. 4. Understand the concept of Pointwise and uniform convergence of sequences and series of functions, necessary and sufficient condition for uniform convergence, Weierstrass's test, Dirichlet's test and Abel's

			will be able to: 1. Basic concepts of dynamics, radial and transversal tangential normal components of velocity and acceleration of a particle in motion, 2. To formulate and solve the simple harmonic motion problem, 3. To formulate and solve motion in resisting medium in a vertical circle 4. To formulate and solve central motion of particle
	4MATTH2	Advanced Analysis-2	After successful completion of the course the students will be able to 1. Understand the concept of Term by term integration and differentiation of an infinite series of functions and power series. 2. Understand the concept of convergence of arbitrary infinite series, alternating series, conditional and absolute convergence, Riemann's theorem on rearrangement of absolutely and conditionally convergent series. 3. Understand the concept of convergence of Improper integrals, integrals over infinite intervals with bounded integrands and convergence of such integrals, absolute convergence, convergence of integrals of product of two functions. 4. Understand the concept of metric spaces, open and closed balls, interior, exterior, boundary and limit points, limit of sequences in metric spaces, Cauchy's sequences.
V	5MATTH1	Algebra-1	After successful completion of the course the students will be able to 1. Recognize different algebraic structures viz. groupoid, semi-group, monoid, group and abelian group with a range of examples including Klein's four group, Hamiltonian eight group, dihedral group, etc. 2. Use the concept of homomorphism and isomorphism of groups. 3. Analyse and demonstrate examples of subgroups, cyclic group, normal subgroups and quotient groups. 4. Understand the proof of Lagrange's theorem and its applications in finite groups including cyclic groups. 5. Define and solve linear and quadratic congruence as well as apply quadratic reciprocity and other methods to classify quadratic residue and non-quadratic residue. 6. Understand the concept of arithmetic functions.
	5MATTH2	Advanced Analysis-3	After successful completion of the course the students will be able to 1. Understand the concept of limit and continuity of functions between metric spaces, compactness of metric spaces. 2. Understand the concept of Uniform continuity, complete metric spaces, analytic functions, Cauchy – Riemann equations and Harmonic functions. 3. Understand the concept of function of several variables, limit, continuity, differentiability and total derivatives. 4. Understand the concept of homogeneous functions, mean

			Implicit function theorem and inverse function theorem.
	5MATTH3	Mechanics-2	On successful completion of this course, the students will be able to: 1. Basic concepts of common catenaries and its applications as wire stretching in high tension, 2. Technique of virtual work, 3. Forces in three dimensions, 4. To find central axis wrench, pitch etc. via vector method.
VI	6MATTH1	Algebra-2	After successful completion of the course the students will be able to 1. Prove and apply Isomorphism Theorems and Correspondance theorems for groups. 2. Understand symmetric groups and produce rigrous proofs of propositions arising in the context of permutation groups. 3. Analyse and demonstrate examples of ring, subring, ideals, quotient rings, division rings and fields. 4. Various canonical type of rings including polynomial ring and modular rings.
	6MATTH2	Numerical Methods	On successful completion of this course, the students will be able to: 1. Understand numerical techniques to find the roots of non- linear equation and the numerical solution of system of linear equations. 2. Define the difference operators and the use of suitable interpolation formulae to deduce the approximate function for a given set of data points. 3. Estimate numerical differentiation and numerical integration by using quadrature formula. 4. Apply single and multistep explicit methods to solve the initial value problem of first order and first degree. 5. Obtain an approximate largest eigen value and corresponding eigen vector for the given matrix.
	6MATTH3	Mechanics-3	On successful completion of this course, the students will be able to: 1. Basic concepts of moments of inertia and product of inertia, It's role in motion of physical bodies, 2. Moment of inertia and product of inertia of some two dimension and three dimension bodies, 3. D'Alembert's principle and reaction about rotating axis, 4. Basic concepts of non-viscous fluid mass conservation law and momentum conservation law, 5. Source and sinks in two dimensional motion.
	SEC146	Operations Research	On successful completion of this course, the students will be able to: 1. Analyze any real life system with limited constraints and depict it in a linear model form 2. Convert the problem into a mathematical model. 3. Solve the mathematical model manually as well as using soft resources/software. 4. Understand variety of problems such as assignment, transportation, travelling salesman etc. 5. Formulate and solve many daily problems as "Linear programming problems".

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	MAT1TH01	Group Theory	On successful completion of this course, the students will be able to: 1. Understand and apply fundamental theorem of group homomorphism and isomorphism theorems. 2. Know the fundamental concept of Geometry related to some groups like dihedral groups, matrix groups, isometry groups of R^2 and R^3. 3. Understand and apply concept of subnormal and normal series. 4. Solve problems using the powerful concept of group action. 5. Class equation and its application 6. Understand and apply Sylow theorems 7. Understand and apply the concept of solvability and nilpotency of groups (especially in finite p-groups and some other finite groups).
	MAT1TH03	Complex Analysis	On successful completion of this course, the students will be able to: 1. Give the concepts of analytic function and harmonic function and to explain the role of Cauchy-Riemann equations. 2. Carry out computations with the complex exponential, logarithmic, root functions and know their domains of definition. 3. Express analytic functions in terms of power series and Laurent series. 4. Calculate contour integrals and some indefinite real integrals by using Cauchy`s integral theorem or calculus of residues. 5. Find the number of zeros and poles within a given curve by using argument principle or Rouche's theorem. 6. Understand the theoretical implication of Cauchy`s theorem such as the maximum modulus principle, Liouville's theorem and the fundamental theorem of algebra. 7. Find the image of circles, lines, upper half plane and lower half plane under the Mobius transformation.
	MAT1TH05	Point-Set Topology	After successful completion of the course the students will be able to 1. Understand and demonstrate the concepts of metric spaces and topological spaces, and their role in mathematics. 2. Demonstrate familiarity with a range of examples of these structures. 3. Define and demonstrate the concept of continuous functions and homeomorphisms and prove a selection of related theorems. 4. Prove basic results about separation, compactness, completeness and connectedness within these structures. 5. Define and illustrate the concepts of product and quotient topology.
	MAT1TH07	Differential Geometry-1	After successful completion of the course the students will be able to 1. Applications of Christoffel's Symbols 2. Examples of curvature, arc lengths and line integrals,

			and curvature
	MAT1TH09	Classical Mechanics	After successful completion of the course the students will be able to 1. understand the basic mechanical concepts related to dynamics of a system of particles and rigid body motions, 2. derive conservation principles involving linear momentum, angular momentum and energy from fundamental equations of motion, 3. know the concepts of generalized coordinates and constrained motion, 4. find the linear approximation to a dynamical system near equilibrium and know how to solve the wave equations for small oscillations, 5. Describe and understand the motion of a mechanical system using Lagrange and Hamilton formalism.
II	MAT2TH02	Module Theory	After successful completion of the course the students will be able to 1. Understand the concept of a module over a ring and its related consequences 2. Understand the concept of free modules, Projective modules, Injective modules and division groups. 3. Understand factorization theory in commutative domains, P.I.D, U.F.D and polynomial rings over domains. 4. Understand torsion and torsion-free modules, decomposition of p-primary finitely generated torsion modules and direct sum decomposition of abelian groups into cyclic groups 5. Reduction of matrices over polynomial rings over a field, F[X]- module structure, Elementary Jordon matrices and Jordon- Chevalley theorem
	MAT2TH04	Measure and Integration	On successful completion of this course, the students will be able to: 1. Explain measure, outer measure, measurable set and non- measurable set. 2. Define measurable functions on a measure space and their algebraic properties. 3. Distinguish the difference between the Riemann integral and Lebesgue integral. 4. Investigate Lebesgue integrability of any measurable function by using dominated convergence and Lebesgue monotone convergence theorems. 5. Identify some important inequalities and properties of Lebesgue L^p- Space.
	MAT2TH06	Partial Differential Equations and Integral Equations	After successful completion of the course the students will be able to 1. Formulate physical and geometrical problems as PDE using conservation principles. 2. Classify PDEs and qualitative differences between the classes of equations. 3. Competent in solving linear and non-linear PDEs using classical methods. 4 Solve the problems related to waves and conduction

			Equations, IVP and BVP. 6. Recognize difference between the Volterra and Fredholm Integral Equations of different kinds, homogenous and non-homogenous etc. 7. Apply different methods to solve Integral Equations.
	MAT2TH08	Mathematical Methods	After successful completion of the course the students will be able to 1. Understand the concept of Eigen values and Eigen functions of Sturm-Liouville problems (SLP), 2. Understand the concepts of orthogonal Eigenfunction expansion of functions (generalized Fourier Series), 3. Understand the concepts and find Fourier series and Fourier integral representation of functions 4. Apply the concepts of Fourier and Laplace transforms in solving ordinary and partial differential equations, 5. Understand the concept of functionals, their variations and extremals.
	MAT2TH10	Differential Geometry-2	After successful completion of the course the students will be able to 1. Understand basic notion of differentiable n-manifolds 2. Basic notion of affine connection and curvature tensor of an affine connection 3. Applications of Lie groups, vector fields, exterior product, tensor fields on manifolds
III	MAT3TH01	Fields and Galois Theory	On successful completion of this course, the students will be able to: 1. Einstein's irreducibility criterion, field extension, algebraic and transcendental extensuion. Factorization of polynomials in extension fields, 2. Splitting fields and their uniqueness, separability over field of prime charecteritic, 3. Automorphism of fields, normality, normal clousure, Galois extension and Galois groups of polynomials, 4. Primitive element theorem, subfields of a finite fields, characterization of cyclic Galois groups and fundamental theorem of algebra, 5. Cyclotonic extensions solvability by radicals and geometrical constructions.
	MAT3TH03	Functional Analysis	On successful completion of this course, the students will be able to: 1. Explain the normed linear spaces and its topological properties. 2. Understand the fundamental properties of Banach spaces, Hilbert spaces and bounded linear operators. 3. Explain the idea of duals and adjoint. 4. Apply Hahn Banach theorem, Open Mapping theorem, Closed Graph theorem and Uniform Bounded Principle. 5. Solve the problems involving weak and weak* topologies, 6. Formulate the Spectral theorem.
	MAT3TH05	Theory of Ordinary Differential Equations	After successful completion of the course the students will be able to 1. find Picard's iterations and solution of IVP, 2. understand the existence and uniqueness of solutions of Initial Value Problems (IVP) 3. understand the concept of envelop and singular solutions, 4. find systems of 1st order equations arising out of equations of higher order and hence the local and global

			6. understand the concept of power series solution of general ODE with deep insight on Legendre and Bessel's equations.
	MAT3TH07	Fluid Mechanics	On successful completion of this course, the students will be able to: 1. Basic concepts of mass conservation law, momentum conservation law for viscous fluid motion, 2. Navier Stoke's equations of motion 3. Concepts of sources and sinks, complex potential 4. To find the images using circle theorem.
	MAT3TH51	Riemannian Geometry	After successful completion of the course the students will be able to 1. Understand the concept of Riemannian metrices and Riemannian manifolds. 2. Understand the concepts of Levi-civita connections, Fundamental Theorem of Riemannian Geometry. 3. Understanding of Gradient, Divergence and curl of a vector field. 4. Understand Jacobi-fields, Riemannian immersions, Gauss equations. 5. Understand Lie-derivatives of scalars, vectors, tensors and linear connections. 6. Understand the affine motion, projective motion in a Riemannian space and homothetic transformations.
	MAT3TH53	Algebraic Topology	After successful completion of the course the students will be able to 1. Introduction of fundamental groups and its applications 2. Calculations of fundamental groups of S^n, RP^2 , Torus and Dunce cap 3. Applications of Brower fixed point theorem, fundamental theorem of algebra, Borsuk-Ulam theorem for S^2. 4. Introduction to singular homology and applications of EilenbergSteenrod axioms 5. Meyer-Vietoris sequences and its applications
IV	MAT4TH02	Wavelets	After successful completion of the course the students will be able to 1. Understand the concepts of DFT, IDFT anf FFT of $l^2(\mathbb{Z}_N)$. 2. Construction of wavelets on $\mathbb{Z}_N$ by different methods. 3. Examples of Wavelets like Haar, Shannon and Daubechies D6' wavelets. 4. Construction of wavelets on $l^2(\mathbb{R})$ and Balian-low theorem. 5. Understand the concept of Multi-Resolution Analysis (MRA) and Franklin Wavelets. 6. Understand the programming in MATLAB and programming to plot member of $l^2(\mathbb{Z}_N)$, its DFT and IDFT. 7. Verify identities using MATLAB Programming. 8. Computing Fourier coefficients w.r.t. given Haar or Daubechies Wavelet at a certain level using MATLAB programming.
	MAT4TH54	Advanced Module Theory	On successful completion of this course, the students will be able to: 1. Modules over rings, annihilators, projections, 2. Chain conditions on modules, Noietherian and Artinian modules and rings, composition series of

			lemma, 4. Injective modules and divisible modules, essential extensions and injective envelope of a module, 5. Small submodules, projective modules and Jacobson radicals of a projective module.
	MAT4TH72	Lie Algebras	After successful completion of the course the students will be able to 1. Basic notions of classical Lie algebras and abstract Lie algebras 2. Applications of Engel's theorem, Cartan's criteria, Lie theorem, and Killing forms 3. Introduction to root decomposition and classification of rank-2 root system 4. Idea of bases and their existence, Weyl chambers
	MAT4TH74	Magneto-hydrodynamics	On successful completion of this course, the students will be able to: 1. Basic assumptions of Magneto-hydrodynamics flow 2. Alfven waves 3. Magneto-hydrodynamics boundary conditions 4. Waves and theory of characteristics 5. Steady Magneto-hydrodynamics flow
	MAT4TH86	Stability Theory of Differential Equations and its Applications	After successful completion of the course the students will be able to 1. Understand the concept of stability of solutions of differential equations 2. Test the stability of the solutions of uncoupled and coupled linear system of ordinary differential equations (ODE) 3. Understand the phenomena of phase plane, critical points and its types 4. Test the stability of non-linear systems by linearization using variational matrix and by Liapunov method, 5. Formulate and analyse various mathematical models specially of population growth.

Date: 25.3.22

D.K. Pandey
25.3.22
(Signature and Seal)
Head/Coordinator of Department

HEAD
DEPARTMENT OF MATHEMATICS
EWING CHRISTIAN COLLEGE
PRAYAGRAJ

DEPARTMENT OF MATHEMATICS

EWING CHRISTIAN COLLEGE, PRAYAGRAJ

(A Christian Minority Institution of the Church of North India)
(An Autonomous Constituent College of University of Allahabad)

PROGRAMME OUTCOME (PO) & PROGRAMME SPECIFIC OUTCOME (PSO)

PROGRAMME OUTCOME (PO):

At the graduation in Faculty of Science with Mathematics student should:

- Develop an understanding of the unifying structures in mathematics and the relationships among them.
- Understands the basic concepts, fundamental principles and scientific theories related to various scientific phenomenon and their relevance in the day-to-day life.
- Understand the application of Mathematics in different fields.
- Develop and understand the value of proof, the single factor that distinguishes mathematics from all other disciplines, and should demonstrate proficiency in writing and understanding proofs.
- Understand the historical and contemporary role of mathematics and be able to place the discipline properly in the context of other human intellectual achievement.
- Be able to think creatively to propose novel ideas in explaining facts and figures or providing new solutions to the problems.
- Be able to pursue higher studies in Mathematics and Scientific Computation.
- Be able to work in different scientific institutions.

At the post-graduation level in Mathematics student should :

- Develop and understand the value of proof and should demonstrate proficiency in writing and understanding proofs.
- Understand the historical and contemporary role of mathematics and be able to place the discipline properly in the context of other human intellectual achievement.
- Be able to think creatively to propose novel ideas in explaining facts and figures or providing new solutions to the problems.
- Research
- Be able to pursue higher studies in Mathematics and Scientific Computation.
- Be able to work in different scientific institution.

PROGRAMME SPECIFIC OUTCOME (PSO):

Student in B.A./B.Sc. with Mathematics should:

- Understands the limit of a function, use to prove properties of continuous functions and derivative of functions.
- Understands the geometry of various multidimensional objects and their properties.
- Solve linear and non-linear differential equations.
- Have been able to use the facility with mathematical and computational modeling of real decision making.
- Demonstrate algebraic structures like groups, rings, fields, etc. and their properties.
- Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
- Expound upon the concept of various types of sequences and series and their applications in the real world problems.
- Understands the use of numerical methods and its various applications.
- Use the methods to design experiments, analysis and interpretation of data and synthesize the information to provide valid conclusion.

Student in M.A./M.Sc. with Mathematics should:

- Understands some standard theorems including Jordan-Holder, Burnside and Sylow theorems and their vast applications in group theory.
- Understands solvability and nilpotency of finite groups.
- Work efficiently on problems related to analytic functions, Mobius transformations, Cauchy Integral Formula and Cauchy's Hardmard theorem.
- Understands the concept of singularities of functions and their applications including evaluation of simple definite integrals using contour integration.
- Familiar with the topological spaces including product topology, Urysohn's embedding and metrization theorem and Tietz extension theorem.
- Understands the curves in spaces, Frenet approximation of a space curve, osculating circle, curvature of curves on surfaces & Christoffel symbols.
- Expound upon the various concepts of motion of a particle as well as rigid body in space.
- Demonstrate the R-module structure over a ring as well as PID and understands the structural decomposition of a module over a PID into elementary divisor form and invariant factor form.
- Understands the general notion of measure, σ –algebras, Lebesgue measure, construction of Lebesgue integral on a measure space and measure limit theorems such as Monotone, Dominated Convergence Theorems etc.
- Able to solve linear & non-linear PDE's, Heat & Wave equations and understands the classification of Integral equations and Resolvent Kernel.

- Able to solve S-L problems and understands the concept of Fourier Series, Fourier Integral & Laplace Transforms and their applications.
- Understands the variation problem techniques to solve differential equations and extremum problems.
- Familiar with the Topological manifolds, Tangent and cotangent spaces, Integral curves and affine connections on a smooth manifold.
- Familiar with the Field extensions, Galois group and primitive element theorem.
- Understands the Galois & Cyclotomic extensions and important theorems such as Dedekind's and Abel-Ruffini theorems.
- Demonstrate an understanding of the concepts of Banach Spaces and Hilbert Spaces and their role in Mathematics.
- Understands the theory of ordinary differential equations and its vast application in the day-to-day life.
- Understands the Use of Computer language, its programming & data structural usage and application in the Wavelet Analysis.

Name of the Department: Physics

Details of Programmes offered in the Department:

S. No.	Name of Programme	Programme Code	Year of Commencement and Duration	Sanctioned Seats
1.	B.Sc.	PCM, PSM, PEM, PCAM, PBPM	1908 and 3 years (6 semesters)	480
2.	M.Sc.	Electronics and Condensed Matter Physics	2016 and 2 years (4 semesters)	30
3.	Ph.D.		2018 and 5 years (Including course work)	16

Courses and their Outcome of B.Sc. Programme

Semester	Course Code	Course Title/Paper title	Course Outcome (After completion of this course students will be able to)
I	1PHYTH1	Mechanics and Relativity	• understand the basic concepts related to mathematical tools behind Physics. • get the ideas about natural laws governing to macroscopic world at relativistic and non-relativistic speeds.
	1PHYTH2	Oscillations and Network Analysis	• work on the household electrical network (wiring). • understand various oscillatory systems.

	1PHYPR1	A- Mechanics/ OR B- Electricity	**Mechanics:** • determine the values of elastic constants of the material using different methods (Y by bending, Torsion table and Searle's apparatus). • find out the spring constant and effective mass of the spiral spring. • determine the moment of inertia of a flywheel about its axis of rotation. • Find the value of acceleration due to gravity and radius of gyration using compound pendulum. OR **Electricity:** • calibrate an electrical energy meter using Joule's calorimeter. • determine the frequency of A.C. mains by sonometer using electromagnet. • find the capacitance of the given condenser by Wien's bridge. • determine the charge sensitivity and current sensitivity of moving coil ballistic galvanometer. • study the LCR series circuit and find the resonant frequency, band width and quality factor.
II	2PHYTH1	Thermal Physics	• understand the concepts of different thermodynamics laws and related phenomena. • get knowledge of heat, work and their interconversions (heat pump aand heat engine).
	2PHYTH2	Analog and Digital Electronics	• understand the digital and analog devices.

			Transistor.
V	5PHYTH1	Quantum mechanics and Spectroscopy	• understand the operators and its algebra, Schrodinger equation and its application, time independent perturbation theory. • study the spectroscopic tools including magnetic resonance spectroscopy (ESR, NMR).
	5PHYTH2	Advanced Electronics	• study basic concepts of different types of amplifiers, and oscillator. • explore different types of logic gates (RTL, DTL, TTL).
	5PHYTH3	Statistical and Classical Mechanics	• study the basic concepts of micro and macroscopic quantities and the Distribution laws. • get the concepts of Lagrangian and Hamiltonian formulations of Classical mechanics, Classical brackets and canonical transformation.
	5PHYPR1	A-Optics/ OR B- Electronics	**Optics:** • study the demarcation method using Spectroscope. • determine the fringe shift using Biprism. • find the wavelength of the given laser source using reflection grating. • determine the acceptance angle and numerical aperture of the given optical fiber. OR **Electronics:** • study the photoelectric effect using photodiode and phototransistor. • study the working of n-channel and p-channel MOSFET and discuss its drain and mutual characteristics. • determine the power dissipation, fan-out and other characteristics of DTL.
VI	6PHYTH1	Electromagnetic theory and Nuclear Physics	• acquire the concepts of Maxwell equation and their plane wave solutions, propagation of electromagnetic wave in real medium, including plasma, boundary condition. • get basic concepts of nuclear

			energy, elementary particles and various conservation laws.
	6PHYTH2	Solid state Physics	• understand the physical properties of matter in the solid state due to motion of electron in the periodic lattice potential and interactions between electrons
	6PHYPR2	B-Optics/ OR A-Electronics	**Optics:** • study the demarcation method using Spectroscope. • determine the fringe shift using Biprism. • find the wavelength of the given laser source using reflection grating. • determine the acceptance angle and numerical aperture of the given optical fiber. OR **Electronics:** • study the photoelectric effect using photodiode and phototransistor. • Study the working of n-channel and p-channel MOSFET and discuss its drain and mutual characteristics. • determine the power dissipation, fan-out and other characteristics of DTL.
	6PHYTH3	Mathematical Physics and Computational Physics	• understand the various mathematical tools (Hermite polynomial, Legendre polynomial etc) to solve Physical problems and plots using MATLAB.
	6SEC004 (SEC)	Skill Enhancement Course (Nanoscience and Technology)	• understand the basic concepts and applications of nano-science and nano-engineering.

Courses and their Outcome of M.Sc. Programme:

Semester	Course Code	Course Title/Paper Title	Course Outcome (After completion of this course students will be able to)
I	PHY1TH01	Mathematical Physics	• master on various mathematical tools applicable to Physics such as 1. Complex variables, differential equations, special functions, 2. integral transforms, Dirac-delta and Green's function.
	PHY1TH02	Classical Mechanics	• master on the advance concepts of Lagrangian and Hamiltonian formalisms and various transformations. • get the concepts and applications of Hamilton-Jacobi theory.
	PHY1TH03	Electromagnetic Theory	• acquire concepts of electromagnetic propagation through guided medium (transmission lines and wave guides). • explore the applications of tensor analysis in Electromagnetic theory. • get the concepts of space time in STR and Covariance of Electromagnetism
	PHY1TH04	Quantum Mechanics-I	• learn Schrodinger, Heisenberg and Dirac's representations of Quantum mechanics. • Angular momenta and Clebsch-Gordon Coefficients • know the Uncertainty principles, matrix theory of harmonic oscillators. • know the application of Quantum mechanics to fields
	PHY1PR01	A-Optics/	**Optics:** • verify the Fresnel's formula for the reflection of light. • find the wavelength of the laser source by using Fabry-Perot interferometer and study the fringe pattern. • determine the Boltzmann constant using the

		OR A-Electronics	Boltzmann constant kit for different semiconductor diode. • determine the resolving power of a plane diffraction grating. OR **Electronics:** • study the Fourier analysis of square and triangular wave • study the modulation and demodulation determine the h-parameters
II	PHY2TH01	Quantum Mechanics-II	• get the Concepts and applications of Time-Independent and dependent Perturbation Theory, Variational Method and WKB Method. • explore the ideas of partial wave analysis • understand Relativistic Quantum mechanics for spin-0 and spin-half particles.
	PHY2TH02	Statistical Mechanics	• explain the concepts and applications of Grand potential, FD and BE distribution in Grand Canonical ensemble. • get the advance concepts of degenerate Bose Gas, Momentum Condensation, (Liquid He II, Two fluid theory, Superfluidity).
	PHY2TH03	Solid State Electronics	• get the concepts of Multistage Amplifiers (BJT at high frequencies, frequency response of gain and phase shift, frequency response of RC coupled amplifier). • explore the applications of different negative feedback amplifiers and their properties.
	PHY2TH04	Atomic and Molecular Physics	• explain the concepts and applications of quantum states and spectra of hydrogen like atoms, x-rays. • acquire knowledge about different kind of spectroscopic tools
	PHY2PR02	B-Optics/	**Optics:** • verify the Fresnel's formula for the reflection of light. • find the wavelength of the laser source by

		OR A-Electronics	using Fabry-Perot interferometer and study the fringe pattern. • determine the Boltzmann constant using the Boltzmann constant kit for different semiconductor diode. • determine the resolving power of a plane diffraction grating. OR **Electronics:** • study the Fourier analysis of square and triangular wave • study the modulation and demodulation • determine the h-parameters
III	PHY3TH01	Condensed Matter Physics	• get advance concepts of electron band theory, superconductivity, lattice with their defects and the theory of magnetism
	PHY3TH02	Nuclear Physics	• get advance knowledge and applications of deuteron problem, nuclear shell model, radioactivity and nuclear reactions. • gain the basic knowledge of elementary particles
	PHY3TH3A	Elective-I (Condensed Matter Physics)	• enable to understand the properties of matter in condensed state using various advance techniques
	PHY3TH3B	Elective-I (Analog and Digital Electronics)	• review and applications of wide band amplifiers and concepts of linear and nonlinear analog systems
	PHY3TH4A	Elective-II (Condensed Matter Physics)	• enable to understand the properties of matter in condensed state using semi-classical and Green function techniques
	PHY3TH4B	Elective-II (Microwaves)	• explore the concepts and applications of microwaves • get the concepts of various microwave generators and its properties
	PHY3PR1A	Condensed Matter	• study the variation of resistivity with temperature and band gap of a Ge crystal by

		Physics (Practical)	Four probe method. • study the dispersion relation for the mono-atomic and diatomic lattices. • calculate the Curie temperature of a ferroelectric material. • determine the Lande-g factor by the ESR spectrometer.
	PHY3PR1B	Electronics (Practical)	• study the operational amplifier with its different characteristics and applications. • know the operation of Klystron, Logocam etc.
IV	PHY4TH01	Experimental Techniques and Control systems	• explore the various concepts and applications of data interpretation and analysis, optoelectronic devices and detectors, measurement and control systems etc.
	PHY4TH02	Programming for Numerical Methods	• acquire the knowledge of advance concepts and applications of C++ programming to various numerical methods.
	PHY4TH3A	Elective-I (Condensed Matter Physics)	• enable to understand the concepts and properties of transport theory,second quantization theory and magnetic phase transition.
	PHY4TH3B	Elective-I (Microprocessor)	• execute the different programs using microprocessor 8085. • understand the hardware description and interfacing of 8085.
	PHY4TH4A	Elective-II (Condensed Matter Physics)	• enable to understand the properties of many electron systems, electron-phonon interactions and linear response theory.
	PHY4TH4B	Elective-II (Semiconductor devices)	• review of semiconductor physics and V-I characteristics of different diodes. • get the advanced characteristics of BJT.
	PHY4PR1A	Condensed Matter Physics (Practical)	• study the magnetoresistance of a given sample. • determine the thermoluminoscence of F-centers of alkali halides. • study the photoconductivity of CdS

	2PHYPR2	B-Mechanics/ OR A-Electricity	**Mechanics:** • determine the values of elastic constants of the material using different methods (Y by bending, Torsion table and Searle's apparatus). • find out the spring constant and effective mass of the spiral spring. • determine the moment of inertia of a flywheel about its axis of rotation. Find the value of acceleration due to gravity and radius of gyration using compound pendulum. OR **Electricity:** • calibrate an electrical energy meter using Joule's calorimeter. • determine the frequency of A.C. mains by sonometer using electromagnet. • find the capacitance of the given condenser by Wien's bridge. • determine the charge sensitivity and current sensitivity of moving coil ballistic galvanometer. • study the LCR series circuit and find the resonant frequency, band width and quality factor
III	3PHYTH1	Wave motion and wave optics	• get the ideas on the wave theory of light (interference, diffraction and polarisation).
	3PHYTH2	Geometrical and Quantum Optics	• get the concepts of matrix method applied to ray optics. • understand the basic principles and application of laser, optical fibre and photonic devices.
	3PHYPR1	A-Optics/	**Optics:** • determine the cardinal points using Goniometer. • study the dispersive power of prism by determining the angle of prism and minimum deviation. • determine the wavelength of sodium light and radius of curvature of plano-convex lens using Newton's ring. • study the angle of diffraction and find the wavelength of mercury light using diffraction grating

		OR B-Electronics	OR **Electronics:** • determine the horizontal and vertical angle of earth magnetic field using Earth Inductor. • study the Bipolar Junction Transistor and its output characteristics. • verify the truth table and draw output characteristics for NOT, AND and OR gates. • study the need of Power supply and also the working of Field Effect Transistor.
IV	4PHYTH1	Electromagnetism	• know the basic laws of electrostics and magnetostatics and electromagnetism.
	4PHYTH2	Atomic Physics	• gain the knowledge of development of Physics at atomic level and also the properties of matter at atomic level. • explain Concepts of wave mechanics.
	4PHYPR2	B-Optics/ OR Electronics	**Optics:** • determine the cardinal points using Goniometer. • study the dispersive power of prism by determining the angle of prism and minimum deviation. • determine the wavelength of sodium light and radius of curvature of plano-convex lens using Newton's ring. • study the angle of diffraction and find the wavelength of mercury light using diffraction grating OR **Electronics:** • determine the horizontal and vertical angle of earth magnetic field using Earth Inductor. • study the Bipolar Junction Transistor and its output characteristics. • Verify the truth table and draw output characteristics for NOT, AND and OR gates. • Study the need of Power supply and also the working of Field Effect

			photoresistor. • determine the hysteresis loss by CRO/DSO of given specimen.
	PHY4PR1B	Electronics (Practical)	• execute the different programs using microprocessor 8085/8086. • understand the hardware description and interfacing of 8085. • determine the modulation and demodulation of a carrier wave.

Date: 26.04.2022

26.04.2022

(Signature and Seal)
Head of the Department

Head of the Physics Department
RWING CHRISTIAN COLLEGE

PROGRAMME AND COURSE OUTCOMES

Details of Programmes offered in the Department

S. No.	Name of Programme	Programme Code	Programme Outcome
1.	MASTERS IN ZOOLOGY	M. Sc. (ZOO)	• Critical analysis of various life forms, its origin, development and their interactions in relation to molecular biology, ecology, genetics and evolution. • In depth study of Insect Taxonomy, Physiology and Integrated pest management. • Perform, Assess and implement practical techniques and procedure to solve biological problems; analyse and quantify data collected during any project/ research problem and to formulate a scientific solution.
2.	BACHELORS IN SCIENCE	B.Sc. (ZBC)	• Develop reasoning and analytical areas. • To better understand the animal kingdom which will lead to identification, classification. • To understand the basics of Cell and Molecular biology, Genetics, Microbiology and Immunology. • In understanding the functioning and different uses of the scientific instruments.
3.	DIPLOMA IN LABORATORY TECHNOLOGY	DLT	• This course involves Advanced Professional learning in Prevention, Diagnosis and Treatment of diseases in patients through Clinical Laboratory tests. • To train students in the field of ***"Laboratory Technology"*** for employment in hospitals, clinics, pathological laboratories, research laboratories, etc. • To encourage entrepreneurship among young men and women with the skills and knowledge provided under this programme. • To brighten the chances of getting employment especially in private sector, which is expanding, many fold.

COURSES AND THEIR OUTCOME OF B.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	1ZOOTH01	MICROSCOPY , CELL BIOLOGY, PROTOZOA AND PORIFERA	• The given course will ensure that the students learn about the simple light and electron microscopy their principles and working. • It will also enable students to learn about the cell biology including structure and functions of cell organelles, nucleus and chromosomes • to understand the phylum Protozoa and Porifera , their general characters , classification upto Orders including Type study.
	1ZOOTH02	COELENTERATA, CTENOPHORA, PLATYHELMINTHES, ASCHELMITHES AND ANNELIDA	• It will help students to understand the general characters of Phylum Coelenterata, Ctenophora, Platyhelminthes, Aschelminthes and Annelida • Classification of Phylum Coelenterata, Ctenophora, Platyhelminthes, Aschelminthes and Annelida upto Orders • Type study of animals from each Phylum.
II	2ZOOTH01	ONYCHOPHORA, ARTHROPODA, MOLLUSCA AND ECHINODERMATA	• It will enable students to understand the general characters of Phylum Onychophora, Arthropoda, Mollusca and Echinodermata and • Classification of Phylum Onychophora, Arthropoda, Mollusca and Echinodermata upto Orders in detail • Type study of animals in each Phylum.
	2ZOOTH02	GENETICS, EVOLUTION AND ANIMAL DISTRIBUTION	• This will help students to understand the Structure of DNA and RNA, Genetic code, Transcription. • The molecular basis of mutation, Sex determination, chromosomal abnormalities and Blood groups in humans. • Further to ensure that the student learn about their variation, isolation and biogeographical distribution of animals and factors influencing them.
III	3ZOOTH01	HEMICHRODATA, PROTOCHORDATES AND SPECIAL TOPICS	• It will help students to understand the general classification and characters of Hemichordata upto orders. • The type study of Balanoglossus, Herdamania and Amphioxus under Protochordates. • This will also ensure a concrete understanding of the biting mechanism of poisonous snakes, flight adaptations in birds, and to

			learn about Sphenodon as a living fossil.
	3ZOOTH02	CLASSIFICATION OF VRTEBRATES AND COMPARATIVE ANATOMY	• It will help students to understand the classification of Vertebrates including Agnatha and Gnathostomata upto orders with examples. • This will also impart an indepth knowledge of comparative anatomy of the vertebrate systems including, Integumentary, Digestive, Circulatory. • Comparative study of the following systems - Respiratory, Urinogenital , Nervous and Skeletal system.
IV	4ZOOTH01	ETHOLOGY, ECOLOGY AND BIOCHEMISTRY	• It will help students to understand the concept of Animal behaviour their innate behaviour, learned behaviour and other types of behaviour such as social behaviour, Parental care, and migration. • Further the students will learn about the ecology, ecosystems, trophic levels and energy flow using biogeochemical cycle and ecological niche. • This will also provide a concrete understanding of characteristics and classification of Protein carbohydrates , lipids, enzymes, and coenzymes with metabolic processes such as Glycolysis, Krebs cycle, etc.
	4ZOOTH02	PHYSIOLOGY	• It will help students to understand the human physiological processes in detail. • Detailed study of the following- Digestion, Respiration, Circulation, Excretion, • Indepth study of the given systems - Musculature Nervous, Reproductive and Endocrine system.
V	5ZOOTH01	ECONOMIC ZOOLOGY AND MEDICAL ZOOLOGY	• It will help students to understand the general concept of economic entomology, through the study of important pests of crops and stored grains and their control. • This will further enhance their knowledge about sericulture, apiculture, lac culture and Pisciculture(Fresh water fishes). • Further it will also provide knowledge about the protozoan parasites in humans, the parasitic adaptation of Helminthes and diseases such as malaria, yellow fever, dengue and plague, their transmission and control.
	5ZOOTH02	TAXONOMY, INSTRUMENTATION AND BIOINFORMATICS	• The given course will provide knowledge about the systematic taxonomy, species concept, and zoological nomenclature to students. • This will also help students to understand the principle and working of

			Ph Meter, Electrophoresis, chromatography, photocolorimeter, PCR, Autoradiography along with • A general introduction about Bioinformatics and its scope.
	5ZOOTH03	IMMUNOLOGY AND MOLECULAR BIOLOGY	• The given course will give a concrete understanding of immunology which includes their types, response. • Antigen, antibodies, immunoglobulins. • Eukaryotic genome organization and transposons in prokaryotes and eukaryotes.
VI	6ZOOTH01	MICROBIOLOGY AND BIOTECHNOLOGY	• The given course will provide knowledge about the microbiology that will include the classification and morphology of bacteria and viruses, the nutrition , cultivation growth and sterilization of microorganism. • Differentiating the beneficial and harmful microorganism. • Students will also learn about the Biotechnology, tools of genetic engineering, nucleotide sequencing, southern blotting techniques, cDNA probes, biosensors and biochips.
	6ZOOTH02	DEVELOPEMENTAL BIOLOGY AND BIOSTATISTICS	• The given course will enhance the knowledge about the developmental biology, sexual reproduction and parthenogenesis. • Further the course will provide a concrete knowledge about the fertilization, cleavage patterns, fate maps-in chick and frog, metamorphosis in insects and Amphioxus and regeneration in Amphibian limbs. • This will provide understanding of Biostatistics and various methods involved such as Arithmetic mean, median, mode, range, variance, SD, and various graphical representation of data through bar chart, frequency polygon and pie chart.
	6ZOOTH03	ENVIRONMENTAL BIOLOGY AND TOXICOLOGY	• The given course will enable students to learn about the various environmental pollution including water, soil, air pollution. • Further to understand the environmental degradation, and wild life management. • This will ensure that the students learn about toxicity, types of toxicants, xenobiotics and teratogenesis in detail.
	SEC	POULTRY	• Have advanced knowledge in poultry anatomy, physiology, and behaviour. • Develope critical thinking skills and insights in poultry production such as responsible use of antimicrobials, sustainability in livestock production, animal welfare, and public perception of poultry

			production. • Identify poultry diseases and take the necessary control measures

COURSES AND THEIR OUTCOME OF M.A./M.Sc. PROGRAMME:

Semester	Course Code	Course Title/Paper Title	Course Outcome
I	ZOO1TH01	NON CHORDATA	• **The given course will provide detail knowledge about the Non Chordates such as** • Protozoa: Nutrition, Reproduction, Locomotory organs and locomotion • Porifera: Canal System, Skeletal system • Cnidaria : Metagenesis in Obelia, Polymorphism: Polypoid and medusoid form • Platyhelminthes : Evolution of Parasitism, Tegument and tegumental organs • Annelida : Metameric segmentation, Trochophore larva- Structure and significance
	ZOO1TH02	NON CHORDATA	• **The given course will provide a detailed knowledge about the other Non Chordates such as Arthropoda - mouthparts, Crustacean larvae** • **Mollusca- Archimollusca , Cephalopoda and Echinodermates.** • **This will also enable students to learn about the Insect metamorphosis and their hormonal control.**
	ZOO1TH03	CHORDATA	• **The given course will provide a detailed and extensive study over the chordates such as** Origin of Chordates, Origin of Gnathostomes • **Pisces** - Ostracoderms and Devonian fishes. Lung fishes (Dipnoi) and their peculiar features: • Amphibia : Origin of Tetrapoda Reptilia : Origin Of Reptiles, Mesozoic Reptiles, Skull of Reptiles , its significance and classification of Reptilia • Aves : Origin of Birds, Palate of Birds Mammalia : Origin and evolution of Mammalia, Characteristics features- Montremes, Marsupials and placentals
	ZOO1TH04	EVOLUTION	• **The given course will give a better understanding about the organic**

			evolution, • element forces of evolution, population genetics, reproductive isolation, • polytypic species and role of hybridization in evolution.
	ZOO1TH05	BIOSTATISTICS	• The given course will provide a detailed study of biostatics and its application with concepts of population sample, graphical representation of data, • Mean and Standard deviation, Bionomial, Poisson and normal distribution of data • Test of significance , correlation and linear regression.
II	ZOO2TH01	ECOLOGY	• The given course will enable students to learn about the population growth, interspecific competence, • Law of thermodynamics, food web, biological cycles, community organisation and its dynamics, • Ecological succession and remote sensing.
	ZOO2TH02	METHODOLOGY & INSTRUMENTATION	• The given course will give a detailed knowledge about the principle, working and application of electron and florescence microscopy, • Autoradiography, radioactive labelling, UV-VIS absorption spectrophotometry, • Hydrobiological techniques, flame photometry, and nephelometer.
	ZOO2TH03	ANIMAL PHYSIOLOGY	• The given course will enable students to learn about ultrastructure of muscles, nerve conduction, • Electric organs, excretion and osmoregulation, homeostasis, bioluminescence, • Active transport, endocrinology, stress physiology and signal transduction in detail.
	ZOO2TH04	BIOCHEMISTRY	• The given course will give a concrete knowledge about the thermodynamics, electrolytes, • Carbohydrates, amino acids, proteins, lipids, • Nucleic acid, enzymes and vitamins in detail.
	ZOO2TH05	BIODIVERSITY AND WILDLIFE	• The given course will enhance students knowledge about animal taxonomy and diversity, conservation biology, quantitative, biology, genomics and biodiversity, bar coding, • RT PCR, species population , heath and management, principles of wild life management, overexploitation of resources, and • Concepts of conservation with special reference to the forest and wildlife management including the role of IUCN, UNDP, FAO, and WWF.
III	ZOO3TH01	FORMAL AND EXPERIMENTAL EMBRYOLOGY	• The given course will enhance the descriptive knowledge of embryology with reference to frog and chick • A detailed understanding about the early embryonic development,

			organizer concept, metamorphosis, regenerating, • Foetal membranes, teratogenesis and techniques and methods used in embryology.
	ZOO3TH02	ANIMAL BEHAVIOUR	• The given course will provide the modern concept of animal behaviour, mechanisms, their methods of study, • Development of animal behaviour and concept of learning, behaviour and memory. • Evolution of behaviour, Hormones and behavior, Motivation and behavior
	ZOO3TH03	BIOTECHNOLOGY	• The given course will enable students to learn about biotechnology, RDNA techniques, cloning vectors, gene probes, • Tissue culture, environmental biotechnology and health care biotechnology • Gene replacement theory and knowledge about biosensors, biochips, bioenergy and genomics.
	ZOO3TH04	MOLECULAR BIOLOGY	• The given course will provide a detailed understanding of molecular analysis of eukaryotic DNA, • Basic transcription apparatus, structure and life cycle of bacteriophage T2, T4. • Molecular biology of cancer through methods of gene targeting and gene silencing.
	ZOO3TH05	ENTOMOLOGY, MORPHOLOGY AND EMBRYOLOGY	• The given course will give a detailed knowledge of insect head, thorax and abdomen, • Structure and function of insect cuticle and fat body, • Development of insect egg, types of larvae and pupae, metamorphosis and pheromones.
IV	ZOO4TH01	BIOINFORMATICS	• The given course will provide knowledge about the role of computers in biology and medicine through genomics, proteomics, cladogram, dendrogram, phylogram, • Operational Taxonomic Unit, biological sequence data bank such as EMBL, SWISSPORT, PDB, sequence alignment, rooted and unrooted trees, Least square , • Neighbour joining - UPGMA, bootstrapping and split decomposition including pedigree analysis.
	ZOO4TH02	INSECT PHYSIOLOGY	• The given course will provide concrete knowledge about the Insect physiology including alimentary canal, • Structure and function of Malpighian tubules, insect spiracles. • Composition of haemocytes, diapauses and endocrine glands in insects.
	ZOO4TH03	TAXONOMY AND ECONOMIC	• The given course will provide the modern classification of Insects,

		ENTOMOLOGY	• Detailed study about the pests of paddy, sugarcane, cotton, • Stored pests along with beneficial insects such as honeybee and silkworm.
	ZOO4TH04	TOXICOLOGY	• The given course will enhance the knowledge about the different types of insecticides, their hazards and precautions to be taken, • Concept of biological control through predators, parasites. • IPM, chemosterilents and autocides including 3rd and 4th generation pesticides.
	ZOO4TH05	PROJECT AND SEMINAR	• The given course is designed so as to enhance the research aptitude among the students so as to understand the methodology, design and outcome of a given scientific problem and its analysis for the welfare of society and nation. • The students learn to form a hypotheses, collect data, analyse results, form conclusions, implement findings into real-life applications and form new research questions. • Students are motivated to present their research work in the seminars and conferences so as to have a better feedback of their work and finally to ensure a qualitative work done in line.

COURSES AND THEIR OUTCOME OF DLT PROGRAMME:

YEAR	Course Code	Course Title/Paper Title	Course Outcome
1		• **Code of Conduct and safety of medical laboratory personnel** :	1. Code of conduct- Laboratory discipline & precaution. 2. Values in the profession. 3. Maintenance of laboratory, records and registry of investigations. 4. Accidents and safety measures including first aid. Examples: Burns, poisoning, injuries, contamination from infected material, shock etc. 5. Prevention of infection e.g., vaccination of laboratory staff etc.
		• **Use of Instruments**	: (Working and care of micro-analytical instruments) (a) Microscopes (b) Weighing scales and analytical balances

			(c) pH meter (d) Centrifuge machine (e) Electrophoresis equipment (f) Blood Pressure instrument (g) Stethoscope (h) Water bath, incubator, hot air oven, autoclave (i) Absorptiometer / colorimeter (j) Haemocytometer (Neubauer's chamber) / Haemoglobinometer or Haemometer. (k) Glassware
		• **Human anatomy**	1. Introduction to human anatomy 2. Surface anatomy in brief 3. Structure of a cell and various tissues 4. Skeletal system - Long bones & Short bones - Bone marrow - Joints, Synovial fluid 5. Muscular system - structure of skeletal muscle - Structure of smooth muscle 6. Circulatory system - Blood components - Structure of heart - Structure of blood vessels (special emphasis on peripheral) - Veins & Arteries 7. Lymphoreticular system - Lymphatics - Lymph nodes - Spleen & other R. E. S. organs 8. Structure of GIT and Hepatobiliary system - Mouth and oral cavity - Esophagus - Stomach and its contents

			- Small intestine - Liver, pancreas 9. Respiratory system - Lungs, respiratory passages - Pleura, pleural fluid 10.Endocrine system - Endocrine glands and their hormones 11.Integumentary system - Skin – Structure and functions 12.Urinary system - Kidneys - Ureter and Urinary bladder 13. Organs of Reproductions - Female, Male 14. Nervous system - Central and peripheral 15. Sensory organs - Eye, nose and throat, organs of speech
		• **Human Physiology**	1. Introduction to human physiology and its scope including names of various system and their functions in brief. 2. Blood - Composition and general function - Coagulation of Blood - Natural anticoagulants - Lymph 3. Cardiovascular system - Function of Heart and Blood vessels - Heart beat, Cardiac cycle, E.C.G. - Blood pressure - Pulse - Systemic circulation and Pulmonary circulation. 4. Respiratory system - Function of Lungs and air passages - Respiratory movements and regulation

			of respiration - O_2 and co_2 carried by blood - Lung volumes and capacities - Hypoxia and Cyanosis 5. Excretory system - Physiologic anatomy of kidneys - Renal blood flow and pressure - Glomerular filtration - Glomerular filtration rate, auto regulation - Tubular reabsorption and secretion - Plasma clearance - Diluting and concentrating mechanisms of kidneys - Acid- base balance 6. Physiology of Digestive system - Metabolism a. Carbohydrate b. Proteins c. Lipids d. Pigments- Bile, etc. e. Digestive enzyme. 7. Endocrine glands - Function of various hormones 8. Miscellaneous - Reproductive system, etc.
2		• **Biochemistry**	○ **Fundamentals of Biochemistry:** 1. Various kinds of solution and their strength 2. Indicators, Buffers, pH 3. Metabolism of (a) Carbohydrates, (b) Proteins, (c) Lipids 4. Hormones 5. Vitamins, Coenzymic roles of some of the important metals 6. Enzymes 7. Minerals 8. Disorders of protein, lipid and carbohydrate metabolism

			○ **Clinical Biochemistry:** 1. Blood glucose estimation 2. Serum urea, creatinine, uric acid, proteins 3. Liver function test (LFT) 4. Blood lipids 5. Serum enzymes 6. Serum electrolytes 7. Serum Trace metal and vitamins 8. Serum calcium 9. Gastric juice examination 10. Serum electrophoresis
		• **Pathology and Medical Microbiology** ○ **General Pathology:**	A. Introduction to Pathology : Definition, different branches, etc. B. Laboratory set up : Cleaning of glasswares : Sterilization : Preparation of vials and containers (For sample collection) : Collection of blood and other samples : Standardization and quality control C. Clinical Haematology : : Blood and its constituents

			: Preparation of blood film, general blood picture : Total Leucocyte counts (TLC) : Differential Leucocyte Counts (DLC) : Total Red blood Corpuscle (RBC) Count : Erythrocyte Sedimentation rate (ESR) : Packed Cell Volume (PCV) absolute values : Red cell indices : Hb %, Anaemias : Leukaemias : Tests for bleeding disorders : Blood groups, cross matching : Platelet counts, L. E. cell phenomenon D. Clinical Pathology : : Urine examination : Sputum examination : Semen examination
		○ **Parasitology:** :	Fundamentals : Stool examination- physical, chemical microscopic, others : Haemoparasites: Trichinella spiralis (Whip worm), Ascaris lumbricoides (Round worm), Wouchereria buncrafti (Filaria), Ancylostoma duodenal, Enterobius

			vermicularis (Pin worm), Fasciola haepatica (Liver fluke)
		Microbiology:	Introduction: Bacteria, Viruses, Fungi, etc. : Gram staining and classification of bacteria & other staining methods : Preparation of culture media : Various cultures and sensitivity testing : Tests for sugar fermentation for identification of bacteria : Motility of bacteria : Albert's stain, Z.N. stain
		: ○ **Applied immunology:** :	Application of Immunology to laboratory diagnosis of diseases : Serological tests : Skin tests (Montoux test, Casoni's tests) : Enzyme Linked Immuno Sorbant Assays (ELISA) : Radio Immune Assays (RIA)
		Cytology: :	Fluid cytology : Fine Needle Aspiration Cytology (FNAC) : Papanicolau staining (PAP) : Sex determination by demonstration of Barr bodies
		Histopathology	Gross examination of tissue and preservation : Tissue processing, section cutting : Staining of histology sections

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