

# **COURSE OUTCOME**

**(2021-22)**

## Contents

<b>Department of Bengali</b> .....	1
<b>Department of English</b> .....	2
<b>Department of Hindi</b> .....	3
<b>Department of Sanskrit</b> .....	4
<b>Department of Economics</b> .....	5
<b>Department of Political Science</b> .....	8
<b>Department of History</b> .....	15
<b>Department of Geography</b> .....	16
<b>Department of Philosophy</b> .....	18
<b>Department of Sociology</b> .....	19
<b>Department of Physics</b> .....	21
<b>Department of Mathematics</b> .....	24
<b>Department of Chemistry</b> .....	28
<b>Department of Computer Science</b> .....	32
<b>Department of Computer Application</b> .....	33
<b>Department of Botany</b> .....	34
<b>Department of Zoology</b> .....	38
<b>Department of Microbiology</b> .....	42
<b>Department of Nutrition</b> .....	45
<b>Department of Commerce</b> .....	48
<b>COURSE OUTCOME OF PG PROGRAM</b>	
<b>Department of Political Science</b> .....	50

## Department of Bengali

Course: B.A. Honours and Program in Bengali

1 <sup>st</sup> and 2 <sup>nd</sup> SEM
<ol style="list-style-type: none"><li>1. A basic idea on Bengali literature and its relevance in modern society.</li><li>2. A preliminary understanding of major literary works.</li></ol>
3 <sup>rd</sup> and 4 <sup>th</sup> SEM
<ol style="list-style-type: none"><li>1. An understanding of the society which is the primary requisite to study and literary piece.</li><li>2. Development of literary appreciation</li></ol>
5 <sup>th</sup> and 6 <sup>th</sup> SEM
<ol style="list-style-type: none"><li>1. Critical assessment of various works</li><li>2. A study of world literature vis a vis Bengali literature</li></ol>

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## Department of English

### Course: B.A. Honours & Program in English

COURSE	COURSE OUTCOME
<p>1<sup>st</sup> and 2<sup>nd</sup> Sem. B.A English</p>	<p><u>HONOURS :</u>            CC-1 : Preliminary knowledge about the history of literature from Anglo-Saxon to 17<sup>th</sup> Century and the relevant texts of that period.            CC-2 : Understanding British prose and drama (from prescribed texts) of Anglo-Saxon period to 17<sup>th</sup> Century.            CC- 3 and 4: Understanding Renaissance and its representative texts.  <u>GE- 1</u> : Formation of idea about Women Empowerment in Contemporary India.            AECC 1: Formation of idea about Prose Writings from prescribed texts.  <u>Program :</u>            CC-1: Formation of ideas about Rhetoric and Prosody            CC-2 : Understanding of representative poetry of British and Indian Literature.</p>
<p>3<sup>rd</sup> and 4<sup>th</sup> Sem. B.A English</p>	<p><u>HONOURS :</u>            CC-5 and 6 : Getting an overall idea on the Puritan, Restoration and Augustan Period and their representative texts.            CC-7 and 8 : Understanding Romantic Literature and the corresponding representative texts.            CC- 9 and 10 :Understanding Victorian Literature and the representative texts of that period.  <u>Program :</u>            CC-3 : Understanding representative fiction and short stories of 20<sup>th</sup> Century.            CC-4 : Understanding non-fiction and drama of the 20<sup>th</sup> Century.  <u>HONOURS :</u></p>
<p>5<sup>th</sup> and 6<sup>th</sup> Sem. B.A English</p>	<p>CC-11 and 12 : Having an overall idea of the Modern British Period and the representative texts of that era            CC-13 : Understanding Shakespeare : his sonnets and plays.            DSE-1 and 2 : Understanding some prescribed texts of Indian Writing in English.            DSE- 3 and 4 : Understanding some prescribed texts of American Literature.  <u>Program :</u>            CC-5 : Gaining knowledge on composition            CC-6 : Phonetics and Phonology</p>

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## Department of Hindi

### Course: B.A. Honours and Program in Hindi

1 <sup>st</sup> & 2 <sup>nd</sup> Sem	<ol style="list-style-type: none"><li>1. A Basic idea on Hindi literature &amp; its relevance in modern society.</li><li>2. A preliminary understanding of major literary works.</li></ol>
3 <sup>rd</sup> & 4 <sup>th</sup> Sem	<ol style="list-style-type: none"><li>3. An understanding of the society which is the primary requisite to study and literary piece.</li><li>4. Development of literary application.</li></ol>
5 <sup>th</sup> & 6 <sup>th</sup> Sem	<ol style="list-style-type: none"><li>5. Critical assessments of various works.</li><li>6. A study of world literature vis-à-vis Hindi literature.</li></ol>

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## Department of Sanskrit

Course: B.A. Honours and Program in Sanskrit

1 <sup>st</sup> SEM
<ul style="list-style-type: none"><li>• Understand the language and basic of it and its grammar.</li><li>• Analyse Epic, specially Indian ancient Epic-Ramayana and Mahabharata.</li><li>• Determine Prosody in the light of 'Chhandamanjari'.</li></ul>
2 <sup>nd</sup> SEM
<ul style="list-style-type: none"><li>• Understand Drama through Dramaturgy (Sahitya Darpan 6<sup>th</sup> Chapter).</li><li>• Analyse History of Sanskrit Literature with modern Indian Language.</li></ul>
3 <sup>rd</sup> SEM
<ul style="list-style-type: none"><li>• Understand Sanskrit grammar: General grammar, Karaka and Samas.</li><li>• Understand Indian Polity: Specially Arthasashtra and Manusamhita.</li></ul>
4 <sup>th</sup> SEM
<ul style="list-style-type: none"><li>• Analyse different Linguistic law: Grim, Grassman, Verner etc. Understand Linguistics.</li><li>• Analyse Ancient Indian Literature and develop understanding of Veda, Vedic Literature, The Bhagwat Gita (Karmayoga).</li><li>• Developo writing skill of students through script writing.</li></ul>
5 <sup>th</sup> SEM
<ul style="list-style-type: none"><li>• Understand poetics through Sahitya Darpan, Kavya prakash, determine Alankara.</li><li>• Understand Indian culture and analyse its reflection in Sanskrit Literature.</li><li>• Understand methodology: with special reference Pouranic Literature.</li></ul>
6 <sup>th</sup> SEM
<ul style="list-style-type: none"><li>• Analyse Indian philosophy: Tarkasangrah, Yogsutra.</li><li>• Understand Indian social institution.</li><li>• Understand environment need of its awareness in Sanskrit Literature.</li></ul>

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## Department of Economics

Course: B.A. Honours and Program in Economics

B.A. (Honours in Economics)	<b>1<sup>st</sup> Semester:</b> <ul style="list-style-type: none"><li>• <b>Micro Economic theory:</b> Students learn about the general concepts of economics, theory of demand, theory of production and cost, perfect and imperfect competition under market structure.</li><li>• <b>Macro Economic theory:</b> Students gain knowledge about the scope and nature of macro economics. Other concepts include national income accounting, classical system, Keynesian model of income determination Keynesian system.</li></ul>
	<b>2<sup>nd</sup> Semester:</b> <ul style="list-style-type: none"><li>• <b>Micro Economic theory:</b> Students get the idea of imperfect competition which includes monopoly, monopolistic completion and oligopoly. Also they become aware of theory of factor pricing, general equilibrium and economic welfare.</li><li>• <b>Mathematical Economics:</b> Students get information of some basic mathematical concepts with economic illustration, calculus and its application in economics, differential and integral calculus, difference and differential equations.</li></ul>
	<b>3<sup>rd</sup> Semester:</b> <ul style="list-style-type: none"><li>• <b>Statistical method:</b> A detailed study of tabular and diagrammatic presentation of data, measures of central tendency and dispersion, co-relation and regression analysis and index number.</li><li>• <b>Macro Economic theory:</b> Students are introduced to consumption function, money market, investment function and theories of inflation.</li><li>• <b>Development Economics:</b> In this course students gain knowledge about the concepts of economic development and under-development theories of economic growth and labour surplus economy and development strategies.</li></ul>

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#### 4<sup>th</sup> Semester:

- **Statistical Method:**

Students learn about time series analysis, probability theory, random variable and mathematical expectation, uni-variate probability distribution, sampling theory and sampling distribution, estimation and testing of hypothesis.

- **Indian Economics:**

Students thoroughly learn about structural changes in the Indian Economy, various concepts relating to agricultural sector, industrial sector, population, poverty and unemployment about the parallel economy in India.

- **Mathematical Economics:**

Students learn about determinants and matrices. Linear programming, input-output analysis and basic game theory.

#### 5<sup>th</sup> Semester:

- **Public finance:**

Students get knowledge about the introductory part of public economics, principles of taxation, public debt and Indian public finances.

- **International Economics:**

Students get idea about the basic of trade, theory of trade, balance of payment and problems of adjustment.

- **DSE:**

Students are introduced to the classical political economy, Indian Economic history, money and financial market of India and environmental Economics.

#### 6<sup>th</sup> Semester:

- **Basic Econometrics:**

Students are exposed to the basic concepts of econometrics, classical linear regression model-two and three variable case and violations of classical assumptions.

- **Indian Economics:**

- Students get knowledge of economic planning, Indian tax structure during plan period, public sector in India and India's Foreign trade.

- **DSE:**

Students are introduced to economics of growth, urban economics, entrepreneurial economics and a project work based on field survey or from secondary data source.

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<b>Program</b>	<ul style="list-style-type: none"><li>• Students learn about consumer and producers behaviour.</li><li>• Students get knowledge about National income, different concepts.</li></ul>
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# Department of Political Science

Course: B.A. Honours and Program in Political Science

SEMESTER	COURSE OUTCOME
1 <sup>ST</sup>	<p><b>CORE PAPER 1: POLITICAL THEORY (LIBERAL TRADITION)</b></p> <ul style="list-style-type: none"><li>• Study of the Normative, Behavioural &amp; Post-behavioural, and Feminist approaches to the study of Politics.</li><li>• Explain the Idealist, Liberal and Neo-liberal theories of the nature of the State.</li><li>• Explain the concept of the State Sovereignty and its monistic and pluralistic theories.</li><li>• Understanding the basic concept of democracy and its classification.</li><li>• Describe the concepts of Liberty, Equality, Rights, Law and their interrelations</li><li>• Describe the concept of Justice with special relations to the theory of Rawls.</li></ul> <p><b>CORE PAPER 2: COMPARATIVE POLITICS</b></p> <ul style="list-style-type: none"><li>• Write down the history of the development of Comparative Politics and differentiate between Comparative Politics and Comparative Government.</li><li>• Study of the approaches to the study of Comparative Politics.</li><li>• Explain the theories of Political System as presented by Easton, Almond and Powell.</li><li>• Explain the theories of Political Modernization and Political Development with special reference to Pye and Huntington.</li><li>• Explain the Dependency Theory of Andre Gunder Frank.</li></ul> <p><b>GENERIC : FOR THE STUDENTS OF OTHER DISCIPLINE</b></p> <p>POLITICAL THEORY</p> <p><b>ABILITY ENHANCEMENT COMPULSORY PAPER 1 : ENVIRONMENTAL STUDIES</b></p> <ul style="list-style-type: none"><li>• Describe the environment, pollution and its causes and classification, wildlife, ecosystem, legal provisions both national and international for the protection of environment.</li></ul>

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2 <sup>ND</sup>	<p><b>CORE PAPER 3: POLITICAL THEORY (SOCIALIST TRADITION)</b></p> <ul style="list-style-type: none"> <li>• Explain Marxist approach to the study of politics.</li> <li>• Describe Gramsci’s view on the question of relative autonomy of the State.</li> <li>• Describe socialist perspective on freedom and democracy.</li> <li>• Explain theory of Revolution with special reference to Lenin and Mao.</li> <li>• Explain Marxian theory of Party, Lenin’s contribution and Lenin-Rosa Luxemburg Debate on Party.</li> </ul> <p><b>CORE PAPER 4: COMPARATIVE CONSTITUTIONAL SYSTEM</b></p> <ul style="list-style-type: none"> <li>• Write down the detail typology of Constitutional Systems.</li> <li>• Write down the detail description of the composition and functions of the Legislature in UK and PRC; second chamber in USA; role of speakers in parliamentary and presidential systems (UK and USA).</li> <li>• Write down the detail description of the executive in UK, USA and PRC.</li> <li>• Describe the relations between executive and legislature in UK, USA and PRC.</li> <li>• Describe the judiciary in UK, USA and PRC (with special reference to the procuratorate).</li> <li>• Describe the Rights of the citizens of UK, USA and PRC and the Duties of the citizens of PRC.</li> </ul> <p><b>GENERIC : FOR THE STUDENTS OF OTHER DISCIPLINE</b></p> <p><b>COMPARATIVE GOVERNMENT AND POLITICS</b></p> <ul style="list-style-type: none"> <li>• Understanding comparative politics.</li> <li>• Explain political system.</li> <li>• Explain typologies of constitutional system with special reference to U.K., U.S.A., P.R.C</li> </ul> <p><b>ABILITY ENHANCEMENT COMPULSORY PAPER 2 : COMPULSORY LANGUAGE (ENGLISH/HINDI/ BENGALI) as per the syllabus framed by the respective departments.</b></p>
	<p><b>CORE PAPER 5: WESTERN POLITICAL THOUGHT (ANCIENT AND MEDIEVAL)</b></p> <ul style="list-style-type: none"> <li>• A brief outline of the background of Western Political Thought with special emphasis on Stoics and Sophists.</li> <li>• Explain Greek Political Thought: <ul style="list-style-type: none"> <li>a) Plato – Theory of justice</li> </ul> </li> </ul>

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b) Aristotle – Concepts of state and constitution

- Explain the Roman Political Thought and the features of Medieval Political Thought in Europe
- Explain the Post-Medieval Political Thought in Europe with special reference to Niccolò Machiavelli – Secularization of politics.
- Explain Jean Bodin's theories of state and sovereignty.

**CORE PAPER 6 – INDIAN POLITICAL THOUGHT**

- Explain Kautilya's Political Thought with special reference to Saptanga, and Dandaniti.
- Describe a broad outline of Medieval Political Thought in India
- Describe Rammohan Roy's view on rule of law, and freedom of thought
- Explain Bankim Chandra's views on nationalism.
- Describe Rabindranath Tagore's critique of nationalism.
- Describe Swami Vivekananda's Nationalism
- Describe Gandhi's view on Swaraj and trusteeship.
- Describe Ambedkar's view on social justice.

**CORE PAPER 7 : POLITICAL SOCIOLOGY**

- Explain the nature and scope of Political Sociology
- Describe in detail the basic concepts :
  - a) Social Stratification and Politics: Caste, class and elite
  - b) Power, Influence, and Authority.
  - c) Political Culture
  - d) Political Socialization
  - e) Social Mobility, Political parties and Pressure groups.

**OPTIONAL : SKILL ENHANCEMENT PAPER**

**1: DEMOCRATIC AWARENESS WITH LEGAL LITERACY**

- Explain briefly fundamental rights, fundamental duties, other constitutional rights
- Explain the laws relating to dowry, sexual harassment and violence against women ; laws relating to consumer rights and cyber crimes
- Write down anti-terrorist laws its Implication for security and human rights; system of courts/ tribunals and their jurisdiction in India – criminal and civil courts, writ jurisdiction, specialized courts such as juvenile courts, Mahila courts and tribunals; alternate dispute such as Lok Adalats, non-formal mechanisms

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2/9/2021



	<p><b>GENERIC : FOR THE STUDENTS OF OTHER DISCIPLINE</b></p> <p>1. NATIONALISM IN INDIA</p> <ul style="list-style-type: none"> <li>• Comparative study of nationalism in the West and the Colonial World.</li> <li>• Emergence of nationalist politics with special reference to the ‘drain theory’</li> <li>• Studying the origin of Indian National Congress with special reference to moderate- extremist division.</li> <li>• Explaining major nationalist movements under Gandhi’s leadership viz., Non-cooperation, Civil Disobedience, Quit India Movement.</li> <li>• Studying Communal Politics in India : Muslim League and Hindu Mahasabha</li> <li>• Explaining Leftist Politics, Conflict between Congress and Muslim League, two nations theory.</li> </ul>
<p>4<sup>TH</sup></p>	<p><b>CORE PAPER 8: MODERN WESTERN POLITICAL THOUGHT</b></p> <ul style="list-style-type: none"> <li>• Explain : <ul style="list-style-type: none"> <li>a) Thomas Hobbes: Materialism, Human nature, and Sovereignty.</li> <li>b) John Locke: Natural rights, and Property.</li> <li>c) J.J. Rousseau: Concept of General Will.</li> <li>d) Hegel: Dialectics and State.</li> <li>e) Karl Marx and Fredrick Engels: Dialectical and Historical Materialism.</li> <li>f) Jeremy Bentham: Utilitarianism</li> <li>g) J.S. Mill: Utilitarianism, and Liberalism</li> </ul> </li> </ul> <p><b>CORE PAPER 9: INDIAN GOVERNMENT AND POLITICS</b></p> <ul style="list-style-type: none"> <li>• Describe the role of the Constituent Assembly in framing Indian Constitution.</li> <li>• Explain : <ul style="list-style-type: none"> <li>a) The Preamble.</li> <li>b) Fundamental Rights and Duties;</li> <li>c) Directive Principles of State Policy.</li> <li>d) Nature of Indian Federalism: Union-State relations.</li> <li>e) Union Executive: President and Vice-President – Election, power and position. Prime Minister – Power and position; Council of Ministers; Relationship of President and Prime Minister.</li> <li>f) Union Legislature: Rajya Sabha and Lok Sabha: Composition and functions; Speaker.</li> <li>g) The Judiciary: Supreme Court and High Courts – Compositions and functions</li> <li>h) Constitutional amendment: Procedures;</li> <li>i) Electoral reforms.</li> </ul> </li> </ul>

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**CORE PAPER 10: BASIC THEORIES OF INTERNATIONAL RELATIONS**

- Explain the basic concepts of International Relations:
  - (a) National power,
  - (b) Balance of power,
  - (c) Collective security,
  - (d) Bipolarity,
  - (e) Unipolarity,
  - (f) Multipolarity,
  - (g) National interest, and
  - (h) Globalization.
- Describe :
  - a) Realism as an approach to the study of International Relations.
  - b) Liberalism as an approach to the study of International Relations.
  - c) World System as an approach to the study of International Relations.
- Describe various techniques of implementation of Foreign Policy viz., Diplomacy, Propaganda and Foreign Aid.

**OPTIONAL : SKILL ENHANCEMENT PAPER**

**1: LEGISLATIVE PRACTICES AND PROCEDURES**

- Describe the powers and functions of people's representative at different tiers of governance; State Legislative Assemblies ;functionaries of rural and urban local governance
- Explain the legislative process of making of a law
- Write down the types and role of Legislative Committees
- Overview of Budget Process
- Explain the types of media and their significance for legislators

**GENERIC : FOR THE STUDENTS OF OTHER DISCIPLINE**

**1. POLITICS OF GLOBALISATION**

- Define globalisation
- Describe the impact of globalization on Indian economy.
- Explain the link between globalization and terrorism, new international order.
- Explain the cultural change due to globalization.

**CORE PAPER 11 : WORLD POLITICS: ORGANIZATIONS AND ISSUES**

- Explain Cold War and its major events.
- Describe:

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- a) The United Nations; its General Assembly, and Security Council
- b) Reform of the UN.
- c) International Financial Institutions viz., World Bank, and IMF.
- d) Regional Organizations viz., SAARC, and ASEAN, AU, SCO, BIMSTEC, Gulf Cooperation Council.

- Analyse the emerging issues in Post-Cold War era:

- a) Development and Environment.
- b) Human Rights: UNDHR
- c) Energy Security and Terrorism

### **CORE PAPER 12: BASIC THEORIES OF PUBLIC ADMINISTRATION**

- Explain the nature, scope and evolution of Public Administration
- Differentiate between Private and Public Administration.
- Explain the major concepts of organization:
  - (a) Hierarchy,
  - (b) Unity of Command,
  - (c) Span of Control,
  - (d) Authority,
  - (e) Centralization, Decentralization, and Delegation,
  - (f) Line and Staff.
- Describe bureaucracy with special reference to Marx and Max Weber.
- Describe development administration of Fred W. Riggs.
- Describe decision making model of Herbert Simon.

### **DISCIPLINE SPECIFIC ELECTIVE**

#### **1. HUMAN RIGHTS: THEORY AND PRACTICE**

- Write down the meaning and a brief history of human rights (UDHR)
- Explain the concept of terrorism and counter-terrorism and the impact of terrorism on Human Rights.
- Write down the provisions provided by the Indian Constitution to protect human rights
- Explain the National Human Rights Commission – Composition and functions.
- Explain the evolution, nature, challenges and prospects of Human Rights Movements in India

#### **2. SOCIAL MOVEMENTS IN CONTEMPORARY INDIA**

- Explain the meaning and features of Social movements in contemporary India,.
- Differentiate between Social Movement and New Social Movement
- Describe Peasant Movements in India with special reference to Telengana and

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	<p>Singur</p> <ul style="list-style-type: none"> <li>• Describe Tribal Movements in India viz., POSCO and Niyamgiri</li> <li>• Describe Environmental Movements in India viz., Chipko, Narmada Bachao and Silent Valley</li> </ul>
<p>6<sup>TH</sup></p>	<p><b>CORE PAER 13: LOCAL GOVERNMENT IN WEST BENGAL</b></p> <ul style="list-style-type: none"> <li>• Write down the evolution of Rural and Urban local government in West Bengal since independence</li> <li>• Describe the structure and functions of Panchayati Raj Institutions in the light of the 73rd Constitution (Amendment) Act, 1992.</li> <li>• Describe the structure and functions of urban local governments under the 74th Constitution (Amendment) Act, 1993 and the West Bengal Municipality Act, 1993.</li> <li>• Discuss the issue of local government and empowerment of women, SCs, and STs.</li> <li>• Discuss the State-Local Government Relations: Financial control of the State.</li> </ul> <p><b>CORE PAPER 14 : PROJECT</b></p> <ul style="list-style-type: none"> <li>• Write down a project from within the discipline of Political Science and its allied subjects.</li> </ul> <p><b>DISCIPLINE SPECIFIC ELECTIVE</b></p> <p><b>1. UNDERSTANDING GLOBAL POLITICS</b></p> <ul style="list-style-type: none"> <li>• Explain the evolution of the state system and the concept of sovereignty.</li> <li>• Describe the global economy; Bretton woods institutions and W.T.O.; Transnational economic actors; global poverty; Millennium Development Goals and unfulfilled promises.</li> </ul> <p><b>2. UNDERSTANDING SOUTH ASIA</b></p> <ul style="list-style-type: none"> <li>• Explain:       <ol style="list-style-type: none"> <li>a) The strategic importance of South Asia in Global Politics as a region.</li> <li>b) Border conflict between India and Pakistan and India and China.</li> <li>c) Democracy and State system in South Asia with special reference to Nepal, Bhutan, Pakistan, Bangladesh, Maldives and Sri Lanka.</li> <li>d) Ethnic conflicts in South Asia with special reference to Sinhala- Tamil conflict in Sri Lanka and Baluchistan problem in Pakistan.</li> <li>e) Regional integration in South Asia: SAARC</li> </ol> </li> </ul>

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## Department of History

### Course: B.A. Honours and Program in History

1 <sup>st</sup> and 2 <sup>nd</sup> Semester	<ol style="list-style-type: none"><li>1. A primary understanding of history, its meaning and significance in modern times.</li><li>2. Studying various institutions, practices and events of the past and situating them within their respective contexts.</li><li>3. Understanding the factors that shape history writing.</li></ol>
3 <sup>rd</sup> and 4 <sup>th</sup> Semester	<ol style="list-style-type: none"><li>1. Applicability of historical knowledge in the present day society.</li><li>2. Seeking the truth amidst myriad contradictory and conflicting sources.</li><li>3. Comprehending the social transition.</li></ol>
5 <sup>th</sup> and 6 <sup>th</sup> Semester	<ol style="list-style-type: none"><li>1. A comprehensive understanding of the happenings in India and the world from the ancient till the contemporary times.</li><li>2. Adopting an interdisciplinary approach and studying history in conjunction with language, literature and other social sciences.</li></ol>

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# Department of Geography

## Course: B.Sc. Honours and Program in Geography

Semester	COURSE OUTCOME
1 <sup>st</sup> and 2 <sup>nd</sup> Semester	<ul style="list-style-type: none"> <li>• Students will acquire an understanding of the various tectonic processes, geomorphologic processes and got a clear perception about various theories that made our earth.</li> <li>• Students will learn to prepare and to analyze their own the geological maps which make them a clear understanding of different geological features of the earth surface. They also learn to prepare land use maps on the basis of various surveying instruments.</li> </ul>
3 <sup>rd</sup> and 4 <sup>th</sup> Semester	<ul style="list-style-type: none"> <li>• Understand the elements of weather and its impacts at different scale</li> <li>• Comprehend the climatic aspects and its bearing on planet earth</li> <li>• Understand the oceanic process and availability of resources</li> <li>• Understand the physical profile of the country</li> <li>• Study the resource endowment and its spatial distribution and utilization for sustainable development</li> <li>• Synthesis and develop the idea of regional dimension</li> <li>• Appreciate the strength and application of remote sensing</li> <li>• Map the resources, their location and availability using GIS software</li> <li>• Apply this knowledge for sustainable development at local to global level</li> <li>• Gain knowledge about drawing of longitudinal sections and interpretation of structure of the geological maps</li> <li>• Predict soil fertility (NPK, PH)</li> <li>• Acquire practical knowledge about the application of various metrological instruments</li> <li>• Interpret and predict the climatic condition of an area</li> <li>• Understand various types of maps and their elements</li> <li>• Understand how projections are applied to prepare maps from the globe</li> <li>• Learns prepare maps from geographic data and their interpretations</li> <li>• Understand the need of regional planning methodology</li> <li>• Know the history of various planning strategies for balanced national development</li> <li>• Capable of diagnosing the regional issues</li> <li>• Know different types of economic activities and their utilities</li> <li>• Understand the theories that are relevant to contemporary world</li> <li>• Examine the importance of economic initiatives that are crucial to development</li> </ul>

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	<ul style="list-style-type: none"> <li>• Understand the relationship between man and environment</li> <li>• Have a good understanding on distribution, utilization and proper management of natural resources</li> <li>• Know about the necessities that are prerequisite for assessment and review of planning and politics</li> <li>• Develop the skill so as to use digital satellite data using software</li> <li>• Prepare the maps based with satellite data to compare with the ground realities</li> <li>• Classify digital data for the land use/land cover and urban studies</li> <li>• Have sound knowledge regarding the classification and elements of maps</li> <li>• Have proper utilization of maps for explaining geographical issues</li> <li>• Know the methods of preparation of various thematic maps.</li> <li>• Appreciate the structure and function of ecosystem with example</li> <li>• Understand the environmental problems and relevant management strategies</li> <li>• Acquire knowledge about the environmental policies and the need to revise policies to tackle the environmental issues of India, in particular</li> <li>• Appreciate the development and use of aerial and satellite remote sensing system and navigation satellite system in India and other nations</li> <li>• Understand the basics of EMR and energy interaction in atmosphere and on earth surface features</li> <li>• analyze and interpret the aerial and satellite data products and GNSS/GPS survey results</li> <li>• Students will have a clear understanding of the regional geographical approaches of India in general and West Bengal in particular.</li> </ul>
<p><b>5<sup>th</sup> and 6<sup>th</sup> Semester</b></p>	<ul style="list-style-type: none"> <li>• They will also be able to find out the relation between geography, environment and human society.</li> <li>• Students will be able to synthesize geographic knowledge and apply geographic research techniques in preparing urban land use map and to short out the different local environmental issues.</li> <li>• At the end of the course, students will learn to prepare and to analyze their own maps on the basis of statistical data and will able to analyze spatial data.</li> <li>• The students will be able to clear the understanding about the environmental and resource management policies.</li> <li>• They will also be able to find out the relation between geography, environment and human society.</li> </ul>

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2/9/2021



## Department of Philosophy

### Course: B.A. Honours and Program in Philosophy

1st & 2nd Semester	<ol style="list-style-type: none"><li>1. Some general knowledge of Indian and western philosophy. Vedas, Upanishad, theory of Knowledge, Theory of metaphysics and Ideas.</li><li>2. Some Psychological issues e.g., Consciousness, Memory, Attention.</li></ol>
3rd and 4th Semester	<ol style="list-style-type: none"><li>1. Some ethical concept- Indian and Western. Some Psychological concept, Concept of Religion and relation of Philosophy and Religion.</li><li>2. Some knowledge of socio-political ideas. Some Logical concept -Indian and western, Logical analysis, <i>purusartha</i>.</li></ol>
5th and 6th Semester	<ol style="list-style-type: none"><li>1. Some contemporary issues of Philosophy- Indian and western, Idealism, Definite Description, Ahimsa, Nature of God, Nature of the world, Practical Vedanta.</li><li>2. Some problems of Philosophy- Knowledge, Sense-data, Value of Philosophy, Necessity and application of Philosophy.</li></ol>

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## Department of Sociology

### Course: B.A. Honours and Program in Sociology

1st & 2nd Semester	<p>The course <b>Introductory Sociology</b> introduces the discipline to students from diverse academic and social backgrounds, trainings and capabilities. The course is intended to introduce the students to a sociological way of thinking. They learn how to apply sociological concepts to the everyday life. The students learn to apply the sociological perspective in understanding how society shapes our individual lives.</p> <p>The second paper <b>Classical Sociology</b> enable students to apply theory to their own everyday life experiences. This requires that students develop their sociological imagination and the capacity to read each situation sociologically and then to think about it theoretically.</p> <p><b>Classical Sociology-II</b> paper helps in understanding the grand foundational themes of sociology. Application of theories and concepts from classical sociological theories to develop intellectual openness and curiosity.</p> <p>In <b>Introductory Sociology-II</b> students can apply sociology in greater society to make awareness among the common people. They can play a vital role in shaping the society in a right way. It will provide a foundation for the further study of Sociology.</p>
3rd Semester	<p>The course <b>Research Methodology and Statistics-I</b> introduces students how sociological research is conducted by following particular method and applying a set of techniques. As a rule, sociologists try to be as systematic as possible in carrying out their research. The students come to know about a variety of methods and techniques that could be applied in empirical research.</p> <p>The course <b>Indian Society – I</b> is meant to acquaint the under graduate students with the development of the modern Indian society from the British colonial period to its contemporary stage. The course introduces the distinctive features and peculiar aspects of Indian society, and discusses the dynamics of social change within the framework of colonial/postcolonial perspectives.</p> <p><b>Sociological Theory</b> enables students to analyze society from a variety of perspectives involved in sociological thought. It also provides an overall understanding of the variety of sociological approaches.</p> <p>Along with the above courses the students are introduced to <b>Ethnography and</b></p>

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	<p><b>Field Research: Dissertation and Viva</b> in this Semester wherein students have to do a field research and collect data to analyze it. It is finally submitted in the form of a dissertation.</p>
4th Semester	<p><b>Indian Social Thought-I</b> ensure that students have conceptual clarity and can articulate the main debates and arguments with regard to sociology in India.</p> <p>Acquaint the students to the continuities and contradictions in Indian society. To ensure that students have understood the formation of the discipline in India and the challenges that it has faced. To help students understand the history of ideas related to the analysis of Indian society.</p> <p><b>Indian Society- II</b> highlights on the various social problems of the society. Its nature, extent, causes and the various measures adopted to combat it.</p> <p><b>Introduction to Social Work</b> is the basic concepts of social work. This paper gives an overview of history of social work. Provide orientation about professional social work.</p> <p>The course <b>Gender Sensitization</b> introduces gender as a critical sociological lens of enquiry in relation to various social fields. It also interrogates the categories of gender, sex, and sexuality. Raising key issues of power and subordination within the purview of gender and the need for and solutions resorted to as measures to initiate change through gender-based movements.</p>
5th and 6th Semester	<p>Some contemporary issues of sociology discussed like</p> <ol style="list-style-type: none"> <li>1. Problem of unemployment and poverty</li> <li>2. Problem of communalism</li> <li>3. Problem of women and child marriage</li> <li>4. Techniques for conducting research in sociology</li> </ol>

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## Department of Physics

### Course: B.Sc. Honours and Program in Physics

1 <sup>st</sup> Sem	<p><b>Mathematical methods I:</b> This course will give the students an initial mathematical foundation required for further studies in Physics. They get familiar with techniques for solving problems related to vector algebra, linear algebra, calculus, ordinary and partial differential equations, probability distributions, determinant and matrices.</p> <p><b>Mechanics:</b> Learning this course the students get acquainted with the system of particles under Newtonian mechanics, different types of coordinate systems used for solving problems, concepts about various general properties of bulk matter and also different types of simple harmonic oscillations with and without damping as well as forced oscillations.</p>
2 <sup>nd</sup> Sem	<p><b>Mathematical methods II:</b> Studying this course the students become familiar with different types of special functions, complex variables and special integrals which will help them solving various problems in Physics.</p> <p><b>Electricity and Magnetism:</b> Electricity and Magnetism are not only important for Physics but also for all science disciplines.</p> <ul style="list-style-type: none"><li>(i) Knowledge of this topic will help the students of any branch of science to have a good grasp of the functioning of various instruments/equipments used in his/her particular field. Most measuring devices in various scientific branches have electrical and magnetic components.</li><li>(ii) Students will get an opportunity to become familiar with the concepts of sources of electric and magnetic fields.</li></ul>
1 <sup>st</sup> and 2 <sup>nd</sup> Sem (LAB):	<p>Performing these experiments, the students get hand-to-hand knowledge of the application of various theories of Mechanics and DC current. Programming using C/C++ languages will help them for solving problems in further studies in Physics.</p>

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2/9/2021



<p>3<sup>rd</sup> Sem</p>	<p><b>Classical Mechanics and Special Theory of Relativity:</b>  This course will help the students by providing</p> <ul style="list-style-type: none"> <li>(i) a clear idea about the mechanics of rotating systems and motion of particles under central forces,</li> <li>(ii) an introduction of the Lagrangian and the Hamiltonian formulations of Classical Mechanics,</li> <li>(iii) a basic idea on Einstein's special relativity and its implications for particles moving with velocity very close to the value of <math>c</math> (light velocity in vacuum).</li> </ul> <p><b>Thermal Physics I:</b>  This course can give the students an in-depth knowledge about</p> <ul style="list-style-type: none"> <li>(i) the molecular motion inside an ideal and a real classical gas,</li> <li>(ii) various processes of heat transfer.</li> </ul> <p><b>Analog Systems and Applications:</b>  Studying this course the students get acquainted with</p> <ul style="list-style-type: none"> <li>(i) the electronic transport mechanisms through intrinsic and extrinsic semiconductors,</li> <li>(ii) the theory of junction diodes, and transistors,</li> <li>(iii) the applications of diodes as rectifiers and transistors as amplifiers.</li> </ul>
	<p><b>SEC:</b></p> <p>The aim of the course on “<b>Electrical circuit network skills</b>” is to make the students familiar with various active and passive circuit elements and their use in AC/DC devices and circuits.</p> <p>The course on “<b>Technical Drawing Skill</b>” enables the students to understand the method of engineering drawing and their interpretation through fundamental technical mathematics.</p>

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2/9/2021



4 <sup>th</sup> Sem	<p><b>Electromagnetic Theory:</b> After completion of this course, the students get acquainted with the</p> <ul style="list-style-type: none"> <li>(iii) the basics of electromagnetic wave, its way of propagation through isotropic/anisotropic dielectric media as well as in conducting media,</li> <li>(iv) the electromagnetic theory of modern-day communication systems such as optical fibres and waveguides,</li> <li>(v) the applications of electromagnetic principles for explanation of various phenomena like dispersion, scattering etc.</li> </ul> <p><b>Wave Optics:</b> The aim of this course is to give the students a clear idea about</p> <ul style="list-style-type: none"> <li>(i) the results of the linear superposition of two or more collinear and perpendicular simple harmonic oscillations,</li> <li>(ii) details of various optical phenomena like interference, diffraction, polarization.</li> </ul> <p><b>Digital Systems and Applications:</b> This course will help the students to</p> <ul style="list-style-type: none"> <li>(i) work with binary logic and apply it to real-life problems,</li> <li>(ii) get idea about combinational and sequential logic circuits – their analysis, design and implementation,</li> <li>(iii) gain knowledge about the working of computers.</li> </ul> <p><b>SEC:</b> The aim of the course on “<b>Basic instrumentation skills</b>” is to make the students familiar with the working principles and operations of various modern equipment like multimeter, CRO, signal generator, AC millivoltmeter etc. Completion of the course on “<b>Computational Physics</b>”, the students will be acquainted with FORTRAN programming language, LATEX software etc.</p> <p><b>3<sup>rd</sup> and 4<sup>th</sup> Semester LAB:</b> Performing the experiments mentioned in the syllabus, the students get hand-to-hand knowledge of the application of various theories of Thermal Physics, Optics, Analogue and Digital Electronics.</p>
5 <sup>th</sup> & 6 <sup>th</sup> Sem.	Development of knowledge on quantum mechanics, advanced thermal physics, statistical mechanics and condensed matter physics. Specialized knowledge adopted through DSE courses like nuclear and particle physics, atomic physics, applied optics etc. Experimental knowledge on advanced level experiments on quantum physics.

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## Department of Mathematics

### Course: B.Sc. Honours and Program in Mathematics

SEM – I	Courses will enable the students to <ol style="list-style-type: none"><li>1. Understand various kinds of standard functions and graphs, techniques of integrations and limits.</li><li>2. Learn about real numbers and its basic properties.</li><li>3. Understand the concepts on three-dimensional geometry.</li><li>4. Understand the genesis of ordinary differential equations.</li><li>5. Understand the various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order.</li><li>6. Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots.</li><li>7. Employ De Moivre's theorem in a number of applications to solve numerical problems.</li><li>8. Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.</li><li>9. Find eigenvalues and corresponding eigenvectors for a square matrix.</li></ol>
SEM – II	Course will enable the students to <ol style="list-style-type: none"><li>1. Learn the Picard's method of obtaining successive approximations of solutions of first order ordinary differential equations.</li><li>2. Know how to solve linear homogeneous and non-homogeneous equations of higher order with constant coefficients.</li><li>3. Understand the system of linear differential equations and the solution techniques.</li><li>4. Learn conceptual differences between usual solution and power series solution of some second order ODEs.</li><li>5. Understand the theory and applications of vector analysis.</li><li>6. Understand many properties of the real line <math>\mathbb{R}</math> and learn to define sequence in terms of functions from <math>\mathbb{R}</math> to a subset of <math>\mathbb{R}</math>.</li><li>7. Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.</li><li>8. Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.</li><li>9. Understand the theory and concepts of Riemann integration.</li><li>10. Understand the applications of the fundamental theorems of integration.</li></ol>

*Shashi*  
2/9/2021



SEM – III

## Multivariable Calculus

This Course will enable the students to

1. Learn conceptual differences while advancing from one variable to several variables in calculus.
2. Apply multivariable calculus in various optimization problems.
3. Understand inter-relationship amongst the line integral, double and triple integral formulations.
4. Visualise the structure of curves and surfaces in plane and space etc.
5. Learn the applications of multivariable calculus in different fields like Physics, Economics, Medical Sciences, Animation & Computer Graphics etc.
6. Realize importance of Green, Gauss and Stokes' theorems in other branches of Mathematics.

## Group Theory

This course will enable the students to:

1. Recognize the mathematical objects called groups.
2. Link the fundamental concepts of groups and symmetries of geometrical objects.
3. Explain the significance of the notions of cosets, normal subgroups, and factor groups.
4. Analyse consequences of Lagrange's theorem.
5. Learn about structure preserving maps between groups and their consequences.

## Probability & Statistics

This course will enable the students to:

1. Understand distributions in the study of the joint behaviour of two random variables.
2. Establish a formulation helping to predict one variable in terms of the other that is correlation and linear regression.
3. Understand central limit theorem, which establish the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell-shaped curve.

## SEC-I

## Mathematical Logic

1. Understand the syntax of first-order logic and semantics of first-order languages
2. Understand about truth table, different propositions, predicates and quantifiers, basic Theorems like the Compactness Theorem, Meta Theorem and Post Tautology Theorem.
3. Grasp the concept of completeness interpretations and their applications with special stress on applications in Algebra.

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	<p style="text-align: center;"><b>Programming Language in C</b></p> <ol style="list-style-type: none"> <li>1. Acquire knowledge of different computer languages.</li> <li>2. Understand basic structure, characters, keywords, identifiers, data types, operators, expressions, etc. in C language.</li> <li>3. Write flow chart and corresponding C-program for solving problems requiring decision making, branching, looping and other control statements.</li> <li>4. Learn to implement arrays and functions in C programming. Familiarise with the concepts of structure, union and pointers.</li> </ol>
SEM – IV	<p style="text-align: center;"><b>Mechanics</b></p> <p>This course will enable the students to:</p> <ol style="list-style-type: none"> <li>1. Familiarize with subject matter, which has been the single centre, to which were drawn mathematicians, physicists, astronomers, and engineers together.</li> <li>2. Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body.</li> <li>3. Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight.</li> <li>4. Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particles.</li> <li>5. Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.</li> </ol> <p style="text-align: center;"><b>Linear Algebra</b></p> <p>This course will enable the students to:</p> <ol style="list-style-type: none"> <li>1. Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.</li> <li>2. Relate matrices and linear transformations, compute eigen values and eigen vectors of linear transformations.</li> <li>3. Learn properties of inner product spaces and determine orthogonality in inner product spaces.</li> <li>4. Realise the importance of adjoint of a linear transformation and its canonical form.</li> </ol>

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	<p style="text-align: center;"><b>Partial Differential Equations and Calculus of Variations</b></p> <p>This course will enable the students to:</p> <ol style="list-style-type: none"> <li>1. Understand the geometric and physical nature of Partial Differential Equations and classify them accordingly.</li> <li>2. Apply a range of techniques to solve first &amp; second order partial differential equations.</li> <li>3. Model physical phenomena using partial differential equations such as the heat and wave equations.</li> <li>4. Understand problems, methods and techniques of calculus of variations.</li> </ol> <p style="text-align: center;"><b>SEC-2</b></p> <p style="text-align: center;"><b>Course Name: Graph Theory</b></p> <p>This course will enable the students to:</p> <ol style="list-style-type: none"> <li>1. Appreciate the definition and basics of graphs along with types and their examples.</li> <li>2. Understand the Eulerian circuits, Eulerian graphs, Hamiltonian cycles, representation of a graph by matrix.</li> <li>3. Relate the graph theory to the real-world problems</li> </ol> <p style="text-align: center;"><b>Object Oriented Programming in C++</b></p> <p>This course will enable the students to:</p> <ol style="list-style-type: none"> <li>1. Understand the basic characteristics of object-oriented programming languages, different components and structures in C++ programming language.</li> <li>2. Understand and apply the programming concepts of C++ which is important for mathematical investigation and problem solving.</li> <li>3. Use mathematical libraries for computational objectives.</li> </ol> <p>Represent the outputs of programs visually in terms of well formatted text and plots.</p>
SEM – V & VI	<p>These Sem provides some advance courses which helps students to choose a suitable path for advancement of their academic carrier.</p> <p>Courses like Topology, Functional Analysis motivate student doing research in Pure Mathematics</p> <p>Courses like Discrete Mathematics, Graph Theory, Computer Programming helps students doing research in the fields of Computer Science, Cryptography etc.</p>

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## Department of Chemistry

Course: B.Sc. Honours and Program in Chemistry

<b>B.Sc. (Honours in Chemistry)</b>	<b>1<sup>st</sup> Semester:</b> <ul style="list-style-type: none"><li>• <b>Inorganic:</b> Students learn about the scientific theory of atoms, concept of wave function, elements in periodic table &amp; their physical and chemical characteristics, periodicity, bonding and structure of the molecules, molecular orbital theory of covalent compounds to get a comprehensive idea on these fundamental topics.</li><li>• <b>Organic:</b> Students gain the basic idea about organic chemistry which includes structure, bonding, and nomenclature of the organic molecules and also about the reactivity, intermediates, reaction mechanisms, stereochemistry, and conformational analysis chemistry of aliphatic &amp; aromatic hydrocarbons.</li></ul>
	<b>2<sup>nd</sup> Semester:</b> <ul style="list-style-type: none"><li>• <b>Physical:</b><ul style="list-style-type: none"><li>• Students gain a detailed knowledge about some fundamental topics such as: properties of gas, properties of liquids and properties of solids, ionic equilibrium.</li></ul></li><li>• <b>Organic:</b> Student gets the idea about substitution reaction, addition reaction, basic use of reaction mechanism, some name reactions and their mechanism, preparation and uses of various classes of organic compounds, organometallic compounds and their use and the use of reagents in various transformation.</li></ul> <b>Practical:</b> <ul style="list-style-type: none"><li>• Students perform the experiments on surface tension and viscosity of liquids. Students get idea about qualitative analysis of organic compound which includes special element detection functional group detection and prepare their suitable derivative.</li></ul>
	<b>3<sup>rd</sup> Semester:</b> <ul style="list-style-type: none"><li>• <b>Inorganic Chemistry:</b> Student acquires basic knowledge about coordination compounds. They learn about nomenclature, various types of ligands, different types of isomerism (both geometrical and optical) in coordination chemistry, chelate effect, macrocyclic effect and their relation with the stability of the complex and also about applications of coordination complexes. Students are introduced to various concepts of acids and bases. They learn about HSAB concepts and relate to application in chemistry. They also get knowledge about the chemistry, reactivity and various properties of s- and p-block elements.</li><li>• <b>Physical Chemistry:</b> Students are introduced to First law of thermodynamics, ideas on Chemical kinetics, Electrochemistry, solubility product of sparingly soluble salt and interface &amp; Dielectrics.</li><li>• <b>Organic Chemistry:</b> Students get knowledge about the preparation, properties and some important reaction of aliphatic and aromatic nitrogen compound and their derivatives e.g. Gabriel's Phthalimide reaction, Hoffman degradation reaction, Mannich reaction, Carbyl ammine reaction, Hofmann Elimination reaction and they can prepare Diazomethane and use diazomethane for various synthetic applications. Students acquire the knowledge about the preparation and properties of five and six membered saturated</li></ul>

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2/9/2021



and unsaturated heterocyclic compound.

In this course student gain knowledge on polynuclear hydrocarbon like naphthalene, phenanthrene and anthracene. Their knowledge enriched with some rearrangement reaction e.g. Pinacol-Pinacolone, Benzil-benzilic acid, Damjanov, Arndt-Eistert, Dienone-phenol, Beckmann, Curtious, Losson, Schmidt, Bayer-Villiger, Dakin, Hofmann-Martious, Fischer-Hepp, Orton rearrangement and some name reaction like Birch, Von Richer, Houben-Hoesch, HVZ, Hunsdiecker, Oppenaur, Stephen and Williamson synthesis etc.

• **Industrial Chemistry:**

In this course students gain knowledge on different fields of industrial chemistry: preparation and uses of some specific inorganic compounds, knowledge on fire extinguisher, paints, varnishes, synthetic dyes, corrosion science, glass, ceramics and refractories.

**Practical Chemistry:**

- Students perform qualitative detection of some acid and basic radicals to get knowledge and practical experience about the radical analysis.
- Students perform the experiments on kinetics of decomposition  $H_2O_2$ , and solubility product of sparingly soluble salt.
- Students get acquainted with various name reactions, rearrangement reaction, aromatic nucleophilic substitution reaction and reagents including synthesis and properties of some important class of organic compounds

Students get knowledge and practical experience on quantitative estimation of glucose acetone and aniline.

**4<sup>th</sup> Semester:**

**Inorganic Chemistry:**

Students thoroughly learn about d and f block elements of periodic table and also gain a detailed knowledge on crystal field theory and magnetochemistry. They acquire knowledge about inorganic reaction mechanism, labile-inert complex, reaction mechanism on various substitution reaction, trans-/cis-effect and its consequences.

**Physical Chemistry:**

Students get knowledge on 2<sup>nd</sup> law of Thermodynamics and its application, Electrochemical cells. They are also taught chemical kinetics, phase Equilibria and colligative Properties.

**Organic Chemistry:**

Students get knowledge on different classes of organic compounds viz. carbohydrate, alkaloids and terpenoids. They are also taught UV, IR and NMR Spectroscopy. Students gain about the basic knowledge about pericyclic reaction by FMO approach.

**Fuel Chemistry:**

They acquired knowledge on fuel chemistry likes coals, petrochemicals and lubricant their properties and nature.

**Practical Chemistry:**

- Students get idea about how to identify some organic compound depending on their general reaction.
- Students learn to synthesize few simple, double and complex salts.
- Students perform the experiments on equilibrium constant, conductometric/potentiometric titrations of acid and base .

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2/9/2021



### 5<sup>th</sup> Semester:

**Inorganic:** Students gain basic knowledge about the concepts of redox potential and redox equilibria. This also provides the knowledge of redox titrimetric analysis.

- They are also exposed to the field of organometallic chemistry, role of metal ions in living systems and also some other aspects of Bioinorganic chemistry.

#### • **Organic:**

Students learn different spectroscopic methods of analysis including UV, IR and NMR techniques. Awareness about the use of green chemistry to cope up with environmental pollution is also focused in this course.

#### **DCE :**

- Students are introduced to the sources, effects remedial measures of different aspects of environmental pollution.
- Students are exposed to solid state chemistry. In this course they learn the basic concept of the different lattice structure, their defects, chemical bonding in solid.

#### **Practical:**

- Students prepare some organic compound and determine the melting point. Students get knowledge and practical experience on quantitative estimation of different metal ions by permanganometry, dichromatometry, iodometry and iodimetry methods of analysis.

### 6<sup>th</sup> Semester:

#### **Inorganic:**

- A detailed study on crystal field theory and magnetochemistry will help the student to get a thorough knowledge on coordination chemistry.
- A comprehensive knowledge is developed by studying the content of the course: analytical chemistry, solvent extraction principle, extraction equilibria etc. and also about complexometric titration. Students also learn about the application in analytical chemistry.

#### • **Physical:**

In this semester Students learn on quantum chemistry, photochemistry & spectroscopy and symmetry and group theory and Colligative property and Phase Equilibrium.

#### **DCE:**

- Students are exposed to newer and modern approaches to dynamic stereochemistry, nano chemistry, quantum chemistry and spectroscopy.

#### **Practical:**

- Students get knowledge and practical experience on quantitative estimation of few metal ions by complexometric and gravimetric methods of analysis. They also acquire practical knowledge on solvent extraction process.

Students perform the experiments on kinetics of saponification of ester, verification of Ostwald dilution law and determination of indicator constant of methyl red.

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2/9/2021



<b>B.Sc. Program</b>	<ul style="list-style-type: none"><li>• Students acquire knowledge about the basic and fundamental inorganic and organic chemistry.</li><li>• A comprehensive knowledge is developed by studying the content of physical chemistry course.</li><li>• To provide a systemic understanding of chemical analysis, principles and theories and to help the students to understand and grasp things quickly, students gather knowledge by doing hands-on practical experiments on organic functional group detection, inorganic radical determination, titration and estimation of metal salt etc.</li><li>• Students acquire knowledge on the versatile field of chemistry like various industrial chemistry and their applications, cosmetic chemistry and their various components, analytical chemistry, basic concept of green chemistry, macromolecular or polymer chemistry, advance inorganic chemistry etc.</li></ul>
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2/9/2021

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## Department of Computer Science

### Course: B.Sc. Honours and Program in Computer Science

1. Introductory knowledge about the syntax and semantics of C/C++-Language Implementation of simple mathematical and logical problem using C. Theoretical knowledge on Digital Logic and its practical implementation in hardware laboratory. Introduction and basic conception on computer architecture.
2. Theoretical knowledge on discrete structure. Thorough idea of data structures and implementation of various data structure operations using C/C++-language.
3. A detailed study on Analysis of Algorithms. A detailed study on Automata theory and Computer Architecture & Organization. Theoretical knowledge on Operating System. Practical knowledge of using UNIX operating system and implementation of simple problems using shell programming. Theoretical knowledge on Computer Networks and its practical implementation in laboratory. Practical implementation of any one from two skill enhancement alternatives Programming in Java and Python Programming.
4. A detailed theoretical knowledge of database management system and object-oriented programming. A practical approach of learning RDBMS using SQL and P/L SQL. Practical knowledge on object-oriented programming using C++, its application and implementation. A detailed theoretical study of software engineering. Practical implementation of any one from two skill enhancement alternatives Mobile Application Development and Web Programming.
5. Knowledge about object-oriented programming using C++, its application and implementation. A detailed theoretical knowledge of Computer Graphics and practical implementation of Graphics algorithms. Theoretical knowledge on any two from four alternatives Analysis of algorithm, Advanced Database Management System, Compiler Design and Artificial Intelligence.
6. Knowledge of core java and its implementation. Knowledge about Microprocessor and its application. Programming in 8085 microprocessor implementations using 8085 microprocessor kit. Theoretical knowledge on any two from five alternatives Optimization Technique, Advanced Computer Architecture, Animation & Multimedia, Cryptography & Network Security and Soft Computing.

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2/9/2021



## Department of Computer Application

### Course: Bachelor of Computer Application (Honours)

1. Introduction and basic conception on computer fundamentals, theoretical knowledge on Digital Logic and its practical implementation in hardware laboratory and practical knowledge on Word, Excel, PowerPoint and Access. Introductory knowledge about the syntax and semantics of C- Language Implementation of simple mathematical and logical problem using C. Mathematical overview on algebra, complex numbers, vector, analytical geometry etc.
2. Thorough idea of data structures and implementation of various data structure operations using C-language. A detailed idea on operating system. Practical knowledge of using UNIX operating system and implementation of simple problems using shell programming. Standard conceptual knowledge on accounting and costing.
3. Knowledge about object-oriented programming using C++, its application and implementation. A detailed theoretical knowledge of database management system and computer organization and architecture. Mathematical overview on differential and integral calculus. An approach to enhance the skills on reasoning and aptitude. A practical approach of learning RDBMS using SQL and P/L SQL.
4. Knowledge about object-oriented programming using CoreJava its application and implementation. A detailed theoretical knowledge of computer networking. A detailed study on Internet and web-technology. Mathematical approach of learning probability, statistics, numerical methods and algorithms. An approach for awareness of value and professional ethics.
5. A detailed theoretical study of software engineering, e-commerce and internet. Mathematical approach of learning probability, statistics, numerical methods and algorithms. Knowledge of core java and its implementation. An introductory approach of learning either cyber security or image processing or intelligent systems. A practical approach of web page designing using HTML and PHP.
6. Implementation of simple mathematical and logical problems using Python and C#.net programming language. Theoretical knowledge either on computer graphics, or theory of computation or cloud computing. Practical application of software development.

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2/9/2021



## Department of Botany

### Course: B.Sc. Honours and Program in Botany

1 <sup>st</sup> and 2 <sup>nd</sup> Semester	<p>Students gain knowledge about:</p> <ol style="list-style-type: none"><li>1. Study of Algae, their classification, evolution, variation in structures. Salient features of various classes and life cycles of different genera Under each class.</li><li>2. Position of Fungi in living system, salient features of fungal classes, Life cycles of different genera, Homothallism, Heterothallism, Parasexuality, economic importance of fungal kingdom.</li><li>3. Plant diseases, concept of parasitism, disease symptoms, defense Mechanism during infection, disease cycles and control measures. Concept of fungal toxin.</li><li>4. Origin and evolution of Bryophyta, classification and life histories of various genera. Concept of gametophyte and sporophyte and their evolution.</li><li>5. Concept and importance of palaeobotany, fossilization, types, Factors, geological time scale, importance of Palaeobotany.</li><li>6. Morphological features of Angiospermic plant organs and Embryological aspect of Angiosperm.</li><li>7. Anatomical nature of plant tissue systems, root stem transition, Primary and secondary growth and their anomalies.</li></ol>
3 <sup>rd</sup> Sem Hons	<p>Students gain knowledge about:</p> <ol style="list-style-type: none"><li>1. Plant Anatomy and plant body.</li><li>2. Adaptive and protective system</li><li>3. Apical meristem</li><li>4. Vascular cambium and Wood</li><li>5. Morphology of Angiosperm</li><li>6. Advance Morphology</li><li>7. Embryology</li><li>8. Palynology</li><li>9. Significance of plant systematics and Taxonomic hierarchy</li><li>10. Plant classification</li><li>11. Botanical nomenclature and system of classification</li><li>12. Phylogenetic systematics</li><li>13. Salient features of some families of Dicot and Monocot.</li></ol>

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2/9/2021



3 <sup>rd</sup> Semester (Program)	<p>Students gain knowledge about:</p> <ol style="list-style-type: none"> <li>1. Archegoniatae</li> <li>2. Bryophyta.</li> <li>3. Pteridophyta.</li> <li>4. Gymnosperm</li> </ol>
4 <sup>th</sup> Sem Hons	<p>Students gain knowledge about:</p> <ol style="list-style-type: none"> <li>1. Basic principles of Ecology and ecological factors</li> <li>2. Ecological adaptation and population ecology.</li> <li>3. Plant communities and Ecosystem</li> <li>4. Fundamental aspects of Ecology and phytogeography</li> <li>5. Utilization of plant wealth (Fibre, Sugar, Timber, oil, pulses, biofuels)</li> <li>6. Utilization of plants (Essential oil)</li> <li>7. Introduction to Pharmacognosy</li> <li>8. Utilization of plant wealth (Drug yielding plants)</li> <li>9. Principle of crop production</li> <li>10. Fundamentals of soil Science</li> <li>11. Agricultural Meteorology.</li> <li>12. Agricultural management and cultivation of some important crops.</li> </ol>
4 <sup>th</sup> Semester (Program)	<p>Students gain knowledge about:</p> <ol style="list-style-type: none"> <li>1. Significance of plant systematics and Taxonomic hierarchy</li> <li>2. Botanical nomenclature and system of classification</li> <li>3. Biometrics, Numerical Taxonomy and cladistics.</li> <li>4. Phylogenetic systematics</li> <li>5. Salient features of some families of Dicot and Monocot.</li> </ol>

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2/9/2021



5 <sup>th</sup> Sem Hons	<p>Students learn about:</p> <ol style="list-style-type: none"> <li>1. Water potential and other physiological potential.</li> <li>2. Photosynthesis and photorespiration.</li> <li>3. Phytochrome, Phytohormones and plant cycle.</li> <li>4. Metabolism.</li> <li>5. Principles of Genetics and Biology of inheritance.</li> <li>6. Extranuclear inheritance, Linkage and crossing over, chromosome mapping.</li> <li>7. Variation of chromosome number and structure, Mutation.</li> <li>8. Fine structure of gene, Gene interaction, population and evolutionary Genetics.</li> <li>9. Cellular fractionation and separation Techniques</li> <li>10. Characterization of Biomolecules.</li> <li>11. Visualization of molecules in living cells.</li> <li>12. Radiology, colorimetry and spectroscopy.</li> <li>13. General introduction.</li> <li>14. Method of crop improvement</li> <li>15. Quantitative inheritance.</li> <li>16. Inbreeding depression, heterosis, and crop improvement</li> </ol>
5 <sup>th</sup> semester (Program)	<p>Students learn about:</p> <ol style="list-style-type: none"> <li>1. Plant Anatomy</li> <li>2. Adaptive and protective system.</li> <li>3. Apical meristem</li> <li>4. Vascular cambium and wood.</li> <li>5. Water potential and other physiological potential.</li> <li>6. Photosynthesis and Photorespiration</li> <li>7. Phytochrome, phytohormones and plant cycle.</li> <li>8. Introduction and history.</li> <li>9. Method of cultivation.</li> <li>10. Storage and Nutrition.</li> <li>11. Food preparation.</li> </ol>

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2/9/2021



6 <sup>th</sup> Sem Hons	<p>Students learn about:</p> <ol style="list-style-type: none"> <li>1. Nucleic Acids- carrier of Genetic information and structure.</li> <li>2. Central Dogma and replication of DNA.</li> <li>3. Genetic code and Transcription.</li> <li>4. Processing and modification of RNA and translation.</li> <li>5. Plant Tissue Culture</li> <li>6. Enzymes and vectors for Genetic manipulation.</li> <li>7. Gene cloning and method of gene transfer.</li> <li>8. Major concerns and application of transgenic technology.</li> <li>9. Biostatistics.</li> <li>10. Data summarization and visualization.</li> <li>11. Descriptive statistics</li> <li>12. Correlation, Regression, statistical inference.</li> <li>13. Horticultural crops- conservation and management.</li> <li>14. Horticultural practices</li> <li>15. Ornamental plants, fruits, vegetables, Medicinal and aromatic plants.</li> <li>16. Post harvest technology.</li> </ol>
6 <sup>th</sup> Semester (Program)	<p>Students gain knowledge about:</p> <ol style="list-style-type: none"> <li>1. Cell structure and Function</li> <li>2. Cell organization</li> <li>3. Cell cycle and division</li> <li>4. Numerical and structural aberration of chromosome, and Mutation.</li> <li>5. Basic principle of Ecology.</li> <li>6. Ecological adaptation. Population ecology.</li> <li>7. Plant communities and Ecosystem.</li> <li>8. Fundamental aspects of Ecosystem and Phytogeography.</li> <li>9. History of gardening</li> <li>10. Ornamental plants</li> <li>11. Commercial floriculture</li> <li>12. Landscaping spaces.</li> </ol>

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## Department of Zoology

### Course: B.Sc. Honours and Program in Zoology

SEMESTER – I	<p><b>CORE COURSE I</b> Systematics &amp; diversity of life: Protists to Chordates: They came to know the basic concept of diversity of life with regard to protists, non-chordates and chordates. It helped to develop critical understanding of how animals changed from a primitive cell to a collection of simple cells to form a complex body plan. It helped them to understand biosystematics and procedure in taxonomy. They could easily identify the taxonomic status of the entire non-chordates up to chordates and discuss the evolutionary model of the group. They were introduced about some of the important and common protozoans, helminthes of parasitic nature causing diseases in human beings. To develop critical understanding how animals changed from a primitive cell to form a complex body plan.</p> <p><b>CORE COURSE II</b> Ecology: They came to know the evolutionary and functional basis of animal ecology. Understand what makes the scientific study of animal ecology a crucial and exciting endeavor. It also imparts knowledge to the student regarding various laws of ecology, types of ecosystem, population and community characteristics and dynamics CO<sub>2</sub>. Students gain fundamental knowledge of environmental pollutions due to toxic materials and their effects over ecosystem and learn about sustainable development.</p>
SEMESTER – II	<p><b>CORE COURSE III</b> Comparative anatomy &amp; Physiology of Non-Chordates: Students are able to develop an understanding of the basic process of classification on the basis of characters besides being able to differentiate the organisms belonging to different taxa. It helps the students in gaining knowledge of coordinated functioning of complex human body machine. Realize that very similar physiological mechanisms are used in very diverse organisms. They were able to describe the physiology of respiratory, renal, endocrine and reproductive systems to define normal and abnormal functions.</p> <p><b>CORE COURSE IV</b> Cell biology &amp; Histology: This course helped to make clear concept of functioning of the various cell organelles and their intricate cellular mechanisms involved. They understood the detailed knowledge of different pathways related to cell signaling and apoptosis thus enabling them to understand the anomalies in cancer and developed an understanding how cells work in healthy and diseased states and to give a 'health forecast' by analyzing the genetic database and cell information.</p>

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SEMESTER – III	<p><b>CORE COURSE V</b> Comparative Anatomy &amp; Physiology of chordates: The students learned about the different types of organ systems like digestive system, circulatory system, respiratory system, excretory system, nervous system in the body of different classes of vertebrates and the development of different types of organ systems. They also studied about different types of modifications of integument like hair, feathers, horn, scales etc, of some organs like ruminant stomach of cattle. Students also learned about different endocrine glands their function, and the role of different hormones in regulating of homeostasis of body. They also learned quantitative determination of carbohydrates and protein, hemoglobin, to identify different types of skeleton bone, scales of fishes and many more things.</p> <p><b>CORE COURSE VI</b> Genetics: Students came to know the basic concept of genetics when they studied Mendelian principle of inheritance. They knew how different traits passed from one generation to the next, and why some diseases occur in an individual if it occurred to any member of the family. They also learned about incomplete dominance, co-dominance, epistasis, multiple allelism and sex is determination and dosage compensation in human and <i>Drosophila sp.</i> They learned about different types of genetic diseases and chromosomal aberrations in human like Down syndrome, Klinefelter syndrome, Turner syndrome, Cri du chat, sickle cell anemia etc, their cause, symptoms etc; and inheritance of these genetic diseases following rules of inheritance via pedigree analysis. In practical they learned to identify the different mutants of <i>Drosophila sp.</i> etc.</p> <p><b>CORE COURSE VII</b> Biochemistry: Students learned about the structure of carbohydrates, proteins, lipids and fats and their metabolism through Glycolysis, Krebs cycle, Pentose phosphate pathway, Transamination, Deamination, Beta oxidation etc. They also understand the processes like glycogenesis, glycogenolysis, gluconeogenesis etc. They understand the concept of enzyme and enzyme action, enzyme kinetics, enzyme inhibition; and structure and function of immunoglobulin. They learned about the structure and function of DNA and RNA.</p>
SEMESTER – IV	<p><b>CORE COURSE VIII</b> Behavior and Chronobiology: The concept of behavior and chronobiology was new but it was of great interest to the students. The study of this paper opened their mind about the different behavioural aspects like altruism, selfishness, parental care, learning, territoriality, aggressiveness etc. in animals. They understand that for how much time an animal remain and forage for food in a food patch. They learned how animals select for a habitat. They came to know about mating behavior, defence etc in animals.</p> <p><b>CORE COURSE IX</b> Developmental biology and evolution</p>

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	<p>Be able to list the types of characteristics that make an organism ideal for the study of developmental biology. Be familiar with the events that lead up to fertilization. Be able to describe the first four rounds of cell division in different groups. Be able to describe the stages and cellular mechanisms for gastrulation. Able to understand difference between specification and determination.</p> <p>An insight to the overview of evolutionary biology, concept of organic evolution during pre- and post- Darwin era evolution and molecular biology- a new synthesis. A concept of – “from molecules to life”, life originated from RNA, introns as ancient component of genes. Understanding of the universal common ancestor and tree of life, three domain concept of living kingdom. Conceptualization of mode of speciation, evolution, systematics, biological classification, origination, extinction, and causes of differential rates of diversification and human evolution.</p> <p><b>CORE COURSE X</b> Molecular biology: An overview of DNA replication, recombination and repair of nucleic acid polymerization, accuracy during flow of genetic information. Understanding of post-transcriptional gene control and nuclear transport, evolution of introns, catalytic RNA, alternative splicing. An overview of protein synthesis. Detailed understanding of signaling pathways in malignant transformation of cells, cell transformation, role of oncogenes. Description of siRNA and miRNA basics, regulation of transcription and translation of proteins by miRNA.</p>
SEMESTER – V	<p><b>CORE COURSE XI</b> Molecular biology: An overview of DNA replication, recombination and repair of nucleic acid polymerization, accuracy during flow of genetic information. Understanding of post-transcriptional gene control and nuclear transport, evolution of introns, catalytic RNA, alternative splicing. An overview of protein synthesis. Detailed understanding of signaling pathways in malignant transformation of cells, cell transformation, role of oncogenes. Description of siRNA and miRNA basics, regulation of transcription and translation of proteins by miRNA.</p> <p><b>CORE COURSE XII</b> Developmental Biology: Be able to list the types of characteristics that make an organism ideal for the study of developmental biology. Be familiar with the events that lead up to fertilization. Be able to describe the first four rounds of cell division in different groups. Be able to describe the stages and cellular mechanisms for gastrulation. Able to understand difference between specification and determination.</p>
SEMESTER – VI	<p>Principles of Genetics: Comprehensive and detailed understanding of the chemical basis of heredity. Understanding about the role of genetics in evolution. The ability to evaluate conclusions that are based on genetic data. The ability to understand results of genetic experimentation in animals.</p>

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2/9/2021



**CORE COURSE XIV**

**Evolutionary Biology:**

An insight to the overview of evolutionary biology, concept of organic evolution during pre- and post- Darwin era evolution and molecular biology- a new synthesis. A concept of – “from molecules to life”, life originated from RNA, introns as ancient component of genes. Understanding of the universal common ancestor and tree of life, three domain concept of living kingdom. Conceptualization of mode of speciation, evolution, systematics, biological classification, origination, extinction, and causes of differential rates of diversification and human evolution.

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## Department of Microbiology

### Course: B.Sc. Honours in Microbiology

Semester	Course learning outcome
1 <sup>st</sup> semester	<ol style="list-style-type: none"><li>1. Students develop good knowledge of the development of the discipline of microbiology and the contributions made by prominent scientists in this field.</li><li>2. Students develop a very good understanding of the characteristics of different types of microbes, methods to classify these and basic tools to study these in the laboratory.</li><li>3. Students can explain the useful and harmful activities of the microbes.</li><li>4. Students can perform basic experiments to grow and study microbes in the laboratory</li><li>5. Students acquire a fairly good understanding of the diversity of the microbes.</li><li>6. Students acquire a fairly good understanding of the importance of microbes.</li><li>7. Students acquire practical skills of handling microbes in the laboratory</li></ol>
2 <sup>nd</sup> semester	<ol style="list-style-type: none"><li>1. Students develop a very good understanding of various biomolecules which are required for development and functioning of a bacterial cell.</li><li>2. Students develop how the carbohydrates make the structural and functional components such as energy generation and as storage food molecules for the bacterial cells.</li><li>3. Student become well conversant about multifarious function of proteins, can calculate enzyme activity and other quantitative and qualitative parameters of enzyme kinetics and also get knowledge about lipids and nucleic acids</li><li>4. Students are able to make buffers, study enzyme kinetics and calculate <math>V_{max}</math>, <math>K_m</math>, <math>K_{cat}</math> values.</li><li>5. Students learn the principle which underlies sterilization of culture media, glassware and plastic ware to be used for microbiological work.</li><li>6. Students learn the principles of a number of analytical instruments which they use during the course of study and also later as microbiologist for performing various laboratory manipulations.</li><li>7. Students learn the handling and use of microscopes for the study of microbes which are among the basic skills expected from a practicing microbiologist. They also get introduction of a variety of modifications in the microscopes for specialized viewing.</li><li>8. Students learn several separation techniques which may be required to be handled later as microbiologist.</li></ol>
3 <sup>rd</sup> semester	<ol style="list-style-type: none"><li>1. Students understand what are viruses and the chemical nature of viruses, different types of viruses infecting animals, plants and bacteria (bacteriophage)</li><li>2. students understand about the biology of bacteriophages</li><li>3. Students gained knowledge of a variety of plant viruses and animal viruses.</li></ol>

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2/9/2021



	<ol style="list-style-type: none"> <li>4. Students can describe role of viruses in the causation of the cancer.</li> <li>5. Students learn about the growth characteristics of the microorganisms capable of growing under unusual environmental condition of temperature, oxygen and solute and water activity.</li> <li>6. Students acquire the knowledge of growth characteristics of the microorganisms which require different nutrient for growth and associated mechanisms of energy generation for their survival like autotrophs, heterotrophs, chemolithoautotrophs etc.</li> <li>7. Students learn the differentiating concepts of aerobic and anaerobic respiration and how these are manifested in the form of different metabolic pathways in microorganisms.</li> <li>8. Students understand the importance and mechanism of central dogma of life.</li> <li>9. Students can describe the structure and function of different components of cell.</li> <li>10. Students can differentiate the cellular and molecular processes between prokaryotes and eukaryotes.</li> <li>11. Students develop a very good understanding of practical aspects of microbiological safety, various detection methodologies, use of different microbiological media in food industries and toxicological testing of products in the pharmaceutical industries.</li> </ol>
4 <sup>th</sup> semester	<ol style="list-style-type: none"> <li>1. Students understand genome organization of model organisms namely <i>E.coli</i> and <i>Saccharomyces</i> and the molecular mechanisms that underlie mutations.</li> <li>2. Students develop a fairly good knowledge about the three well known mechanisms by which genetic material is transferred among the microorganisms namely transformation, transduction and conjugation.</li> <li>3. Students are able to describe different types of the extra chromosomal elements or the plasmids; the nature of the transposable elements in the prokaryotic and the eukaryotic cells.</li> <li>4. Students learn skills of isolation of plasmid DNA from bacterial cells and its visualization by performing agarose gel electrophoresis.</li> <li>5. Students develop a fairly good knowledge and understanding of different types of environments and habitats where microorganisms grow including the microbiomes of the human gut and animal gut.</li> <li>6. Students are able to identify the important role microorganisms play in maintaining healthy environment by degradation of solid/liquid wastes; how these activities of microorganisms are used in sewage treatment plants, production of activated sludge and functioning of septic tanks.</li> <li>7. Students understand the significance of BOD/COD and various tests involving use of enumerating fecal <i>E.coli</i> for assessing quality of water.</li> <li>8. Students develop the practical skills for conducting experiments to assess the BOD/COD of waste and their interpretation; practically assess the portability of drinking water by the use of standard microbiological tests.</li> <li>9. Students are capable of describing a large number of substrates that are used for the industrial fermentation processes.</li> </ol>

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2/9/2021



	<p>10. Students develop an understanding of different types of reactors or fermenters that are used for laboratory, pilot and industrial scale fermentations and their processes parameters.</p> <p>11. Students acquire detail knowledge of number of products which are produced by industrial fermentation processes.</p> <p>12. Students develop very good understanding of practical aspects of production of biofertilizers.</p>
5 <sup>th</sup> semester	<p>1. Students learn about immune cells and organs, antigens and antibodies, various mechanisms of immune system and various immunological techniques.</p> <p>2. Students acquire knowledge about normal micro flora of human body, host pathogen interaction, various microbial diseases and anti-microbial agents.</p> <p>3. Students get a basic idea about various statistical methods, sampling distribution, standard error, testing of hypothesis, level of significance and degree of freedom, large and small sample test.</p> <p>4. Students get introduction to bioinformatics and biological databases.</p> <p>5. Students learn about sequence alignment, phylogeny, phylogenetic trees, genome organization and analysis.</p> <p>6. Students get knowledge about viral transmission, salient features of viral nucleic acid and replication.</p> <p>7. Students are introduced to oncogenic viruses.</p> <p>8. Students learn about practical application of virology.</p>
6 <sup>th</sup> semester	<p>1. Students acquire good knowledge about microbial genome organization and mutation, plasmids, mechanism of gene exchange, transposable elements and phage genetics.</p> <p>2. Students learn to practically isolate plasmid DNA, chromosomal DNA and protein. They also get idea about isolating mutants.</p> <p>3. Students get introduction to genetic engineering, various tools, Strategies and methods of molecular cloning and application of recombinant DNA technology.</p> <p>4. Students learn about Mendelian principles of Genetics, linkage and crossing over, extra- chromosomal inheritance, characteristics of chromosomes and genetic recombination.</p> <p>5. Students get an idea about microbial biotechnology and its application.</p> <p>6. Students gain knowledge about therapeutic and industrial biotechnology.</p> <p>7. Students learn about microbial products and then recovery, microbes for bio- energy and environment and RNAi</p> <p>8. Students are acquainted regarding intellectual property rights.</p> <p>9. Students are given an opportunity to visit industries to know the industrial processes involving microbiology.</p>

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2/9/2021



## Department of Nutrition

### Course: B.Sc. Honours in Nutrition

1 <sup>st</sup> Semester	<p><b>CCI</b> : Introduction and basic knowledge development on community nutrition status, different health programmes, epidemiological term, method, approach, Epidemiology of Nutritional diseases, Community food protection, immunization basics.</p> <p><b>CCII</b>: Fundamentals on biochemical basics, different macro &amp; micro nutrients &amp; water metabolism, Biophysical knowledge on thermodynamics, acid base balance, Enzymes. Electrophoresis, photometry principle, Waste disposal.</p> <p><b>CCII Practical</b>: Qualitative estimation of different nutrients &amp; adulterants. Ph determination, solution preparation of different normality &amp; molarity.</p>
2 <sup>nd</sup> Semester	<p><b>CCIII</b>: Theoretical knowledge on different food commodities, Food groups, their structure, use functions of macro &amp; micro nutrients, role in Nutrition Science, Food standard, food additives. Knowledge on bakery &amp; confectionary.</p> <p><b>CCIV</b>: Nutrition based Physiology of human being to understand Nutrition Science clearly.</p> <p><b>CCIV Practical</b>: Skill development to do Quantification of different micro and macro nutrients in food, qualitative assessment of normal and abnormal constituents in urine. Blood Pressure measurements.</p>
3 <sup>rd</sup> Semester	<p><b>CCV</b>: Knowledge on different nutrition programming, its evaluation method, nutrition management in emergency situation.</p> <p><b>CC VI</b>: Basics information development on Human Nutrition including different form of Malnutrition, Body composition, Minimum Nutrients requirements, RDA, Energy requirement, Growth and development of human and its connection to nutrition.</p> <p><b>CCVII</b>: Theoretical knowledge on fundamental diet therapy &amp; its different aspect, Exchange list concept including different foods groups, socio cultural food habit.</p> <p><b>CCVII Practical</b>: Learning on calculation of Energy, Carbohydrate, Protein, fat requirement in general people, energy distribution in meal &amp; meal planning, Balance sheet preparation.</p>

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2/9/2021



	<p><b>SEC I:</b> Preliminary and fundamental knowledge on Child development and growth.</p>
4 <sup>th</sup> Semester	<p><b>CCVIII:</b> Introduction to food microbiology, Food spoilage and contamination, Bacterial food infection, Cultivation of microorganism.</p> <p><b>CCVIII Practical:</b> Ability build up for Preparation of Media, Pure culture of microbiological techniques, Staining of microorganisms, Staining of microorganisms, Microbiological examination of milk.</p> <p><b>CCIX:</b> Knowledge development on Diet Therapy, supplementary feeding, diet classification, Meal &amp; Diet preparation on different age group of different socio economic condition.</p> <p><b>CCIX Practical:</b> Training on Planning and preparations of Meal of different age group of different socio economic condition, Concept on Vegetarian diet.</p> <p><b>CCX:</b> Development of Concept of food preservation &amp; processing, methods and preserved foods.</p> <p><b>CCX Practical:</b> Hands on training on Efficacy testing of the method of Food preservation, Jam &amp; Jelly preparation, Visit to food industry and report preparation.</p> <p><b>SEC II:</b> Capability of Micronutrient analysis of different recopies by Indian Food Composition Table.</p>
5 <sup>th</sup> Semester	<p><b>CCXI:</b> Information of different Non Communicable Disease and Diet therapy on non communicable diseases.</p> <p><b>CCXI Practical:</b> Training on Diet formulation of Obesity, Diabetes, CVD, Kidney disease, Stress.</p> <p><b>CCXII:</b> Fundamental development of knowledge on Research methodology, steps to formulate research, hypothesis.</p> <p><b>CCXII Practical:</b> Review paper formulation on concerned topic.</p> <p><b>DSEI:</b> Internship program in dept of dietetics in hospital, report preparation.</p> <p><b>DSE I Practical:</b> Assignment on Audio Visual presentation on internship program.</p>

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2/9/2021



	<p><b>DSE II:</b> Theoretical knowledge on Immunization types, schedules, vaccination.</p> <p><b>DSE II Practical:</b> Assignment program &amp; its report writing on child immunization by survey technique.</p>
6 <sup>th</sup> Semester	<p><b>CCXIII:</b> Basics of different Communicable Diseases and Diet therapy on communicable diseases.</p> <p><b>CCXIII Practical:</b> Training on diet formulation of diarrhoea, cholera, hepatitis, jaundice, malaria, HIV AIDS.</p> <p><b>CCXIV:</b> Knowledge gain on Health statistics, data presentation, central tendency, standard error, standard deviation, test of significance.</p> <p><b>CCXIV Practical:</b> Learning of technique on Graphical presentation of data, Computation of central tendency, Analysis of test of significance, Test of significance analysis.</p> <p><b>DSEIII:</b> Theory based knowledge on Diet counseling, phases, model, barrier, field of employment.</p> <p><b>DSEIII Practical:</b> Practical report presentation &amp; Submission of diet counseling on field based study.</p> <p><b>DSEIV:</b> Knowledge on IEC system, Patient education, patient types &amp; features.</p> <p><b>DSEIV Practical:</b> Practical report presentation &amp; Submission of patient education activities on field based study</p>

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## Department of Commerce

### Course: B.Com. Honours and Program in Accounting

Sem-I	<p>After completing the course, the student shall be able to understand</p> <ul style="list-style-type: none"><li>• the theoretical framework of accounting and to prepare financial statements CO2: learn the accounting system of Consignment Business , hire purchase transactions and instalment payment system,Sectional and Self Balancing Ledgers and dissolution of a partnership firm in details.</li><li>• basic aspects of contracts for making the agreements, contracts ,legitimate rights and obligations under The Sale of Goods Act, apply their skills to initiate entrepreneurial ventures as LLP, fundamentals of Internet based activities under the Information and Technology Act.</li><li>• the concepts of demand and supply and determination of equilibrium price through the interaction of market forces, analyze different approaches explaining the theoretical foundation of consumer behaviour. concepts of cost, nature of production and its relationship to Business operations, concepts of different market forms and analyse different theories related to determination of factor prices.</li><li>• Gain idea on Business Organisation and Management.</li><li>• Ideas of Environmental Studies</li><li>• Concept of English/Hindi/Bengali language</li></ul>
Sem-II	<p>After completing the course, the student shall be able to</p> <ul style="list-style-type: none"><li>• develop an understanding of accounting for share capital and debentures , financial statements of a company, cash flow statements, amalgamation and liquidation of companies and prepare consolidated balance sheet for Holding company.</li><li>• understand the regulatory aspects and the broader procedural aspects of Companies Act 2013 and Rules thereunder, follow the basic legal documents and their usage essential for operations and management of company, equip the students with framework of dividend distribution and role of auditors in a company, comprehend and evaluate working of depositories and their functions in stock markets.</li><li>• describe the nature and scope of Macro Economics, Income, Expenditure and their components and determinants, expose fiscal and monetary policy implications through IS-LM framework in short run and long run, theories of demand for money, supply of</li></ul>

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2/9/2021



	<p>money approach and working of money multiplier, elucidate causes and effects of different types of inflation and trade-off between inflation and unemployment, describe the role of saving and investment in different size of economies on trade and exchange rate and rate of interest.</p> <ul style="list-style-type: none"> <li>• Develop concept of English/Hindi/Bengali language</li> <li>• Will learn Business Mathematics and Statistics.</li> </ul>
Sem-III & IV	<p>After completing the course, the student shall be able to gain knowledge about the following:</p> <ol style="list-style-type: none"> <li>1. Some concepts of Human Resource Management</li> <li>2. Details of Income Tax Law and Practice</li> <li>3. Basic concepts of Management Principles and Applications</li> <li>4. Basic ideas on E-Commerce</li> <li>5. Some concepts on Business Statistics</li> <li>6. General view of Cost Accounting</li> <li>7. Learn Business Mathematics</li> <li>8. Concept of Entrepreneurship Development</li> <li>9. Idea of Computer Application in Business</li> <li>10. Details of Indian Economy</li> <li>11. Company Law</li> <li>12. Corporate Accounting</li> </ol>
SemV & VI	<p>After completing the course, the student shall be able to gain knowledge about the following:</p> <ol style="list-style-type: none"> <li>1. Basic concept Computerized Accounting</li> <li>2. Basic ideas Advanced Corporate Accounting</li> <li>3. Some ideas on theories of Microeconomics</li> <li>4. General view of Business Regulatory Framework</li> <li>5. Ideas on Principles of Management</li> <li>6. Details of Corporate Reporting</li> <li>7. Some ideas on Indian Economy</li> </ol>

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## Course: M.A in Political Science

<b>SEMESTER: I</b>	<p><b>INDIAN POLITICAL THOUGHT</b></p> <ul style="list-style-type: none"><li>• Develops insights among students on the relevance of political ideas in ancient, medieval and modern India by exploring the themes, concepts and issues that are integral to the understanding of Political Thought in India.</li><li>• Develops knowledge and expertise on India's tradition of political values and thoughts.</li></ul> <p><b>INDIAN GOVERNMENT AND POLIICS SINCE INDEPENDENCE</b></p> <ul style="list-style-type: none"><li>• Develops insights on societal dynamics and their impact on political processes.</li><li>• Identifies specific themes which are significant for the study of politics in India, explores the way in which these themes have acquired salience, and how their changing forms have impacted upon the nature and course of Indian politics.</li><li>• Develops an understanding of how state and politics are informed by social processes and political mobilizations, historically and in contemporary contexts.</li><li>• Imparts understanding of the Constitution of India vis-à-vis the simultaneous political processes.</li></ul> <p><b>MODERN WESTERN POLITICAL THOUGHT</b></p> <ul style="list-style-type: none"><li>• Develops an in-depth understanding of ideas and concepts originated from within the Modern Western Political Philosophical Tradition.</li><li>• Helps to be equipped with experiences of the ideas and conceptual acquaintance instigated by several Modern age Western Political Thinkers starting from Machiavelli to Marx.</li></ul> <p><b>ADVANCED POLITICAL THEORY</b></p> <ul style="list-style-type: none"><li>• Builds a prior understanding of the nature and value of theoretical</li></ul>
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2/9/2021



	<p>inquiry in politics.</p> <ul style="list-style-type: none"> <li>• Develops an understanding of some of the major debates that contemporary political theory is engaged in.</li> <li>• Enriches skills of analysis and judgment.</li> <li>• The students will be accustomed to the inter-relationship between political practice and political theory.</li> </ul> <p><b>THEORIES OF COMPARATIVE POLITICS</b></p> <ul style="list-style-type: none"> <li>• Develops fundamental grasp over the various theories and explanations specifically some of the major paradigms which have elicited different theories of development, underdevelopment in the study of Comparative Politics.</li> <li>• Discerns the Eurocentric bias in the field of comparative politics</li> <li>• Identifies the processes of de-centring which have reconfigured the field in significant ways.</li> </ul>
<p><b>SEMESTER: II</b></p>	<p><b>THEORIES OF PUBLIC ADMINISTRATION</b></p> <ul style="list-style-type: none"> <li>• Develops a comprehensive albeit in-depth understanding of various theories of organization and models of governance along with the historical development of the discipline of Public Administration and its current trends.</li> <li>• Clarifies what can be the prerequisites for promoting effective and just administration at the local and national levels.</li> </ul> <p><b>INDIAN ADMINISTRATION</b></p> <ul style="list-style-type: none"> <li>• Equips the students with the knowledge of the pattern of present administrative system in the Indian federal structure.</li> <li>• Develops understanding of the historical development of Indian Administrative System.</li> </ul> <p><b>THEORIES OF INTERNATIONAL RELATIONS</b></p> <ul style="list-style-type: none"> <li>• The students will be able to have knowledge of paradigms,</li> </ul>

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2/9/2021



	<p>approaches, theories and concepts in the discipline of International Relations along with the historical development of the discipline.</p> <p><b>FOREIGN POLICY ANALYSIS</b></p> <ul style="list-style-type: none"> <li>• The students will be able to be familiar with the foreign policy making process which will enable them to develop certain skills required for various national / international think tanks.</li> </ul> <p><b>DYNAMICS OF INDIAN CONSTITUTION</b></p> <ul style="list-style-type: none"> <li>• The course expects to cover the basic structure and the features of the Constitution of India. Hence, the students will be able to have a basic knowledge of the Constitution of India which shall enable them competent for different competitive examinations.</li> </ul>
<p><b>SEMESTER: III</b></p>	<p><b>POLITICAL SOCIOLOGY</b></p> <ul style="list-style-type: none"> <li>• Enables the students to study theories and concepts of Political Sociology.</li> <li>• Enables the students to be conversant in conceptual aspects of the discipline of Political Sociology.</li> </ul> <p><b>RESEARCH METHODOLOGY</b></p> <ul style="list-style-type: none"> <li>• Equips the students with skills to research on both academic as well as socio-political, socio-economic and socio-cultural issues.</li> </ul> <p><b>FUNDAMENTAL THOUGHTS IN PUBLIC ADMINISTRATION</b></p> <ul style="list-style-type: none"> <li>• Enable the students to understand the fundamental concepts, ideas and thoughts in the discipline of Public Administration.</li> </ul> <p><b>CONTENDING ISSUES IN PUBLIC ADMINISTRATION WITH SPECIAL REFERENCE TO INDIA</b></p> <ul style="list-style-type: none"> <li>• The students will be able to learn the fundamental issues, challenges to Public Administration in India.</li> </ul>

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2/9/2021



	<p><b>CONFLICT RESOLUTION AND PEACE STUDIES</b></p> <ul style="list-style-type: none"> <li>• Promotes strategic and critical understanding of issues concerning global peace and security.</li> <li>• Develops knowledge of policies and strategies for minimising conflict in contemporary world order.</li> </ul> <p><b>INDIAN FOREIGN POLICY</b></p> <ul style="list-style-type: none"> <li>• Develops an understanding of India's foreign policy making process.</li> <li>• Develops critical mind for assessing India's relations with neighbours as well as major power countries.</li> </ul> <p><b>MEDIA AND POLITICS</b></p> <ul style="list-style-type: none"> <li>• Develops skills required for understanding of the reciprocity between mass media and political process and developing expertise in the field of media politics.</li> </ul>
<p><b>SEMESTER: IV</b></p>	<p><b>STATE POLITICS IN INDIA</b></p> <ul style="list-style-type: none"> <li>• The students would be familiar with the regional variations of political and social issues within the Indian nation-state, social political and economic architecture of Indian federalism beyond its institutional design.</li> </ul> <p><b>POLITICS OF DEVELOPING SOCIETIES</b></p> <ul style="list-style-type: none"> <li>• Develops a conceptual understanding of the political processes in the Third World.</li> <li>• Enables the students to understand different concepts and issues of the Third World.</li> </ul> <p><b>POLITICS IN SOUTH ASIA</b></p> <ul style="list-style-type: none"> <li>• Develops an advanced understanding of the various nation states and their stakes and issues in the South Asian region.</li> </ul>

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### **DISSERTATION**

- The students will have an idea of writing research reports.

### **PUBLIC POLICY: CONCEPTS, THEORIES AND PRACTICES IN INDIA**

- Enables to penetrate in the knowledge of policy formulation, policy implementation and policy evaluation.,

### **LOCAL GOVERNMENT WITH SPECIAL REFERNCE TO WEST BENGAL**

- The course intends to delineate onerous understanding of the structures and functions of local government in West Bengal. Hence,the students will be able to build acquaintance of the Panchayati Raj system in West Bengal.

### **CONTEMPORARY ISSUES IN INERNATIONAL RELATIONS**

- Develops expertise in dealing with the challenging issues of international politics.

### **GLOBAL ENVIRONMENTAL POLITICS**

- Develops a rigorous understanding of different environmental issues and their political exposition

### **GRAND VIVA**

- The course delineates the enhancement of presentation skills. Hence,the students will have a sense of presentation and viva voce.

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2/9/2021

