Programme Code	Programme Name	Course Code	Course Name	Course Outcome
	M.A. Geography 1st Sem	16GEO21C1	Geomorphology	CO1: Understand various aspects of landform growth and evolution on the Earth. CO2: Explain the basic conceptual and dynamic concepts of landform development. CO3: Understand the relevance of applied aspects of Geomorphology in various fields.
		16GEO21C2	Climatology	CO1: Understand various aspects of landform growth and evolution on the Earth. CO2: Explain the basic conceptual and dynamic concepts of landform development. CO3: Understand the relevance of applied aspects of Geomorphology in various fields.
		16GEO21C3	Resource Geography	CO1: Sensitized to concept and classification of resources. CO2: Get knowledge about the models of natural resource process. CO3: Understand a deep sense about use and misuse, conservation and management of resources for sustainable development.
		16GEO21C4	Statistical Methods in Geography	CO1: Explain the nature and types of data and related statistical techniques. CO2: Make a rational choice amongst listed various statistical techniques. CO3: Describe and explain geographical data relationships.
	M.A. Geography 2nd Sem	16GEO22C1	Geography of World Economy	CO1: Understand how in an increasingly globalized world, economic activities occur unevenly over geographical

				space.
				CO2: Know how local places and global economy are intertwined. CO3: Describe the regime of neoliberal policies are generating uneven geography of capitalist development.
		16GEO22C2	Regional Development and Planning	CO1: Get familiarised with the theoretical foundations and conceptual grounding of this branch. CO2: Understand and evaluate the concept of region in geography. CO3: Know about the regional development and planning process in India.
		16GEO22C3	Environmental Geography	CO1: Know the importance of biodiversity to maintain ecological balance. CO2: Understand various environmental issues at national and international concerns. CO3: Understand the linkages between environment and biomes.
		16GEO22D1	Urban Geography	CO1: Gain a better understanding of the process of urbanization. CO2: Understand the key aspects of cities and get an indication of the breadth of material that can be covered when examining cities. CO3: Get sensitized to the evolving urban planning visions.
		16GEO22D2	Cultural Geography	CO1: Keep up to date with the theoretical aspects and conceptual base of this branch. CO2: Understand and evaluate the concept of culture in geography and its role and relevance in society. CO3: Understand the cultural environment and various cultural regions of the world.

		16GEO22D3	Geography of India	CO1: Understand the geographical aspects of India. CO2: Have knowledge about Indian sub continent contemporary issues. CO3: Understand demographic aspects of India.
		16GEO22D4	Geography of Rural Settlements	CO1: Have knowledge about the historical development, patterns, types and functional systems of rural settlements. CO2: Know about the morphology of rural settlements. CO3: Understand the factors and rural settlement planning in India.
		16GEO22D5	Soil Geography	CO1: Enhance their knowledge about the soils, its properties, development and degradation. CO2: Understand the management and conservation of soil resource with reference to India. CO3: Understand the linkages between soil, environment and biomes along with its importance.
	M.A. Geography 3rd Sem	17GEO23C1	Remote Sensing and GIS	CO1: Know about various aspects of aerial photogrammetry. CO2: Familiarize and enhance their knowledge about the Remote Sensing and GIS technology. CO3: Understand the technology along with application value in the Earth observation.
		17GEO23C2	Geography of Transport	CO1: Understand geographic relevance of transportation. CO2: Familiarize about various models and theories related to transport network. CO3: Know about structural analysis of transport network.
		17GEO23D1	Bio Geography	CO1: Know about various

				aspects of living organisms, their relationship with climate and physical environment. CO2: Familiarize with interface between biology, ecology and geography. CO3: Familiarize with converging and forming our biosphere.
		17GEO23D2	Political Geography	CO1: Learn key concepts like state, nation and nationalism. CO2: Understand the changing nature of modern state, challenges it is facing. CO3: Know the linkages of space and politics at the local level.
		17GEO23D3	Social Geography	CO1: Understand the development of society and different social groups in India. CO2: Know the theoretical, philosophical and conceptual base of social geography. CO3: Understand the basic concepts of society in geographical perspectives.
		17GEO23D4	Hydrology	CO1: Make better understanding about different physical aspects of water as a natural resource. CO2: Understand different state of water occurrence. CO3: Have better understanding of water distribution and circulation.
		17GEO23D5	Oceanography	CO1: Understand the dynamics of ocean physiography. CO2: Know about ocean-human interface including weather, climate, navigation, security and resource utilisation. CO3: Have knowledge of oceans as a resource in times to come.
	M.A. Geography	17GEO24C1	Geographical Thought	CO1: Acquaint with the philosophy, methodology and

	4rth Sem			historical development of geography as a professional field. CO2: Address the spirit and purpose of the changing geographies and to what we as geographers contribute towards knowledge production. CO3: Critically look at the contents of other courses at Postgraduate level as logically integrated with the broad currents of thought the subject has witnessed in the distant and recent past.
		17GEO24C2	Research Methodology	CO1: Formulate research questions. CO2: Understand advantages and disadvantages of quantitative and qualitative approaches. CO3: Write a research proposal.
		17GEO24DA1	Water Resource and Management	CO1: Learn some strategies of water resource management. CO2: Have awareness about various importants relating water. CO3: Know water management strategies.
		17GEO24DA2	Geography of Tourism	CO1: Understand the basic concepts of tourism. CO2: Know regional dimensions of tourism in India. CO3: Have close insight to tourism in our own country.
		17GEO24DA3	Rural Geography	CO1: Know about rural geography. CO2: Enhance the knowledge about infrastructure, various types of houses and their building materials. CO3: Be aware about developmental issues in rural India.
		17GEO24DB1	Population Geography	CO1: Know about spatial distribution of population with

				causative factors. CO2: Learn with various theories and concepts related with population. CO3: Understand the distribution, dynamics of population distribution, its problems and management.
		17GEO24DB2	Natural Hazards and Disaster Management	CO1: Understand basic concepts of natural hazards and disaster management. CO2: Know the techniques of management of disasters. CO3: Know the disaster management setup of India.
		17GEO24DB3	Agricultural Geography	CO1: Have an understanding of agricultural geography as a developed branch of geography. CO2: Learn major concepts, factors affecting agricultural land use, agricultural system of the world and the emerging scenario in agriculture. CO3: Know the agricultural systems of the world and about agricultural models. They would gain an insight into the world trade in agriculture and address the question of sustainable agriculture.
	M.A. ENGLISH 1st Sem	21ENG21C1	Chaucer to the Puritan Age	C.S.O.1. Contextualizing the age which heralded writing in English in different genres along with the politico-cultural milieu C.S.O.2. Familiarity with the authors and works of the Anglo-Saxons as precursors to Modern English works C.S.O.3. Understanding of various stages, trends, types of narratives, dramatic writings, sonnets, and essays. C.S.O.4. Appreciationdifferent styles of writing that evolved through the archaic English of Anglo-Saxon age, to the early

				Elizabethan, Jacobean, Caroline, and Puritan times
		21ENG21C2	The Augustan Age	C.S.O.1. Familiarization with British literature from 1660 to 1798 C.S.O.2. Understanding the nuances of new literary forms as a reaction to macro- cultural formation C.S.O.3. Acquaintance with various aspects of prose, fiction, poetry and drama C.S.O.4. Ability to situate literary texts within the historical, political, and cultural context
		21ENG21C3	The Romantic Age	C.S.O.1. Familiarity with the social, cultural and intellectual background of the literature of the romantic age of British Literature C.S.O.2. Familiarity with the major representative literary works of the Romantic age C.S.O.3. Ability to analyze a wide spectrum of romantic literature across various genres C.S.O.4. Marked understanding and critical perspective of key literary concepts and terminology of the age
		21ENG21C4	Indian Literary Theory and Criticism	C.S.O.1. Contextualizing the socio-cultural background of criticism /literary writings C.S.O.2. Understanding literary movements, styles and concepts manifested through critical writings C.S.O.3. Inculcating an appreciation for Indian classical theory and its application through the prescribed texts C.S.O.4. Situating theoretical reference point for present day Indian writing in English
		21ENG21C5	European Drama	C.S.O.1. Developing understanding of drama as a medium of interpersonal and

				cultural communication C.S.O.2. Enabling analysis of drama as social and political narrative C.S.O.3. Familiarity with innovative writing styles C.S. O.4. Contextualizing dramatic texts in larger socio-cultural background
		21ENG21D1	Essentials of Writing	C.S.O.1. Understanding of the elements and conventions of writing skills C.S.O.2. Abilityto convertskills of summarizing into bulleted points for power point presentations C.S.O.3. Focus on the application of the learnt principles
	M.A. ENGLISH 2ND Sem	21ENG22C1The	The Victorian Age	C.S.O.1. Ability to establish a link with the preceding and following ages in British history and literature C.S.O.2. Familiarity with a range of major and minor Victorian thinkers, writers, and texts C.S.O.3. Understanding of socio-political and literary trends and movements that shaped the different genres of the age C.S.O.4. Analytical knowledgeof different genres ofVictorian literature
		21ENG22C2	The Twentieth Century	C.S.O.1. Familiarity with major and minor writers and texts of the 20th century C.S.O.2. Providing interface of literature, politics, and society through various texts/works written during and after the two World Wars. C.S.O.3. Gaining knowledge of the transformational changes taking place in different genres of literature C.S.O.4. Development ofcritical temperament for better

				understanding of texts
		21ENG22C3	Linguistics and English Language Teaching	C.S.O.1. Introducing fundamental tools of linguistics for systematic study of language C.S.O.2. Comprehension of normative rules C.S.O.3. Ability to approach language as a vital component of contemporary theoretical perspectives C.S.O.4. Enabling study of language acquisition, use and linguistic behavior C.S.O.5 Familiarity with basic concepts and principles of second language teaching along with conceptual frameworks and methods
		21ENG22C4	Indian Feminist Thought (For visually challenged)	C.S.O.1. Traces the trajectory of Indian feminist thought C.S.O.2. Establishes an understanding about feminist writing in its socio- cultural backdrop C.S.O.3. Enables a critical understanding of genre –wise feminist expression C.S.O.4. Facilitates an understanding of narrative techniques and literary devices in feminist writing
		21ENG22C5	Indian Writing in English I (Pre-Independence)	C.S.O.1. Ability to understand Indian writing in English's evolution through convention, experimentation and innovation highlighting the multicultural montage of Indian literature C.S.O.2. Familiarity with the concepts of 'Indianness', nativism, nationalism and Indian sensibility as exemplified in the socio-cultural, historical and linguistic contexts of Indian Literature written/translated in English C.S.O.3. Appreciation of the

				relevance of prescribed texts in the contemporary Indian literary scenario thereby focusing on the humanistic concern represented through the various works of Indian Writings in English. C.S.O.4. Understanding narrative techniques and thematic concerns of various literary writings.
		21ENG22C6	Literary Theory and Criticism I	C.S.O .1. Tracing the development of critical thought through different literary eras C.S.O .2. Contextualizing critical theory within socio cultural milieu C.S.O.3. Comprehension and application of critical concepts on prescribed texts of various courses C.S.O.4. Developing an understanding of various movements and thoughts as initiation intocritical theory
		21ENG22F1	From common pool	
		21ENG22O1	From common pool	
	M.A. ENGLISH 3rd Sem	22ENG23 C1	Research Methodology and Application	
		22ENG23 C2	Basics of Research Methodology and Project	
		22ENG23 C3	Indian Writing in English - II (PostIndependence)	
		22ENG23 C4	Literary Theory and Criticism – II	

		22ENG23 D1	American Literature	
		22ENG23 D2	Canadian Literature	
		22ENG23 D3	African Literature	
		22ENG23 D4	Film and Literature	
		22ENG23 O2	From common pool	
	M.A. ENGLISH 4^{rth} Sem	22ENG24C1	Indian Writing in English III (Regional Writings)	
		22ENG24C2	Postcolonial Literature	
		22ENG24C3	Literary Theory and Criticism III	
		22ENG24D1	Diasporic Literature	
		22ENG24D2	Literature from the Northeast	
		22ENG24D3 2	World Literature in Translation	
		2ENG24D4	Subaltern Studies	
		22ENG24D5	South Asian Literature	
	M.A. Political Science 1st Sem	16POL21C1	Western Political Thought I	CO1 Develop an understanding about the western political philosophy CO2 Have a nuanced reflection on its impact on contemporary world CO3 Critically engage with western political philosophies in terms of what it means to us CO4 Familiarize the with the various schools of political thought CO5 impart with knowledge advocated by various political philosophers on state and politics

		16POL21C2	Indian Govt. & Politics-I	CO1. Understand the fundamentals of constitutional democracy
				CO2. Deals with certain critical questions relating to the process and functions of democracy in India
				CO3. Analysis the policy and reforms in the system
				CO4. Update their knowledge about recent trends and changes in Indian political system
				CO5. Develop deep understanding about the important features of the Indian politics
		16POL21C3	International Politics-I	CO1. Apply abstract theory and methodology to grasp and evaluate global political significant events
				CO2. Grasp normative assumptions inherent in analytical expositions
				CO3. Analyze the major issues in world today and its complexities
				CO4. Develop sense of some important theoretical approaches to understand international relations
				CO5. Comprehend and critically examine the major trends and issues in international relations
		16POL21C4	Public Administration-I	CO1. Knowledge about public administration theory, research and practice
				CO2. Analytical and critical thinking skills to inform public and community problem-solving and decision-making process CO3. An understanding of the ethical basis for public services
				CO4. Sense to identify the core mechanism of Public administration, including the theories, organization, and

				management of human resources CO5. Explain how different environments impact public and administration
		16POL21C5	Research Methodology-I	CO1. Understand and apply research approaches, techniques and strategies in the appropriate manner for managerial decision making CO2. Conceptualize the research process CO3. Demonstrate knowledge and understanding of data analysis and interpretation in the relation to the research process CO4. Develop an understanding of various research designs and techniques CO5. Develop an understanding of the ethical dimensions of conduction applied research
	M.A. Political Science 2nd Sem	16POL22C6	Western Political Thought-II	CO1. Theoretically locate the diverse intellectual traditions in the West CO2. Engage and critically examine the significant issues of the western political philosophy CO3. Have a comparative perspective of political philosophies in the west CO4. Critically examine the complex character of state and politics CO5. Familiarize with various schools of political thoughts
		16POL22C7	Indian Govt. & Politics-II	CO1. Introduce the fundamentals of constitutional democracy in India CO2. Critically engage with the contemporary societal issues and grasp the different dimensions of it CO3. Get a more nuanced understanding of Indian politics CO4. Develop an

				understanding about the issues impacting Indian politics like caste, religion, language, economy CO5. Develop a perspective to understand and analyze Indian politics
		16POL22C8	International Politics-II	CO1. Analyze the complexities of the globalized world CO2. Demonstrate an understanding of the key historical events which shaped the international events in the 20th century CO3. Evaluate the visible and invisible impact of global developments on domestic settings and relations between global and regional politics CO4. Discuss the basic structure, key actors , institutions and their functioning CO5. Put emphasis on the new world order and contemporary challenges faced in multiple global interaction
		16POL22C9	Public Administration-II	CO1. Capable to define and analyze key terms, ideas and concepts of public administration CO2. Familiar with the mechanisms operating in the major political institutions and agencies for creation and implementation of public policies CO3. Familiar with the social forces that affect the creation of public policies CO4. Able to create an understanding about the predominant political, economic and social actors that actively engage in the policymaking process CO5. Able to examine, appraise and contribute to the field of

				public administration
		16POL22C10	Research Methodology-II	CO1. Develop an understanding about comprehensive research methodology for research questions CO2. Apply the understanding of feasibility and practically of research methodology for a proposed project CO3. Identify various sources of information for literature review and data collection
	SOFT OPEN ELECTIVE	16POLO1	Disaster Management	CO1. Explain the different stage of research such as research design data collection, analysis and report writing CO2. Understand the components of scholarly writing and evaluate its quality
	M.A. Political Science 3rd Sem	17POL23C11	Contemporary Political Thought & Theory-	CO1. Understand the basic concepts and categories of politics CO2. Sensitize on the normative dimensions of politics CO3. Understand the meaning and practices of the key concepts CO4. Develop skills of understanding different theories and concepts CO5. Summarize the primary principles of capitalism, socialism, communism, liberalism, neo-liberalism, fascism, anarchy etc.
		17POL23C12	Comparative Politics & Political Analysis-I	CO1. Create a good understanding of the field of comparative politics, including big concepts, and theoretical approaches CO2. Understand the meaning of fundamental concepts in comparative political analysis including the state, nations, society, regimes, and multi-level governance

				CO3. Introduce and systemically discuss classical themes and topics of comparative politics including political culture and socialization, political recruitment, interest groups, political parties, government and policy- making. CO4. Covers case studies of politics in developed, developing and transforming countries
	GROUP A (Discipline Specific course)	17POL23DA1 I	international Law I	CO1. Understand the principles of sovereignty and of the operation of jurisdiction CO2. Define, explain, distinguish and apply the basic concepts and terminology of international law CO3. Define and distinguish amongst a variety of processes by which international law is formed and roles played by the important bodies and institutions involved in the international legal system CO4. Define and contrast in many aspects of the international law relating to treaties and the use of force CO5. Understand the concept of international legal personality and the identity of the subject of international law
		17POL23DA2	Ancient Indian Political Thought-I	CO1. To understand the political ideas and philosophical perspectives of early India C O2. To grasp the complex relationship between politics, religion and society in early India CO3. To enable students to critically reflect on the ideas and institutions of early India CO4. To see the nuanced interconnections between the present and the past

		17POL23DA3	Political Sociology with Special reference to India-I	CO1. Introduce the linkages between politics and society CO2. Understand the political process with conceptual clarity CO3. Sensitize on the socio-political issues CO4. Engage with the contemporary societal issues and grasp the different dimensions of it CO5. Create the interconnectedness between various socio-political issues and draw inferences on the
		17POL23DB1	Modern Indian Political thought-I	CO1. Awareness about the distinctive features of political theory and modern political thought of India CO2. Sense to analyze the different aspects of political theory and the contribution of the modern India thinkers to political theorizing and relative autonomy of Indian political thought
		17POL23DB2	Theory & Practice of Diplomacy-I	CO1. Understand the historical origin of diplomacy and protocol CO2. Explain the fundamentals of diplomatic negotiations CO3. Discuss the difference between bilateral and multilateral diplomacy CO4. Understand the complexity of the institutions and processes by which states and others represents themselves and their interests to one another CO5. Be familiar with the ways in which diplomacy is debated among academic theorists and by experts in think tanks and practitioners
		17POL23DB3	Indian Political Economy-I	CO1. Understand the basic concepts and debates about development and growth in India's political economy

			CO2. Develop awareness about India's economic policies since independence CO3. Develop insights into various policies that have shaped the Indian economy CO4. Engage on varied topics ranging from globalization, to growth models and to challenge in Indian agriculture CO5. Critically analyze the economic policies and identify the actors involved in economic policy formation
	GROUP C (Discipline Specific course)		
		17POL23DC1	Marxist & Neo Marxist Political Theory-I	CO1. To specify the historical evolution of the economic and ideological powers of capitalism CO2. To analyze Marx's theories of economic determinants, radical democracy etc. CO3. To study the evolution of Marxism through its early, late and postmodernist phase CO4. To analyze the Marxist philosophy in making a better society
		17POL23DC2	State Politics in India(with special reference to Haryana)-I	CO1. To deal with the various dynamics of the institutions at central and state level CO2. To understand the parliamentary system in the country CO3. To get knowledge about the various institutions and their functioning in the Indian Federalism CO4. To know about the emerging trends in Indian federalism with the civil society movements and various commissions.
		17POL23DC3	Foreign Policy of India-I	CO1. Understand the

				foundation aspects of foreign policy of India CO2. Study India's foreign policy, its determinants, objectives and environment in the post independence period CO3. Study the mechanism and dynamics of foreign policy making and implementation CO4. Discuss India's growing interaction with global and regional players and multilateral organizations and forums CO5. Analyze India's regional approach in the contemporary environment
		17POLO2	Natural and Men made Disaster Management	
	M.A. Political Science 4rth Sem	17POL24C13	Contemporary Political Thought & Theory-II	CO1. Develop an understanding about the relevance of political theory CO2. Understand about the basic ideas of political theory, its history, various approaches and an assessment of its critical and contemporary trends CO3. Understand how different political issues are assessed by different philosophical and ideological traditions CO4. Effectively write and develop their arguments CO5. Students will become familiar with a number of contemporary political issues
		17POL24C14	Comparative Politics & Political Analysis-II	CO1. Develop an ability to critically assess and apply theories of comparative politics to everyday political realities CO2. Develop an analytical knowledge and practical skills to understand comparative politics worldwide CO3. Understand the functioning of fundamental institutions of democratic

			regimes like legislature, the executive and its bureaucracy, law and judicial systems, elections and interests groups CO4. Understand the differences between centrally planned economies, mixed economies and welfare states CO5. Understand and critically assess presidential, semi-presidential and parliamentary systems
	GROUP A (Discipline Specific course)		
		17POL24DA1	International Law-II
			CO1. Identify the nature of international law and the structure of the international legal system CO2. Understand the procedure about the implementation of international law in practical contexts, including the law surrounding the use of force, space law and human rights CO3. Study the impact of international law on diverse peoples and the critique implementation on international law CO4. Identify and appraise the various theoretical perspectives on the formation and operation of the international legal system CO5. Explain and demonstrate through particular cases the relevance of international law current political and social developments at the international and national levels

		17POL24DA2	Ancient Indian Political Thought-II	
		17POL24DA3	Political Sociology with Special reference to India-II	CO1. Understand the early origins and development of social aspect of political science CO2. Develop analytical abilities to understand and interpret the social reality CO3. Discuss the key phenomena such as political culture, socialization, modernization, nationalism and transnationalism CO4. Analyze political process from a sociological angle CO5. Understand major traditional, mainly theoretical approaches in political sociology such as pluralism, behaviouralism, post-behaviouralism etc.
		17POL24DB1	Modern Indian Political thought-II	CO1. Create awareness about the most important Indian political thinkers of modern period who have written extensively on politics, state and government CO2. Study the thinkers and philosophers who have changed the social structure of Indian society CO3. Analyze the Western-British impact on Indian society and intellectual traditions and Indian response to the same CO4. Understand the ideas of nationalism, democracy and social transformation
		17POL24DB2	Theory & Practice of Diplomacy-II	CO1. Understanding the new role of diplomacy in the current situation of international relations

				CO2. Understand the variable institutional structure of global governance CO3. Analysis of the major international challenges and issues of the 21st century and the role of bilateral and multilateral diplomacy in dealing with them CO4. Discuss subject specific diplomacy such as environmental and human rights diplomacy, summit diplomacy etc. CO5. Familiarize with the ways in which diplomacy is debated among academic theorists and policy makers.
		17POL24DB3	Indian Political Economy-II	CO1. Explores the linkages and relationship between economics and politics CO2. Study the evolution of different streams of economic ideas and their political contexts from the beginning of capitalism to contemporary era CO3. Understand the issues of market mechanisms, development and underdevelopment and their impacts on political processes CO4. Analyze the process of globalization form the perspectives of liberals, Marxists, and neo-Marxists CO5. Deals with various economic structure and ideas of development and their impact on Indian political process
		17POL24DC1	Marxist & Neo Marxist Political Theory-II	CO1. Identify and understand the most important concepts and debates and issues in Marxists and Post-Marxist theories CO2. Critically interpret

				economy issues and related problems in the light of Marxist method, concept and contributors
				CO3. Compare different approaches to key concepts in Marxian political economy
				CO4. Examine critically the Marxist contributions to the study of development and contemporary capitalism
	17POL24DC2	State Politics in India(with special reference to Haryana)-II	CO1. To understand about the political developments in Haryana
				CO2. To know about issues based on religion, language and caste in a comparative mode
				CO3. Enable the students to acquire sufficient knowledge of government and politics in Haryana
				CO4. To study the problems of transitions, nation building and the democratization process in the region
				CO5. To understand the developments such as privatization, liberalization and issues of social justice.
	17POL24DC3	Foreign Policy of India-II	CO1. Understand the changed political and economic environment after the end of cold wa
				CO2. Discuss about the economic aspects of India's foreign policy and it's relations and contribution in various economic organizations
				CO3. Evaluate India's foreign policy and challenges for it in the post-cold war era
				CO4. Discuss about the changed environment in the India Ocean region and its impact on India's foreign policy
				CO5. Discuss the new emerging issues in international environment i.e. human rights,

				cross-border terrorism, environment issues etc.
	M.Sc. Chemistry 1ST Sem	16CHE21C1	Inorganic Chemistry 1	CO1 Explain bonding in main group compounds CO2 Predict the shapes and determine the energetics of hybridization of main group compounds CO3 Explain mechanisms of ligand displacement reactions in octahedral and square planar complexes CO4 Understand the structures and properties of isopoly and heteropoly acids and salts CO5 Explain crystal structures of selected binary and ternary compounds.
		16CHE21C2	Physical Chemistry-1	CO1 Various concepts of quantum mechanics & wave mechanics CO2 Detailed application & need of first & second law of thermodynamics CO3 Detailed discussion on Debye Huckel theory for Solutions.
		16CHE21C3	Organic Chemistry-1	CO1 Differentiate chiral and achiral molecules. CO2 Know the relationship between enantiomers and their specific rotations. CO3 Differentiate simple synthesis and asymmetric synthesis of organic molecules. CO4 Deliver the importance of reaction mechanism. CO5 Analyse the structure of carbohydrates, natural and Synthetic Dyes.
		16CHE21F1	Computer for Chemists	CO1 Recognize the different parts of the computer and their functioning, CO2 Describe the computer applications in different fields. CO3 The problem identifications and their solutions by flow charts and

				decision tables.
	M.Sc. Chemistry 2nd Sem	16CHE22C1	Inorganic Chemistry-II	CO1 Explain bonding in transition metal complexes. CO2 Derive spectroscopic states from spectroscopic terms and Interpret Orgel and Tanabe-Sugano diagrams. CO3 Explain electronic spectra of complexes. CO4 Apply fundamentals of magnetochemistry in structure determination. complexesπ CO5 Explain structure and bonding in selected metal clusters and transition metal-
		16CHE22C2	Physical Chemistry-II	CO1 Various concepts of quantum mechanics and their applicaitons. CO2 Detailed application & third law of thermodynamics and systems of one component as well as multi-component systems CO3 Mechanism and further studies in chain reactions CO4 Ion transport in solutions
		16CHE22C3	Organic Chemistry-II	CO1 Identify and differentiate the aromatic and aliphatic nucleophillic substitution reactions CO2 Be able understand all different kind of mechanisms given by different compounds CO3 Know about the regio and chemoselectivity, and different type of elemination and addition reactions CO4 Develop capacity to solve the organic reaction mechanism related problems. CO5 Develop a clear understanding about the reactions for addition to the carbon-carbon and carbon-hetero bond.
		16CHE22D1 OR	General Spectroscopy	CO1 Study the spectra of compounds and propose

		16CHE22D2	or Techniques in Chemistry	structures for compounds. CO2 Determine functional groups and write structures. CO3 Detailed study of principles and applications of UV, IR and NMR spectra. Or CO1 Deliver the importance of general spectroscopic techniques. CO2 Understand the need to increase Nanotechnology awareness CO3 Know the processing of some nanoprticles CO4 Explain the principles of the most important liquid and gas chromatography. CO5 Acquire some technical knowledge of gas and liquid chromatography, and in capillary electrophoresis.
		16CHE22O1	Environmental Chemistry-I	CO1 Demonstrate knowledge of chemical and biochemical principles of fundamental environmental processes in air, water, and soil. CO2 Recognize different types of toxic substances & responses and analyze toxicological information. CO3 Apply basic chemical concepts to analyze chemical processes involved in different environmental problems (air, water & soil). CO4 Describe causes and effects of noise pollution and discuss some mitigation strategies.
	M.Sc. Chemistry 3rd Sem	17CHE23GA1	Inorganic Special-I	CO1 Identify and characterize the molecule on the basis of spectroscopic study. CO2 Apply vibrational spectroscopy to identify modes

				of bonding of ambidentate ligands and active sites of metalloproteins CO3 Apply ESR in transitional metals with unpaired electrons. CO4 Find application of mass, Mossbauer, nmr and nqr spectroscopy in various fields..
		17CHE23GB1	Physical Special-I	CO1 Thermodynamics of electrified interfaces CO2 Models of simple ionic liquids & lattice oriented models CO3 Gibb's adsorption equation and its applications CO4 method for the calculation of energy of activation
		17CHE23GC1	Organic Special-I	CO1 Determine functional groups and write structures. CO2 Study the spectra of compounds and propose structures for compounds. CO3 Elucidate the structures of organic molecules from spectral data.
		17CHE23GA2	Inorganic Special-II	CO1 Explain origin of nuclear energy and decay of unstable nuclei CO2 Explain structure of the nucleus based on experimental evidence CO3 Discuss the impact of radiation on matter CO4 Describe various methods of detecting nuclear radiation CO5 Explain types and mechanism of nuclear reactions
		17CHE23GB2	Physical Special-II	CO1 computing entropy by counting the number of allowed states for simple systems such as the ideal gas. CO2 identifying the relationship and correct usage of infinitesinal work, work, energy, heat capacity, specific heat, latent heat, and enthalpy. CO3 Explaining quantum mechanical treatment of

				Helium atom.
		17CHE23GC2	Organic Special-II	CO1 Able to know the determine of structure and synthesis of given vitamins. CO2 Know the importance and route for the synthesis of given carotene and porphyrins. CO3 Have a clear understanding about the biological importance and types of enzymes and coenzymes.
		17CHE23GA3	Inorganic Special-III	CO1 Identify essential and trace elements found in nature and describe their function CO2 Explain how metal ions contribute to functioning of vital biological systems CO3 Explain the structure and function of vial metalloproteins and metalloenzymes. CO4 Explain the composition of the atmosphere CO5 Explain the impact of foreign particles (chemicals, noise etc) released into the atmosphere
		17CHE23GB3	Physical Special-III	CO1 Identify essential and trace elements found in nature and describe their function CO2 Explain how metal ions contribute to functioning of vital biological systems CO3 Explain the structure and function of vial metalloproteins and metalloenzymes. CO4 Explain the composition of the atmosphere CO5 Explain the impact of foreign particles (chemicals, noise etc) released into the atmosphere
		17CHE23GC3	Organic Special-III	CO1 Nomenclature, synthesis and reactivity of different heterocyclic compounds. CO2 Nucleosides and Nucleotides CO3 General methods of

				formation and reaction mechanisms of Ylides CO4 Relationship between physiological action and the chemical constitution of different type of drugs
		17CHE2301	Environmental Chemistry-II	CO1 Demonstrate knowledge of water quality parameters and standards. CO2 Recognize different types of toxic substances for soil pollution and industrial pollution. CO3 Describe causes and effects of environmental pollution by energy industry and discuss some mitigation strategies CO4 Explain the importance and principles of green chemistry.
	M.Sc. 4th semester	17CHE24GA1	Inorganic Special-IV	CO1 Define and identify an organometallic compound CO2 Write their structure, synthesis and reaction mechanism. CO3 Apply their properties for different applications like polymerization, catalytic hydrogenation etc CO4 Comment on their kinetics and stability.
		17CHE24GB1	Physical Special-IV	CO1 Apply the principles of electrochemistry in various electrochemical energy converters. CO2 Perform Amperometric titrations determination of activation energy for an irreversible electrode process. CO3 Identify polymerization reactions and their kinetics. CO4 Calculate the molecular weight of polymers by osmometry, viscometry, light scattering and sedimentation method.

				CO5 Evaluate the size, shape, molecular weight and extent of hydration of biopolymers by various experimental techniques
		17CHE24GC1	Organic Special-IV	CO1 Be able to understand and deal Phenomenon of photochemistry. CO2 Be able to understand the photochemical reactions of Alkenes, Carbonyl and Aromatic compounds. CO3 Be able to understand and be able to apply the Woodward–Hoffmann rules governing pericyclic reactions
		17CHE24GA2	Inorganic Special-V	CO1 Compare the advantages and/or disadvantages of dropping mercury electrode. CO2 Describe how a coulometric titration is performed and discuss the advantages of a coulometric titration over a conventional redox titration. CO3 Describe the process of performing an amperometric titration. CO4 Discuss the theory of stripping voltametry and ion selective electrode
		17CHE24GB2	Physical Special-V	CO1 learn to recognize, define, and solve problems in equilibrium thermodynamics and statistical physics. CO2 Understand the fundamentals and thermodynamic criteria for non-equilibrium states, entropy production and entropy flow . CO3 Apply the theory of fluctuations and calculate equilibrium fluctuations of extensive parameters, intensive parameters and densities in systems. CO4 Use the Hamiltonian operator to derive the

				quantization rules and also use the method of ladder operators CO5 Apply Huckels method for the determination of energies of conjugated hydrocarbon systems like ethylene, benzene, butadiene
		17CHE24GC2 Organic Special-V		CO1 identify and characterize various classes of natural products by their structures. CO2 have some knowledge of some of the plants around them and their pharmaceutical importance. CO3 have some knowledge of bacteria and other life forms from which useful pharmaceuticals are derived. CO4 have acquired the skills to isolate, purify and characterize simple products that are derived from plants and some animals.
		17CHE24GA3	Inorganic Special-VI	CO1 Identify the metal deficiency diseases and treat them with proper therapy. CO2 Become familiar with carcinogens, tumor growth and role of various metals in anticancer activity. CO3 Discuss role of ligands and their beneficial effects as chelating agents in anti-cancer drugs, antiviral activity etc. CO4 Apply knowledge of nuclear medicine as they study about radioiodine -1 31, technetium – 99m, gallium and indium.
		17CHE24GB3	Physical Special-VI	CO1 Identify symmetry elements and recognize symmetry operations generated by each symmetry element for a given molecule. CO2 Combine symmetry operations and set up multiplication table for simple point groups.

				CO3 Perform vector transformation and generate reducible representation of common molecules. CO4 Find the number of infrared and Raman active vibrations in a molecule. CO5 Identify the causes, conditions and prevention of corrosion.
		17CHE24GC3	Organic Special-VI	CO1 Apply different reagents in the organic transformations. CO2 Understand the need to study molecular rearrangements. CO3 Construct efficient, simple mechanistic pathways for the synthesis of a given compound
	M.Sc. Physics 1st Sem	18PHY21C1	Mathematical Physics	CO1 The students would get sufficient exposure /understanding of the linear vector space and applications of matrices to physical problems CO2 The students would be able to solve problems based on differential equations CO3 The analysis of special functions would equip a student for effective tackling of specific problems. CO4 The students would be able to realize various applications with proper understanding of series expansion and integral transforms
		18PHY21C2	Classical Mechanics	CO1 Student would be able to describe and understand the motion of a mechanical system using Lagrange and Hamilton formalisms. CO2 Students would become able to understand the concepts of central force motion and moving co-ordinate systems. CO3 Student would get basic ideas about the theory of small

				oscillations and use of poisson's bracket which will lead to understand the concepts of quantum mechanics.
		18PHY21C3	Quantum Mechanics –I	CO1 Student would be able to understand the concepts of operators in Quantum mechanics. CO2 Students would be able to apply Pauli spin matrices to explain angular momentum. CO3 Students would be capable to solve problems such as hydrogen atom. CO4 Students can determine energies and wave functions of first and second order
		18PHY21C4	Physics of Electronic Devices	CO1 Students would be able to explain the basic physics and application of different transistor types. CO2 Students get familiarity with integrated circuit fabrication technology and will be able to seek carrier in advance research. CO3 Students would be able to appreciate the functioning and applications of various optoelectronic and memory devices.
	M.Sc. Physics 2nd Sem	18PHY22C1	Statistical Mechanics	CO1 The students are able to appreciate cellular nature of phase space and interface of Statistical Mechanics with Thermodynamics CO2 Knowledge of ensemble theory would result in greater insight into solutions of various complex problems CO3 The students would be able to analyse the peculiar gas behavior and are in a position to extend the treatment to complex problems CO4 The students would be equipped to explore the applications of Ising Model and

				to understand different approximations
		18PHY22C2	Quantum Mechanics -II	CO1 Students would be able to explain ground state of hydrogen and helium molecules. CO2 Students get enabled to analyze various transitions and their selection rules. CO3 Students would be capable to understand 3D collisions. CO4 Students would be capable to calculate spin states of identical particles.
		18PHY22C3	Nuclear & Particle Physics	CO1 Students would be able to realize the nature of nuclear force. CO2 Students would be able to understand the structure of nucleus and would be able to find out spin, parity, magnetic moments etc. of different nuclei. CO3 Students would be able to understand different nuclear decays and reactions. CO4 Students would gain a basic knowledge about Elementary Particles and their interactions.
		18PHY22D1	Solid State Physics	CO1 Differentiate between different lattice types and explain the concept of reciprocal lattice and crystal diffraction using X-rays CO2 Explain motion of electron in periodic lattice of solids under different binding conditions, concept of energy band and effect of same on electrical properties. CO3 Lattice vibrations in solids and identity different types of defects in crystals CO4 Explain various types of magnetic phenomena,

			Or	superconductivity, physics behind them and their possible applications. Or
		18PHY22D2	Plasma Physics	CO1 The students shall be able to realize / understand Plasma formation and basic concepts CO2 The students will be able to analyze the theoretical concepts in context of time and space variations CO3 The exposure to distribution functions will lead to analysis of macro parameters of plasma CO4 The students will be able to analyze drift wave formation in magnetized plasma and theory of non-linear effects
	M.Sc. 3rd Semester	19PHY23C1	Atomic & Molecular Physics	CO1 Atomic spectra of one and two electron atoms. CO2 The change in behavior of atoms in external applied electric and magnetic field. CO3 Diatomic molecules and their rotational vibrational and rotational vibrational spectra.
		19PHY23C2	Electrodynamics and Wave Propagation	CO1 Student would be able to formulate and solve electrodynamic problems in relativistic covariant form in four dimensional space. CO2 Student would gain the knowledge about electrostatic and magnetic fields produced by static and moving charges in a variety of simple configurations. CO3 Would be able to analyze the basics of theory of transmission lines and waveguides
		19PHY23DA1	Condensed Matter Physics – I	CO1 The students would be able to understand the bonding in metals, ionic and covalent crystals and also their thermal expansion and thermal

				conductivity. CO2 Proper understanding of various theoretical concepts of optical properties of solids. CO3 The students would understand different phenomena, and theoretical analysis of superconducting materials along with their applications in SQUIDs magnetometer. CO4 The students would be able to classify superconductor materials in type-I & II and to have an elementary knowledge of high temperature superconductivity.
		19PHY23DA2	or Electronics - I	CO1 express numbers, alphabets, special characters etc. in binary representation, perform mathematical operation in digitally and application of different codes. CO2 implement Boolean expression with basic gates and design circuits to achieve desired output. CO3 design basic building blocks of ICs for different electronics operations such as addition, subtraction, code generation, data register, counting etc. CO4 develop various building blocks for ICs using MOSFET as MOS devices fabricated on a chip with high packing density and low power intake.
		19PHY23DB1	Computational Physics –I	CO1 Students would acquire a vision for use of computer in research prospective. CO2 Students would be able to recognize the nature of a specific numerical problem and would develop the acumen for choosing an appropriate

			Or	numerical technique to find its solution. CO3 Students would be able to design Fortran programs to solve numerical computationally.
		19PHY23DB2	Radiation Physics - I	OR CO1 radioactivity and uses of radio-isotopes. CO2 radiation quantities and units. CO3 interaction of radiation with matter and neutrons.
	M.Sc. 4th Semester	19PHY24C1	Physics of Laser and Laser Applications	CO1 Student would be able to understand the diversity of laser designs and various applications. CO2 Understand the basic concepts of most of the commercially available lasers. CO3 Student will get the knowledge about the basic principles which form the basis of nonlinear optics.
		19PHY24C2	Physics of Nanomaterials	CO1 Students would be able to explain the properties of Nanomaterials/nanostructures. CO2 Students get enabled to analyze the density of states in various nanostructures and related effect on optical properties. CO3 Students get acquainted with important techniques for preparation of Nanomaterials/nanostructures. CO4 Understanding quantitatively, the experimental results of x-ray diffraction, photoluminescence and Raman spectra of Nanomaterials opens up avenues of future research. CO5 Students would find themselves confident to carry out research work in this

				important field of Nanoscience/ Nano-technology.
		19PHY24DA1	Condensed Matter Physics – II or	CO1 Explain the concepts of point and space groups and experimental methods to find space groups, and to apply these for correct interpretation of x-ray diffraction data for crystal structure. CO2 Understand the influence of symmetry elements on physical properties of materials. CO3 Have understanding of exotic solids and their important applications. CO4 Appreciate the synthesis of few important Nanomaterials as well as characterization techniques. OR CO1 understand the fabrication process of solar cells, photodiodes, PMT's etc. CO2 analyse the functioning of various communication devices such as TV, Radio, mobile phone etc. CO3 realize the performance of operational amplifier for various mathematical operationssuch as addition, subtraction, differentiation, integration etc. CO4 understand circuit analysis and implementation of operational amplifier for various applications like comparator, A/D & D/A convertor, oscillators etc.
		19PHY24DA2	Electronics - II	
		19PHY24DB1	Computational Physics – II	CO1 Students would be able to understand framework of computer languages CO2 Students would be able to solve numerically various physical problems CO3 Students would gain the necessary basic knowledge of

				application of MATLAB for problem solving
			Or	OR
		19PHY24DB2	Radiation Physics - II	CO1 radiation detectors. CO2 Biological effects of radiation. CO3 radiation hazard.
	M.Sc. Mathematics 1ST Sem	16MAT21C1	Abstract Algebra	CO1 Apply group theoretic reasoning to group actions. CO2 Learn properties and analysis of solvable & nilpotent groups, Noetherian & Artinian modules and rings. CO3 Apply Sylow's theorems to describe the structure of some finite groups and use the concepts of isomorphism and homomorphism for groups and rings. CO4 Use various canonical types of groups and rings- cyclic groups and groups of permutations, polynomial rings and modular rings. CO5 Analyze and illustrate examples of composition series, normal series, subnormal series.
		16MAT21C2	Mathematical Analysis	CO1 Understand Riemann Stieltjes integral, its properties and rectifiable curves. CO2 Learn about pointwise and uniform convergence of sequence and series of functions and various tests for uniform convergence. CO3 Find the stationary points and extreme values of implicit functions. CO4 Be familiar with the chain rule, partial derivatives and concept of derivation in an open subset of R^n .
		16MAT21C3	Ordinary Differential Equations	CO1 Apply differential equations to variety of

				problems in diversified fields of life. CO2 Learn use of differential equations for modeling and solving real life problems. CO3 Interpret the obtained solutions in terms of the physical quantities involved in the original problem under reference. CO4 Use various methods of approximation to get qualitative information about the general behaviour of the solutions of various problems.
		16MAT21C4	Complex Analysis	CO1 Be familiar with complex numbers and their geometrical interpretations. CO2 Understand the concept of complex numbers as an extension of the real numbers. CO3 Represent the sum function of a power series as an analytic function. CO4 Demonstrate the ideas of complex differentiation and integration for solving related problems and establishing theoretical results. CO5 Understand concept of residues, evaluate contour integrals and solve polynomial equations.
		16 MAT21C5	Mathematical Statistics	CO1 Understand the mathematical basis of probability and its applications in various fields of life. CO2 Use and apply the concepts of probability mass/density functions for the problems involving single/bivariate random variables. CO3 Have competence in practically applying the discrete and continuous probability distributions along with their properties.

				CO4 Decide as to which test of significance is to be applied for any given large sample problem.
	M.Sc. Mathematics Semester-II	16MAT22C1	Theory of Field Extensions	CO1 Use diverse properties of field extensions in various areas. CO2 Establish the connection between the concept of field extensions and Galois theory. CO3 Describe the concept of automorphism, monomorphism and their linear independence in field theory. CO4 Compute the Galois group for several classical situations. CO5 Solve polynomial equations by radicals along with the understanding of ruler and compass constructions.
		16MAT22C2	Measure and Integration Theory	CO1 Describe the shortcomings of Riemann integral and benefits of Lebesgue integral. CO2 Understand the fundamental concept of measure and Lebesgue measure. CO3 Learn about the differentiation of monotonic function, indefinite integral, use of the fundamental theorem of calculus.
		16MAT22C3 Variations	Integral Equations and Calculus of Variations	CO1 Understand the methods to reduce Initial value problems associated with linear differential equations to various integral equations. CO2 Categorise and solve different integral equations using various techniques. CO3 Describe importance of Green's function method for solving boundary value problems associated with non-homogeneous ordinary and partial differential equations, especially the Sturm-Liouville boundary value problems.

				CO4 Learn methods to solve various mathematical and physical problems using variational techniques.
		16MAT22C4	Partial Differential Equations	CO1 Establish a fundamental familiarity with partial differential equations and their applications. CO2 Distinguish between linear and nonlinear partial differential equations. CO3 Solve boundary value problems related to Laplace, heat and wave equations by various methods. CO4 Use Green's function method to solve partial differential equations. CO5 Find complete integrals of Non-linear first order partial differential equations.
		16MAT22C5	Operations Research Techniques	CO1 Identify and develop operations research model describing a real life problem. CO2 Understand the mathematical tools that are needed to solve various optimization problems. CO3 Solve various linear programming, transportation, assignment, queuing, inventory and game problems related to real life.
		16MM22DO1	Mathematics for Finance and Insurance	CO1 Demonstrate knowledge of the terminology related to nature, scope, goals, risks and decisions of financial management. CO2 Predict various types of returns and risks in investments and take necessary protective measures for minimizing the risk. CO3 Develop ability to understand, analyse and solve problems in bonds, finance and insurance. CO4 Build skills for computation

				of premium of life insurance and claims for general insurance using probability distributions. Section - I
		16MM22DO2	Statistics through SPSS	CO1 Understand different types of data and scales of their measurement. CO2 Learn basic workings of SPSS and perform a wide range of data management tasks in SPSS. CO3 Obtain descriptive statistics and basic inferential statistics for comparisons using SPSS. CO4 Apply basic statistical parametric and non-parametric tests for the given data. CO5 Carry out correlation, regression and factor analysis through the use of SPSS.
	M.Sc. Mathematics, Semester-III	17MAT23C1	Functional Analysis	CO1 Be familiar with the completeness in normed linear spaces. CO2 Understand the concepts of bounded linear transformation, equivalent formulation of continuity and spaces of bounded linear transformations. CO3 Describe the solvability of linear equations in Banach Spaces, weak and strong convergence and their equivalence in finite dimensional space. CO4 Learn the properties of compact operators. CO5 Understand uniform boundedness principle and its consequences.
		17MAT23C2	Elementary Topology	CO1 Get familiar with the concepts of topological space and continuous functions. CO2 Generate new topologies from a given set with bases. CO3 Describe the concept of homeomorphism and

				topological invariants. CO4 Establish connectedness and compactness of topological spaces and proofs of related theorems. CO5 Have in-depth knowledge of separation axioms and their properties.
		17MAT23C3	Fluid Dynamics	CO1 Be familiar with continuum model of fluid flow and classify fluid/flows based on physical properties of a fluid/flow along with Eulerian and Lagrangian descriptions of fluid motion. CO2 Derive and solve equation of continuity, equations of motion, vorticity equation, equation of moving boundary surface, pressure equation and equation of impulsive action for a moving inviscid fluid. CO3 Calculate velocity fields and forces on bodies for simple steady and unsteady f low including those derived from potentials. CO4 Understand the concepts of velocity potent
	Discipline Specific Elective Group A (Any One)			
		17MAT23DA1	17MAT23DA1 Discrete Mathematics	CO1- Be familiar with fundamental mathematical concepts and terminology of discrete mathematics and discrete structures. CO2- Express a logic sentence in terms of predicates, quantifiers and logical connectives. CO3 -Use finite-state machines to model computer operations. CO4- Apply the rules of inference and contradiction for proofs of various results. CO5 -Evaluate boolean

				functions and simplify expressions using the properties of boolean algebra.
		17MAT23DA2	Fuzzy Set Theory	CO1 Draw a parallelism between crisp set operations and fuzzy set operations through the use of characteristic and membership functions respectively. CO2 Learn fuzzy sets using linguistic words and represent these sets by membership functions. CO3 Define mapping of fuzzy sets by a function and fuzzy-set-related notions; such as αlevel sets, convexity, normality, support, etc. CO4 Know the concepts of fuzzy graph, fuzzy relation, fuzzy morphism and fuzzy numbers. CO5 Become familiar with the extension principle, its compatibility with the α-level sets and its usefulness in performing fuzzy number arithmetic operations.
		17MAT23DA3	Mechanics of Solids	CO1 Get familiar with Cartesian tensors, as generalization of vectors, and their properties which are used in the analysis of stress and strain to describe the phenomenon of solid mechanics. CO2 Analyse the basic properties of stress and strain components, their transformations, extreme values, invariants and Saint-Venant principle of elasticity. CO3 Demonstrate generalized Hooke's law for three dimensional elastic solid which provides the linear relationship between stress components and strain components. CO4 Use different types of elastic symmetries to derive the

				stress-strain relationship for isotropic elastic materials for applications to architecture and engineering.
		17MAT23DA4	Difference Equations	CO1 Be familiar with the difference equation and various types of difference operators. CO2 Derive and solve difference equations. CO3 Apply the concepts of stability of linear and nonlinear systems. CO4 Get knowledge of phase plane analysis for linear systems. CO5 Understand the concept of asymptotic methods for linear and nonlinear equations. Also explain the chaotic behaviour of solutions.
		17MAT23DA5	Statistical Inference	CO1 Understand the concepts of point estimation and interval estimation. CO2 Identify good estimators using criterion of good estimators and obtain estimators using method of maximum likelihood and moments. CO3 Learn about the chi-square, Students' t and Snedcor F-statistics and their important applications. CO4 Carry out different tests of significance for small samples and apply common nonparametric tests to real life problems. CO5 Explain and use Neyman-Pearson lemma and likelihood ratio tests.
		17MAT23DA6	Programming in C	CO1 Write and run a C program along with gradual improvement using efficient error handling. CO2 Implement selective structures and repetitive

				structures in C programs using different control statements. CO3 To emphasize on the importance of use of pointers for efficient C programming. CO4 Use structures and unions in a C program for handling multivariate data. CO5 Efficient management of memory space of the system by using compact C statements and Dynamic memory allocation functions.
	Group B (Any One)			
		17MAT23DB1	17MAT23DB1 Analytical Number Theory	CO1 Know about the classical results related to prime numbers and get familiar with the irrationality of e and П. CO2 Study the algebraic properties of Un and Qn. CO3 Learn about the Waring problems and their applicability. CO4 Learn the definition, examples and simple properties of arithmetic functions and about perfect numbers. CO5 Understand the representation of numbers by two or four squares.
		17MAT23DB2	17MAT23DB2 Advanced Complex Analysis	CO1 Understand the concepts of Gamma function and its properties. CO2 Get familiar with Riemann Zeta function, Riemann functional equation and Mittag Leffler theorem. CO3 Demonstrate the idea of Harnack Inequality, Dirichlet region, Green function and its properties. CO4 Understand the concept of integral functions, their factorisation, order and exponent of convergence. CO5 Be familiar with the range of analytic function and proof

				of related results.
		17MAT23DB3	17MAT23DB3 Mathematical Modeling	CO1 Understand the core principles of mathematical modeling. CO2 Apply precise and logical reasoning to problem solving. CO3 Frame quantitative problems and model them mathematically. CO4 Analyze the importance of partial differential equations in mathematical modeling. CO5 Formulate the observable real problem mathematically.
		17MAT23DB4	17MAT23DB4 Computational Fluid Dynamics	CO1 Possess a good understanding of the basics of fluid mechanics and the governing equations of the fluid dynamics. CO2 Learn the art of numerical methods employed in computational aspects of fluid dynamics and related applications. CO3 Acquire a good knowledge of the mathematical concepts of the finite difference and finite volume discretizations. CO4 Describe the major theories, approaches and the methodologies used in CFD along with their limitations on accuracy.
		17MAT23DB5	Sampling Techniques and Design of Experiments	CO1 Understand the applicability of sample survey over the complete enumeration and vice-versa. CO2 Distinguish between simple random sampling, stratifies random sampling and systematic sampling, and to learn under what situations which type of sampling technique is applicable. CO3 Give complete analysis of completely randomised, randomized block and latin square designs and solve

				various related problems. CO4 Have the skill of solving problems on Factorial designs – 2 2 and 23 designs.
		17MAT23DB6	Computer Graphics	CO1 Gain programming skills in C language for writing applications that produce 2D and 3D computer graphics. CO2 Learn the principles and commonly used paradigms and techniques of computer graphics. CO3 Write basic graphics application programs including animation. CO4 Design and code programs for 2-D and 3-D transformations, clipping, filling area and hidden surface removal
	Open Elective	17MAT23SO1	Multivariate Analysis	CO1 Perform exploratory analysis of multivariate data. CO2 Test for multivariate normality of the data. CO3 Apply multivariate statistical methods for testing of hypothesis and estimation. CO4 Perform data reduction using principal component analysis. CO5 Apply multivariate techniques to study the population structure.
		17MAT23SO2	MATLAB	CO1 Know the basic concepts of MATLAB software. CO2 Understand the procedures, algorithms, and concepts required in solving specific problems. CO3 Code solutions to problems in MATLAB, in a legible, debug' able and efficient way. CO4 Solve different types of mathematical problems and draw various types of graphs using MATLAB.

M.Sc. Mathematics, Semester- IV	17MAT24C1	Inner Product Spaces and Measure Theory	CO1 Understand Hilbert spaces and related terms. CO2 Introduce the concept of projections, measure and outer measure. CO3 Learn about Hahn, Jordan and Radon-Nikodyn decomposition theorem, Lebesguestieltjes integral, Baire sets and Baire measure.	
		17MAT24C2	Classical Mechanics	CO1 Be familiar with the concepts of momental ellipsoid, equimomental systems and general motion of a rigid body. CO2 Understand ideal constrains, general equation of dynamics and Lagrange's equations for potential forces. CO3 Describe Hamiltonian function, Poincare-Carton integral invariant and principle of least action. CO4 Get familiar with canonical transformations, conditions of canonicity of a transformation in terms of Lagrange and Poisson brackets.	
		17MAT24C3	Viscous Fluid Dynamics	CO1 Understand about vortex motion and its permanence, rectilinear vertices, vortex images and specific types of rows of vortices. CO2 Model mathematically the compressible fluid flow and describe various aspects of gas flow. CO3 Acquire knowledge of viscosity, relation between shear stress and rates of shear strain for Newtonian fluids, energy dissipation due to viscosity, and laminar and turbulent flows. CO4 Derive the equations of motion for a viscous fluid flow and use them for study of flow Newtonian fluids in pipes and ducts for laminar flow fields,	

				and their applications in mechanical engineering. CO5 Get familiar with dimensional analysis and similitude, and understand the common dimensional numbers of fluid dynamics along with their physical and mathematical
	Discipline Specific Elective Group C (Any One)			
		17MAT24DA1	General Topology	CO1 Have the knowledge of the separation axioms. CO2 Understand the concept of product topological spaces and their properties. CO3 Be familiar with Tychonoff embedding theorem and Urysohn's metrization theorem. CO4 Know about methods of generating nets and filters and their relations. CO5 Describe paracompact spaces and their characterizations.
		17MAT24DA2	Graph Theory	CO1 Model real world problems and solve them using basic Graph Theory. CO2 Understand graph, subgraphs, connected and disconnected graphs etc. CO3 Differentiate between Hamiltonian and Eulerian graphs. CO4 Solve problems involving vertex, edge connectivity, planarity and edge coloring. CO5 Apply tree and graph algorithms to solve problems.
		17MAT24DA3	Applied Solid Mechanics	CO1 Be familiar with the concept of generalized plane stress and solution of twodimensional biharmonic equations. CO2 Solve the problems based

				on thick-walled tube under external and internal pressures. CO3 Understand the concept of torsional rigidity, lines of shearing stress and solve the problems of torsion of beams with different cross-sections. CO4 Describe Ritz method, Galerkin method, Kantrovich method and their applications to the torsional problems. CO5 Get familiar with simple harmonic progressive waves, plane waves and wave propagation in two-dimensions.
		17MAT24DA4	Bio Mechanics	CO1 Use the mathematics of mechanics to quantify the kinematics and kinetics of human movement alongwith describing its qualitative analysis. CO2 Possess knowledge of steady laminar flow in elastic tubes, pulsatile flow and significance of non-dimensional number affecting the flow CO3 Be familiar with internal flows such as blood flow in blood vessels, gas in lungs, urine in kidneys, water and other body fluids in interstitial space between blood vessels and cells.
		17MAT24DA5	Information Theory	CO1 Understand various measures of information with proofs of important properties of information measures. CO2 Learn the basic concepts of noiseless coding, channel and channel capacity and relation among them. CO3 Compare different codes and construct optimal codes. CO4 Explain important discrete memoryless channels and continuous channels. CO5 Analyse information processed by the channels and

				obtain channel capacity.
		17MAT24DA6	Object Oriented Programming with C++	CO1 Apply C++ features to design and implement a program. CO2 Develop solutions to problems demonstrating usage of data abstraction, encapsulation and inheritance. CO3 Program using C++ features such as operators overloading, polymorphism, streams, exception handling etc. CO4 Implement practical applications and analyze issues related to object-oriented techniques in the C++ programming language.
	Group D (Any One)			
		17MAT24DB1	Algebraic Number Theory	CO1 Learn the arithmetic of algebraic number fields. CO2 Prove theorems for integral bases and unique factorization into ideals. CO3 Factorize an algebraic integer into irreducibles. CO4 Obtain the ideals of an algebraic number ring. CO5 Understand ramified and unramified extensions and their related results.
		17MAT24DB2	Harmonic Analysis	CO1 Understand the concept of Fourier series and Fourier transformation using various theorems. CO2 Learn about Poisson kernel and its properties, Poisson integral of L1 function and Poisson measure. CO3 Study the boundary behaviour of Poisson integral. CO4 Operate with Hardy spaces, use the Poisson integral and canonical factorization theorem.
		17MAT24DB3 Bio	Fluid Dynamics	CO1 Understand the basic

				concepts of physiological and biological fluid dynamics. CO2 Know about the systematic and pulmonary circulations, specific flow properties of blood and identify diseases related to obstruction of blood flow in human body. CO3 Get familiar with important models of bio-fluid flows and their applications to duct and pipe flows. CO4 Able to describe non-Newtonian fluid flow models and peristaltic flows along with their applications in blood flow in human body.
		17MAT24DB4	Space Dynamics	CO1 Have a good understanding of orbiting bodies. CO2 Solve body problems analytically by using Hamilton Jacobi theory. CO3 Find stationary solutions and stability of dynamical system. CO4 Be familiar with perturbations such as perturbing forces, secular and periodic perturbations on body problems.
		17MAT24DB5	Stochastic Processes	CO1 Learn about stochastic processes, their classifications and real life applications. CO2 Understand the concept of Markov chains and to obtain higher transition probabilities. CO3 Explain various properties of a Poisson process. CO4 Demonstrate the ideas of birth and death process, immigration-emigration process, renewal process, Regenerative stochastic process, Markov renewal process and semiMarkov process. CO5 Apply the stochastic theory

				for modeling real systems/ phenomena and study their implications including reliability of the systems.
		17MAT24DB6	Information and Communication Technology	CO1 Learn about various types of computer networks and transmission protocols. CO2 Implement installation, handling and safe usage of different softwares. CO3 Understand and analyze the appropriateness of methodologies and technologies for the design and implementation of ICT solutions. CO4 Know about different type of threats, technologies, ethics and issues related to ICT. CO5 Demonstrate ICT infrastructure and articulate the relationships and interdependencies between technologies.
	M.COM –1st sem	16MCO21C1	Accounting Standards and Financial Reporting	CO1: This subject provides detailed insight into accounting regulations and accounting aspects of Companies. CO2: To know about Stages and Process of Standards settings by ICAI in India along with Compliance and Applicability of Accounting Standards in India. CO3: To understand the difference between Accounting Standard, IFRS, IASB and FASB and also gain knowledge on Convergence of Indian Accounting Standards with IFRS CO4: To learn about the IFRS current status and Challenge and also understand the concept of harmonization in Accounting and Reporting. CO5: It also covers contemporary issues in accounting i.e. Human

				Resource Accounting, Corporate Social Reporting, Forensic Accounting and Reporting. Environmental Reporting.
		16MCO21C2	Statistical Analysis for Business	CO1: Will enable the students to understand the Correlation and Regression Analysis, Probability Distribution: Binomial, Poisson and Normal Distribution C02: Will learn the Hypotheses testing, Sampling tests – Large and small Sample tests – Z-Test, T-Test. CO3: Will help students to understand Parametric and Non-Parametric tests. CO4: Will enable the students understand the Association of Attributes, Chi-Square test
		16MCO21C3	Managerial Economics	CO1: Will enable the students understand the meaning and nature of managerial economics and also theories of consumer choice C02: Will acquaint the students with production and cost functions CO3: Will help students to understand meaning and nature of macro economics and the concept of inflation CO4: Will enable the students understand the various macro economic indicators.
		16MCO21C4	Computer Application in Business	CO1: To know the basics of Computer System, Computer Software & Hardware and Information processing system. CO2: To understand the differences of types of computer systems, input-output devices, storage devices, communication devices, configuration of hardware devices and their applications. CO3: To learn about the

				personal computers, its components, hardware configuration, RAM,:B2B,B2C,C2C,C2B,B2Gand G2C, electronic Payment Systems. C O4: To be familiar with Modern network Technologies i.e. LAN, WAN, MAN, E-mail, Internet technologies, World Wide Web and Internet browsing. CO5: To get practical learning on M.S.Word, Excel, Power Point, Internet Technology – Applications, manager., control panel, paintbrush, calculator, desk top, my computer, settings, find, run etc.
		16MCO21D1	Student must choose one paper from the followings: (i) Entrepreneur ship Development	CO1: To know the basics of Entrepreneurship, Factors & Problems (Operational and Non- Operational) and Obstacles. CO2: To understand the Theories of Entrepreneurship, Schumpeter's, Ducker's and Walker's views on Entrepreneur. CO3: To learn about the converting business opportunities into reality, feasibility Report and analysis, Entrepreneurial Problems.
		16MCO21D2	or (ii) Business Environment	Or CO1: Systematically explores the external environment-legal & regulatory, macroeconomic, cultural, political, technological and natural. CO2: Analyze the environment of a business from the legal & regulatory, technological and natural perspectives. CO3: Discuss the supply and demand theory and its impact on insurance.

		16MCO21D3	or (iii) (iii) Principles of Management	Or CO1: To discuss and communicate the evolution of management and how it will affect future managers. CO2: To identify and explain the importance of management process and identify some of the key skills required for the contemporary management practices. CO3: To have the in-depth understanding of the process of motivation and its various theories.
	M.Com Second Semester	16MCO 22C1	Management Accounting	CO1: To communicate the major management accounting concepts related to functions of planning, directing, controlling and decision making. CO2: To make the students able to use management accounting tools for pricing, budgetary control, cost allocation, and performance evaluation as well as the new developments in management accounting knowledge CO3: To evaluate the costs and benefits of different conventional and contemporary costing systems.
		16MCO 22C2	Investment Management	CO1: Will enable the students comprehend the meaning, nature, scope and types of investments CO2: Will help students understand Capital Market instruments and their operations CO3: Will lend students ability to make valuation of financial securities CO4: Will introduce students to the theoretical paradigms of EMH

				CO5: Will equip students with skills of fundamental and technical analysis of investments
		16MCO 22C3	Financial Management	CO1: Will enable the students understand the meaning and nature of financial management and also the concept of cost of capital CO2: Will acquaint the students with the leverages, capital structure and dividend decisions C03: Will help students to understand the detailed concept of capital budgeting decisions with its various methods and risk analysis pertaining to capital budgeting decisons CO4: Will enable the students understand the concept of corporate and financial restructuring
		16MCO22D1 Or 16MCO22D2 Or 16MCO22D3	Student must choose one paper from the followings: (i) International Economics	CO1: Will enable the students understand the meaning and nature of International economics, International trade and Protection. CO2: Will acquaint the students with the International factor movements, multinational firms and FDI, Political economy of trade, WTO. C03: Will help students to understand the International macroeconomics, National income accounting and Balance of payments. CO4: Will enable the students understand the concept of international monetary system and International capital markets. Or CO1: Will enable the students understand the Financial Policy

			or (ii) Strategic Financial Management	and Strategic Planning, Risk and Uncertainty. CO2: Will acquaint the students with the Expansion and Financial Restructuring: Mergers and Amalgamations, Divestment Strategy and Evaluation of merger proposal. C03: Will help students to understand the Leasing, Venture Capital and fiscal incentives. CO4: Will enable the students understand the Financing Strategy, Corporate Strategy Financial Policy and shareholder value creation.
			or (iii) Organizational Behaviour	Or CO1: Students will gain a comprehensive understanding of the concept of Organisational Behaviour and Relationship to other fields and Learning. CO2: Students will understand about the Attitude, changing of attitude and aspects of personality. CO3: Students will learn about the Perception, factors influencing perception, Group Dynamics and Team Development. CO4: Will enable the students to learn about Organisational Conflict, its Dynamics, Traditional and modern approaches to conflict and Organisational development.
	M.Com Third Semester	17MCO 23C1 Portfolio Management	Portfolio Management	CO1: Students will gain a comprehensive understanding of the concept of Portfolio and its allied aspects CO2: Students will gain skills of building Portfolio with the help of Markowitz's model, Sharpe's Index Model and Capital Assets

			Pricing Model CO3: Students will understand main techniques of Portfolio performance evaluation CO4: Will enable the students comprehend the premise of Behavioural Finance CO5: Will equip students with strategies of Great Masters in the sphere of investment management
		17MCO 23C2 Corporate Tax	Corporate Tax	CO1: Student will learn the keywords of Corporate Tax and how the residential status of Corporate Sector is being determined. CO2: Student will gain with the provisions regarding determination income under various heads. CO3: Student will become familiar with the provisions of income tax regarding assessment of charitable trust, education institutions, political parties, co-operative societies and income of nonresidents. CO4: Students will know about the unilateral relief in case of double taxation relief.
		17MCO23DA1 or	Student must choose one paper from the followings : (i) Marketing Concepts & Decisions	CO1: To know the concept of Marketing, and problems in marketing. CO2: To understand the basis for market segmentation, Branding, trade-mark and product life cycle. CO3: To be familiar with Pricing & Distribution channel factors affecting choice of a distribution channel. CO4: To learn the New Product planning & development, branding, Packaging and labelling, Pricing Decisions and strategies.

		17MCO23DA2	(ii) Project Management	Or CO1: Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders. CO2: Apply project management practices to the launch of new programs, initiatives, products, services, and events relative to the needs of stakeholders. CO3: Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success
		or 17MCO23DA3	or (iii)Management of Financial Services	Or CO1: This subject prepares the students in understanding financial system and its history, operating procedure, and its relevance in Import & Export. CO2: To gain knowledge on Financial Markets - Money and capital markets, Money market instruments and Recent trends in Indian money markets & capital-market CO3: To learn about the Process of issuing securities in primary and secondary market.
		17MCO23DB1	Student must choose one paper from the followings : (i) International Finance	CO1: To provide an introduction to international finance theory (e.g., exchange rate determinants, foreign exchange exposure, foreign exchange markets, interest rate parity). CO2: To develop knowledge, capability, and skills necessary for making sound financial decisions for a multinational firm. To teach students on how to run their own MNC and write a quality feasibility report.

		Or 17MCO23DB2	Or (ii) Service Marketing	CO3: Demonstrate the understanding of international financial theory and applications pertaining to, e.g., exchange rate determinants, foreign exchange exposure, foreign direct investment interest rate parity, and the balance of payment. Or CO1: To understand importance of Service, The '7 Ps of Services. CO2: Demonstrate knowledge about Service Design, Service Quality, The Gaps Model of Service Quality and The SERVQUAL Scale CO3: Better understanding of the Demand and Capacity Management, Yield management Or CO1: To understand importance of cost accounting and financial accounting for preparing management accounting. CO2: Demonstrate knowledge about various financial decision based on management accounting. CO3: Better understanding of the variance concept.
		Or 17MCO23DB3	or (iii) Advance Cost Accounting	
	M.Com Fourth Semester	17MCO 24C1	Cost Accounting Standards & Reporting	CO1: Demonstrate domain knowledge in Cost accounting standard, Generally accepted cost accounting principles, CAS need and statutory recognition. CO2: Better knowledge about the CAS, Cost auditor – appointment, eligibility, remuneration, rights and responsibilities etc. CO3: Understanding the Outlines of CAS, CAS-1, CAS- 3, CAS-6, CAS-7, CAS -10, CAS-11,

				CAS- 12 etc. CO4: Getting the deep knowledge about the Cost Audit, Cost accounting records
		17MCO 24C2	Corporate Tax Planning and Management	CO1: Students will know about the difference between Tax evasion, Tax avoidance, Tax planning and Tax management. CO2: Students will aware about the Income Tax Insensitive provided to the industrial undertakings established for the development of Infrastructure facilities and backward area. CO3: Student will learn about the provisions of Income Tax Act during taking of financial decisions
		17MCO 24C3	Business Research Methods	CO1: Understand a general definition of research design. CO2: Be able to identify the overall process of designing a research study from its inception to its report. CO3: Students should be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research. CO4: Students should be familiar with how to write a good introduction to an educational research study and the components that comprise such an introduction.
		17MCO24DA1	Student must choose one paper from the followings : (i) HumanResourceManagement	CO1: This subject prepares the student for the most critical ingredient of the business i.e. HRM. CO2: To be able to understand the Importance, Objective and Scope of Human Resource Management (HRM). CO3: To learn about the steps, Techniques/methods of Recruitment, Selection, Training and Management

		Or 17MCO24DA2	Or (ii)Working Capital Management	Development. CO4: To gain an insight about the Wage and Salary Administration and Wage Incentives Or CO1: Will enable the students comprehend the meaning, nature, scope and determinants of Working Capital CO2: Will equip students with the recommendations of various committees with regard to financing of Working Capital CO3: Will help students understand various aspects of Cash Management Or CO1: Identify the forces impacting on corporate and business strategies.
		Or 17MCO24DA3 \	Or (iii) Strategic Management	CO2: Be critically aware of factors involved in strategy making CO3: Assess the resources and constraints for strategy making in a business context
		17MCO24DB1	Student must choose one paper from the followings : (i) International Business Environment	CO1: Will enable the students understand the meaning ,nature and importance of international International Business and Environment CO2: Will acquaint the students with the International Economic Cooperation and Agreements, SAARC, SAPTA, Indo-Lanka Free Trade Agreements, NAFTA. CO3: Will help students to gain understanding pertaining to IMF, WB, ADB, UNCTAD, IMODO and WTO. Or CO1: To aware the students
		Or	or	about how Production and

		17MCO24DB2	(ii) Production Management	Operations are managed. CO2: The course is an attempt to integrate the courses studied by the students like statistics, economics, finance, organizational behaviour and strategy into a consolidated production and operation related decisions. CO3: To provide exposure to students regarding quality control, production planning and control. Or CO1: Student will learn the keywords of Accounts for holding and subsidiary Companies, Capital Profits, Cost of Control, Revaluation of Assets and Liabilities. CO2: Student will gain with the knowledge of corporate restructuring, Forensic Accounting Double Account System CO3: Understand the accounting treatment for Farm Accounting, Government Accounts, Comptroller and Audit General of India
		Or 17MCO24DB3 \	Or (iii) Advance Accounting	
M.A. HINDI				