

RAJA PEARY MOHAN COLLEGE, UTTARPARA



Lesson Plans

B.A, B.SC, B.COM

HONOURS AND GENERAL DEGREE COURSES OF STUDIES

2019-2020

BENGALI HONOURS

SEMESTER - I

CC 1-1 (65 MARKS): Bangla Sahityer Itihash (till 1800)

TOPIC	TEACHER ASSIGNED
MODULE 1	MB, GG, HG
MODULE 2	SGC, GG, AKD
MODULE 3-	AKD, MB, HG

CC 1-2 (65 MARKS): Barnana Mulok Bhasha Bigyan o Bangla Bhasha

TOPIC	TEACHER ASSIGNED
MODULE 1	MB
MODULE 2	GG
MODULE 3	SGC

SEMESTER - II

CC 2-3 (65 MARKS): Bangla Sahityer Itihash

TOPIC	TEACHER ASSIGNED
MODULE 1	GG
MODULE 2	SGC, MB, HG
MODULE 3	HG

CC 2-4 (65 MARKS): Bangla Sahitya Probeshal Path

TOPIC	TEACHER ASSIGNED
MODULE 1	GG, AKD, SGC, HG
MODULE 2	SGC, MB
MODULE 3	AKD, GG, HG

PART - II

PAPER: 3 (100 MARKS)

TOPIC	TEACHER ASSIGNED
Katha Sahityer Rupaved	SGC, MB
Uponyas--Chandrasekhar (Bankim Chandra Chattoadhyay)-	GG
Sesher Kabita (Rabindranath Tagore)	AKD
Hanshulibanker Upokatha (Tarashankar Bandyopadhyay)	SGC

PAPER: 4 (100 MARKS)

TOPIC	TEACHER ASSIGNED
Rangamancher Itihas	AKD
Tiner Talowar (Drama by Utpal Dutta)	AKD
Muktadhara (Drama by Rabindranath Tagore)	HG
Burosalikher Ghare Ro (Satire by Michel Madhusudan Dutta)	GG
Ekei Ki Bole Sobbhota (Satire by Michel Madhusudan Dutta)	GG

PART - III

PAPER: 5 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1: Kabyer Rupoved	SGC, GG
MODULE 2 : Birangana : Madhusudan Dutta	MB
MODULE 3: Sonar Tari : Rabindranath Tagore	AKD

MODULE 4: Sanchita: Nazrul Islam	SGC
MODULE 5: E kaler kobita sanchayan	GG, HG
MODULE 6: Kabyer Soili bichar	GG, HG

PAPER: 6 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1: Putul Nacher Itikotha	AKD
MODULE 2: Aranyer Odhikar	GG
MODULE 3: Rabindranath'er Chotogolpo	SGC, MB
MODULE 4: Swadhinata Purboborty Chhotogolpo	GG
MODULE 5: Swadhinata poroborty Chhotogolpo	HG

PAPER: 7 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1: Probondho Nibandher Rupoved	SGC, MB
MODULE 2: Komolakanter Doptor	GG
MODULE 3: Chhinnopotro	AKD
MODULE 4: E Kaal'er probondho Sanchayan	SGC, GG, HG
MODULE 5: E kaaler somalochona sanchayan	MB, HG, SGC
MODULE 6: Bangla Sahitya bishayok Prabandha	AKD, HG

PAPER: 8 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1: History of Sanskrit Literature	MB
MODULE 2: History of English Literature	SGC
MODULE 3: Protibeshi Sahityer Itihash	AKD

MODULE 4: Kabya Jighgyasha	GG
MODULE 5: Sahitya	HG

BENGALI GENERAL

SEMESTER - I

BNGG-G-CC/GE-1-1 (65 MARKS): BANGLA SAHITYER ITIHASH

TOPIC	TEACHER ASSIGNED
MODULE 1	HG, MB
MODULE 2	GG, AKD
MODULE 3	SCG, HG

SEMESTER - II

CC/GE-2-2 (65 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1	GG, HG
MODULE 2	SGC
MODULE 3	MB, AKD

PART - II

PAPER: 2 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1	GG
MODULE 2	MB
MODULE 3	SGC
MODULE 4	HG
MODULE 5	SGC, AKD

PAPER: 3 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1	SGC
MODULE 2	AKD
MODULE 3	HG
MODULE 4	MB
MODULE 5	GG

PART - III

PAPER: 4 (100 MARKS)

TOPIC	TEACHER ASSIGNED
MODULE 1	GG
MODULE 2	MB
MODULE 3	AKD
MODULE 4	MB
MODULE 5	SGC, HG
MODULE 6	HG
MODULE 7	SGC, AKD
MODULE 8	SGC, AKD

AECC-1: SEMESTER - I

Stream	Professors
B.A. (General)	HG
B.A. (Honours)	AKD
B.Sc. (Honours)	SGC+GG

B.Sc. (General)	SGC+GG
B.Com. (Hons. + Gen.)	MB

ENGLISH HONOURS

Under CBCS Syllabus for UG English (Hons.)

SEMESTER I

CC1: History of Literature and Philology

Topics	Teachers Assigned
<p><u>Group A: History of Literature</u></p> <ul style="list-style-type: none"> • Modern Novel: Joseph Conrad, Virginia Woolf, James Joyce • Modern Drama: Samuel Beckett, Harold Pinter, John Osborne <p><u>Group B: Philology</u></p> <ul style="list-style-type: none"> • Consonant Shift • Short Notes (Hybridism, Monosyllabism, Free & Fixed Compounds, -ing formation) 	<p>Dr. Pinaki De (PD)</p>
<p><u>Group A: History of Literature</u></p> <ul style="list-style-type: none"> • University Wits and Ben Jonson • Restoration Comedy of Manners and Eighteenth-Century Novels <p><u>Group B: Philology</u></p> <ul style="list-style-type: none"> • Short Notes (Malapropism, Johnsonese) • CC 1 TUTORIAL (Project Work) 	<p>Dr. Abu Saleh (AS)</p>
<p><u>Group A: History of Literature</u></p> <ul style="list-style-type: none"> • Elizabethan Sonnets • Modern Poetry: T.S. Eliot, W.B. Yeats, Dylan Thomas 	<p>Dr. Kalapi Sen (KS)</p>
<p><u>Group B: Philology:</u></p> <ul style="list-style-type: none"> • Word Formation Processes 	<p>Prof. Arup Malik (AM)</p>

<p><u>Group A: History of English Literature</u></p> <ul style="list-style-type: none"> • Chaucer • Victorian Novel and the Pre-Raphaelites 	<p>Prof. Manisha Bhattacharya (MB)</p>
<p><u>Group B: Philology</u></p> <ul style="list-style-type: none"> • Latin Influence, Scandinavian Influence, French Influence, Americanism 	<p>Prof. Gaurab Goswami (GG)</p>

CC2: EUROPEAN CLASSICAL LITERATURE

Topics	Assigned Teachers
<ul style="list-style-type: none"> • <i>Sophocles: Oedipus the King</i> in The Three Theban Plays, translated by Robert Fagles • Horace, Satires, I: IV in Horace: <i>Satires</i> and Epistles and Persius translated Niall Rudd, Penguin, 2005 	<p>DC</p>
<ul style="list-style-type: none"> • Homer: <i>The Iliad</i> (Books I and II) translated by E.V. Rieu • CC 2 TUTORIAL (Project Work) 	<p>PD</p>
<ul style="list-style-type: none"> • Ovid, Selections from <i>Metamorphosis</i>, 'Bacchus' (Book III) 	<p>KS</p>
<ul style="list-style-type: none"> • Plautus: <i>Pot of Gold</i>, translated by E.F. Watling 	<p>GG</p>

SEMESTER II

CC3: Indian Writing in English

Topics	Teacher Assigned
<ul style="list-style-type: none"> • Mahesh Dattani, <i>Bravely Fought the Queen</i> 	<p>PD</p>
<ul style="list-style-type: none"> • Henry Louis Vivian Derozio, <i>To India, My Native Land</i> • Toru Dutt, <i>Our Casuarina Tree</i> • A.K. Ramanujan, <i>River</i> • Nissim Ezekiel, <i>Enterprise</i> • Jayanta Mahapatra, <i>Dawn at Puri</i> 	<p>AS</p>
<ul style="list-style-type: none"> • Kamala Das, <i>Introduction</i> • Bankimchandra Chattopadhyay: <i>Rajmohan's Wife</i> 	<p>MB</p>

CC4: British Drama and Poetry (14th – 17th Century)

Topics	Teacher Assigned
• John Donne, <i>The Good Morrow</i>	AS
• Geoffrey Chaucer, <i>Wife of Bath's Prologue</i>	KS
• Edmund Spenser, <i>One Day I Wrote Her Name</i> • William Shakespeare, Sonnets 18 & 130	AM
• Andrew Marvell, <i>To His Coy Mistress</i>	GG
• Christopher Marlowe, <i>Edward II</i> OR William Shakespeare, <i>Macbeth</i>	PD
• William Shakespeare, <i>Twelfth Night</i> OR <i>As You Like It</i>	AM

AECC-1: SEMESTER - I

Stream	Professors
B.A. (General)	AS
B.A. (Honours)	AS
B.Sc. (Honours)	GG
B.Sc. (General)	AM
B.Com. (Hons. + Gen.)	PD & AM

THREE YEARS DEGREE COURSE (1+1+1 System New regulations 2017-2018)**Part II****Paper III – Drama**

Topics	Teacher Assigned
Drama	
• Christopher Marlowe's <i>Tamburlaine Part I</i>	PD
• William Shakespeare's <i>A Midsummer Night's Dream</i>	AM
• William Shakespeare's <i>Macbeth</i>	DC
• R. B. Sheridan's <i>The Rivals</i>	AS
Literary Terms	
• Literary Terms related to Drama	AM

Paper IV – Novels, Essays and Short Story

Topics	Teacher Assigned
Novels	
Jane Austen: <i>Pride and Prejudice</i>	GG
Essays	
• Francis Bacon: <i>Of Studies</i>	PD
• Charles Lamb: <i>Dream Children: A Reverie</i>	KS
• George Orwell's "Shooting an Elephant"	AS
Literary Terms	
• Literary Terms related to Fiction	GG
Short Story	
• James Joyce: <i>Araby</i>	AS
• Joseph Conrad: <i>The Lagoon</i>	MB
• Katherine Mansfield: <i>The Fly</i>	DC
Unseen	
• Substance writing and Critical Note	PD

Part III**THREE YEARS DEGREE COURSE (1+1+1 System New regulations 2010)****Paper V: Poetry from Elizabethan Period to Neo-classical Period**

Topics	Teacher Assigned
Poetry	
• Shakespeare's sonnets No. 18 (<i>Shall I compare thee to a summer's day</i>) & No. 130 (<i>My Mistress' eyes are nothing like the sun</i>)	AM
• John Donne: <i>The Good Morrow</i> , Andrew Marvell: <i>To His Coy Mistress</i>	DC
• John Milton, <i>Paradise Lost</i> , Book I	PD
• Alexander Pope, <i>The Rape of the Lock</i> (First 3 Cantos)	KS
Literary Terms	
• Literary Terms related to Poetry	AM

Paper VI: Novel, Essay and Writing

Topics	Teacher Assigned
Novel	
• Charles Dickens: <i>Great Expectations</i>	KS
• Thomas Hardy: <i>The Mayor of Casterbridge</i>	MB
Unseen Writing Skills	

<ul style="list-style-type: none"> Miscellaneous Writing Skills (Report Writing/Film Reviews/Book Reviews/Dialogue) 	PD + AS
<ul style="list-style-type: none"> Essay 	PD
<ul style="list-style-type: none"> Summary and Critical Note 	DC

Paper VII: Drama and Literary Types

Topics	Assigned Teacher
Drama	
<ul style="list-style-type: none"> John Osborne: <i>Look Back in Anger</i> 	AM
<ul style="list-style-type: none"> George Bernard Shaw: <i>Arms and the Man</i> 	AS
<ul style="list-style-type: none"> Synge: <i>Riders to the Sea</i> 	KS
<ul style="list-style-type: none"> John Osborne: <i>Look Back in Anger</i> 	AM
Literary Types	
<ul style="list-style-type: none"> Tragedy 	DC
<ul style="list-style-type: none"> Novel 	KS
<ul style="list-style-type: none"> Epic 	AS
<ul style="list-style-type: none"> Comedy 	AM

Paper VIII: Indian Writing in English (Optional Paper)

Topics	Assigned Teacher
Novel	
<ul style="list-style-type: none"> Mulk Raj Anand: <i>Coolie</i> 	AS
<ul style="list-style-type: none"> Rabindranath Tagore: <i>The Home and the World</i> 	DC
<ul style="list-style-type: none"> Amitav Ghosh: <i>The Shadow Lines</i> 	PD
Short Story	
<ul style="list-style-type: none"> Munshi Prem Chand: <i>The Shroud</i> 	PD
<ul style="list-style-type: none"> Ruskin Bond: <i>The Eyes are not Here</i> 	AM
<ul style="list-style-type: none"> Manik Bandyopadhyay: <i>Primeval</i> 	KS
<ul style="list-style-type: none"> R.K. Narayan: <i>Cat Within</i> 	GG
Poetry	
<ul style="list-style-type: none"> Sarojini Naidu: <i>Palanquin Bearers</i> 	KS
<ul style="list-style-type: none"> Nissim Ezekiel: <i>Enterprise</i> 	PD
<ul style="list-style-type: none"> Kamala Das: <i>An Introduction</i> 	MB
<ul style="list-style-type: none"> Mahadevi Verma: <i>This is the Lamp of the Temple</i> 	MB
<ul style="list-style-type: none"> Agyeya: <i>Hiroshima</i> 	GG
Drama	
<ul style="list-style-type: none"> Mahesh Dattani: <i>Bravely Fought the Queen</i> 	PD

ENGLISH GENERAL

Under CBCS Syllabus for UG English (GEN)

SEMESTER I

CC1/GE1: Poetry and Short Story

Topics	Assigned Teacher
Poetry	
• William Shakespeare: <i>Sonnet 18</i>	AM
• P.B. Shelley: <i>To a Skylark</i>	AS
• William Wordsworth: <i>Strange fits of Passion</i>	MB
• John Keats: <i>To Autumn</i>	AS
Short Story	
• James Joyce: <i>Araby</i>	AS
• Katherine Mansfield: <i>The Fly</i>	KS
• Joseph Conrad: <i>The Lagoon</i>	MB

SEMESTER II

CC2/GE2: Essay, Drama and Novel

Topics	Assigned Teacher
Essay	
• Charles Lamb: <i>Dream Children: A Reverie</i>	KS
• George Orwell: <i>Shooting an Elephant</i>	PD
Drama	
• William Shakespeare: <i>As You Like It</i>	
• George Bernard Shaw: <i>Arms and the Man</i>	AS
Novel	
• Thomas Hardy: <i>The Mayor of Casterbridge</i>	MB

THREE YEARS DEGREE COURSE (1+1+1 System New regulations 2017-2018)

Paper II: Fiction

Topics	Assigned Teacher
Novel	
• Charles Dickens: <i>Great Expectations</i>	N/A
• Thomas Hardy: <i>The Mayor of Casterbridge</i>	MB
Short Story	

• James Joyce: <i>Araby</i>	AS
• Katherine Mansfield: <i>The Fly</i>	AS
• Joseph Conrad: <i>The Lagoon</i>	DC
Unseen	
• Precis Writing	
Essay	
• Charles Lamb: <i>Dream Children: A Reverie</i>	GG
• Robert Lynd: <i>Sea-side</i>	GG
• George Orwell: <i>Shooting an Elephant</i>	AS

Paper III: Drama

Topics	Assigned Teacher
Drama	
• William Shakespeare: <i>Julius Caesar</i>	PD
• William Shakespeare: <i>A Midsummer Night's Dream</i>	
• George Bernard Shaw: <i>Arms and the Man</i>	AS
Literary Terms	
• Literary Terms related to Drama	PD
Unseen	
• Proof Reading	DC

Part III

THREE YEARS DEGREE COURSE (1+1+1 System New regulations 2010)

Paper IV: Indian Writing in English

Topics	Assigned Teacher
Short Stories	
Bhabani Bhattacharya: <i>A Moment of Eternity</i>	KS
Mulk Raj Anand: <i>Duty</i>	PD
R.K. Narayan: <i>Cat Within</i>	PD
Rabindranath Tagore: <i>The Home-coming</i>	DC
Poems	
Toru Dutt: <i>Sita</i>	KS
Kamala Das: <i>An Introduction</i>	DC
A.K. Ramanujan: <i>A River</i>	KS
Nissim Ezekiel: <i>Goodbye Party for Miss Pushpa T.S</i>	PD
Unseen	
• Dialogue Writing	AM

**HISTORY HONOURS
SEMESTER - I**

CC1 & CC2 (65 MARKS EACH)

Name of the Teachers	Core Course 1	Core Course 2
Dr. Sarmistha Nath	I. Reconstructing Ancient Indian History : a) Early Indian notions of History, b) Sources and tools of historical reconstruction c) Historical interpretations (with special reference to gender, environment, technology and regions)	IV. Nomadic groups in Central and West Asia : Debate on the advent of iron and its implications. V. Slave society in ancient Greece & Rome : agrarian economy, urbanization, trade. VI. Polis in ancient Greece : Athens and Sparta; Greek culture.
Prof. Sandipan Sarkar	II. Hunter-gatherers and the advent of food products : a) Paleolithic cultures – sequence and distribution; stone industries and other technological developments. b) Mesolithic cultures – regional and chronological distribution; new developments in technology and economy; rock art. c) Neolithic and Chalcolithic cultures : distribution and subsistence pattern.	I. Evolution of Human kind : Paleolithic and Mesolithic cultures – Role of kinship social institutions in the development of early societies. II. Food production : beginnings of agriculture and animal husbandry.
Prof. Monalisa Sreemani	<p style="text-align: center;">Nil</p>	III. Bronze Age civilization : Egypt (Old Kingdom) / China (Shang), economy, social stratification, state structure, religion.
Prof. Sudeshna Mallick	III. The Harappan civilization : Origins; settlement patterns and town planning; agrarian base; craft productions and trade; social and political organization; religious beliefs and practices; art; the	<p style="text-align: center;">Nil</p>

	problem of urban decline and late/post-Harappan traditions.	
Prof Animesh das	<p>IV. Cultures in transition : Settlement patterns, technological and economical developments; social stratification; political relations; religion and philosophy; the Aryan problem.</p> <p>a) North India (circa 1500 BCE – 300 BCE) b) Central India and the Deccan (circa 1000 BCE – circa 300 BCE)</p>	Nil

CC3 & CC4 (65 MARKS EACH)

Name of the Teachers	Core Course 3	Core Course 4
Dr. Sarmistha Nath	<p>II. Changing Political Formation (300 BCE to circa CE 300): a) The Mauriyan Empire b) Post Mauriyan politics with special reference to the Kushans and the Satavahanas, Gana-Sanghas .</p> <p>III. Towards Early Medieval India (circa CE 4th century to CE 750) a) Agrarian expansion – Land Grants, changing production relations, graded land rights and peasantry. b) The problem of Urban decline-patterns of trade, currency and urban settlements. c) Verna, proliferation of Jatis, changing norms of marriage and property. d. The nature of polities – the Gupta empire and its contemporaries post Gupta polities – Pallavas, Chalukyas and Vardhanas.</p>	VI. Judaism and Christianity under Islam.

Prof. Sandipan Sarkar	<p>I. Economy and Society circa 300 BCE to circa CE 300 :</p> <p>a) Expansion of agrarian economy – production relations.</p> <p>b) Urban growth – North India, Central India and the Decan; craft production – trade and trade goods, coinage.</p> <p>c) Social stratification – class, varna, jati, untouchability, gender, marriage and property relation.</p>	<p>III. Crisis of the Roman empire and its principal causes – Historiography.</p> <p>V. The Feudal society its origins and its crisis - Historiography.</p>
Prof. Monalisa Sreemani	<p>V. Cultural Development (circa 300 BCE to circa CE 750) :</p> <p>a) A brief survey of Sanskrit, Pali, Prakrit and Tamil literature. Scientific and technical treatise.</p> <p>b) Art and architecture nad forms and patronage, mauryan, post-mauryan, Gupta, post- Gupta.</p>	
Prof. Sudeshna Mallick		<p>IV. Religion and culture in Medieval Europe – society, religious organizations (Church and Monastery), Carolingian Renaissance twelve century renaissance. Position of women in medieval Europe , witchcraft and magic, urbanization, rise of university, medieval art and architecture.</p>
Prof Animesh das	<p>IV. Religion, Philosophy and Society circa 300 BCE to CE 750.</p> <p>a)Consolidation of the Brahmanical tradition – Dharma, Varnashram, purushastras, sanskaras.</p> <p>b) Theistic cults (circa 2nd century BC), Mahayan, The Puranic tradition.</p> <p>c) The beginnings of Tantricism.</p>	

PART - II

PAPER: III (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>Unit – I : Module – 1</p> <p>1.1 Nature of the Feudal Society and its regional variations. 1.2 Crisis of Feudalism; 1.3 Transition Debate</p> <p>Unit – I : Module – 2</p> <p>Economic Crisis and the commercial decline in the 14th Century Europe. The urban Decay and the epidemics.</p> <p>Unit – I : Module – 3</p> <p>3.1 Impact of the fall of Constantinople 3.2 Development of National Monarchy</p> <p>Unit –II : Module – 4</p> <p>4.1 Origins of Modern science. 4.2 Scientific Revolution 4.3 Emergence of scientific academies 4.4 Origins of Enlightenment</p>	AD
<p>Unit- I : Module – 4</p> <p>4.1 Economic in the 15th century Europe 4.2 Economic expansion of Europe in the 16th Century 4.3 Proto-industrialisation – the rise of new merchants 4.4 Price Revolution 4.5 Agricultural Revolution and the Enclosure Movement.</p> <p>Unit- I : Module – 5</p> <p>5.1 Printing Revolution; 5.2 Revolution in war techniques; 5.3 The exploration of the new world; 5.4 Portugese and Spanish voyages.</p> <p>Unit- II : Module – 1</p> <p>1.1 The formation of early modern state 1.2 The empire of Charles V of Spain</p> <p>1.3 New Monarchy in England</p> <p>Unit- II : Module – 3</p> <p>The economy of the 17th Century Europe</p> <p>Unit- II : Module – 6</p> <p>6.1 The English Civil War of the 17th Century 6.2 Political ideas of the Civil War 6.3 The Settlement of 1688 and the ideas of Jhon Locke and the concept</p>	SS

of liberalism	
<p>Unit- I : Module – 6</p> <p>6.1 Renaissance; 6.2 Renaissance Humanism; 6.3 Rediscovery of classics 6.4 Italian Renaissance and its impact on art, culture, education and Political thought. 6.5 Northern Humanism.</p> <p>Unit- II : Module – 2</p> <p>2.1 Reformation Movements; 2.2 Origins & courses; 2.3 Martin Luther & Lutheranism 2.4 Jhon Calvin & Calvinism</p> <p>Unit- II : Module – 2</p> <p>2.5 Radical Reformation : Anabaptists and Huguenots 2.6 English Reformation and the Role of the State. 2.7 Counter Reformation.</p> <p>Unit- II : Module – 5</p> <p>5.1 Peace of Westphalia (1648) 5.2 Emergence of Modern European State system.</p>	SN

PAPER - IV (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>Unit – I : Module – 1</p> <p>1.1 Historiography and sources : i) Historiography : different approaches; ii) An overview of sources including : Abul Fazl, Badauni, Bernier</p> <p>Unit – I : Module – 2</p> <p>A brief overview of India on the eve of Babur’s invasion-kingdoms of Delhi, Mewar, Bengal, Bihar, Punjab;</p> <p>Conquest and stability : i) Struggle for Empire in North India – Significance of Babur and Humayun’s reign; ii) significance of Afghan despotism and rise of Sher Shah Sur to power and his contribution.</p> <p>Unit – I : Module – 3</p> <p>3.1 i) The Turko-Mongal tradition; ii) the Akbari imperial agenda and Shul-i-kul; iii) Akbar’s attitude towards religion and the state.</p> <p>Unit – I : Module – 3</p> <p>3.2 Evolution of imperial policy towards religion and state in the 17th century;</p>	MS

<p>3.3 Ideology of alliances – the Mughals and the Rajputs in 16th & 17th centuries.</p> <p>Unit – I : Module – 4</p> <p>The system of agricultural production – agricultural technology and crop patterns; i) Zabti system – magnitude of land tax; ii) non-agricultural production.</p> <p>Trade, commerce and monetary system – i) inland and oceanic trade network in the 17th century; ii) creation of new trading centres; iii) crafts, industries and organization.</p>	
<p>Unit – I : Module – 2</p> <p>2.3 Expansion and consolidation of the empire: i) making of a new imperial system and administration – the Mughal nobility, mansab and jagir; ii) formation and evolution of the Mughal ruling class, iii) Nurjahan – her role in imperial politics and the ‘junta’, iv) the mansabdari system under Shahjahan and Aurangzeb in 17th century. 2.4 The Mughals and the North-western frontier and Central Asia.</p> <p>Unit – II : Module – 2</p> <p>2.1 Sufism; 2.2 Bhakti movement in the 17th century – the Vaishnava Bhakti cult in Bengal and its regional variations; 2.3 Literature, Painting and architecture; 2.4 Technology – an overview of mechanical devices in textile, irrigation, military & building technology.</p> <p>Unit – I : Module – 5</p> <p>5.1 Aurangzeb, the imperial elite and the Deccan wars. 5.2 Rise of the Marathas under Shivaji. 5.3 Popular revolts within the Mughal Empire – the Jats, Satnamis, Afgans and the Sikhs; 5.4 Crisis in the Jagirdari system – its political and economic implications.</p> <p>Unit – II : Module – 1</p> <p>1.1 Rural society and agrarian relations : i) land ownership and nature of land rights, ii) zamindars and peasantry, 1.2 Urban society : i) towns and town life, ii) merchant communities, artisans and bankers.</p>	<p>SM</p>
<p>Unit – II : Module – 3</p> <p>3.1 Interpretations on the decline of the Mughal Empire 3.2 Emergence of the regional powers – case studies of Maharashtra , Awadh and Bengal; 3.3 Bengal Nawabs and the rise of the English East India Co. in Bengal</p> <p>Unit – II : Module –5</p>	<p>SN</p>

<p>Interpreting the 18th century and transition to colonialism.</p> <p>Unit – II : Module –4</p> <p>4.1 The Anglo- French relations; 4.2 Buxar, Diwani; the Famine, Drain of Wealth; framework of company’s control (the Regulating Act, Pitt’s India Act); the Permanent settlement. 4.3 Company’s relationship with the other Indian powers – Mysore and Awadh.</p>	
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PART - III

PAPER - V (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>The Nature and structure of the traditional Chinese society-the peasantry and the gentry class.</p> <p>Government bureaucracy and central control.</p> <p>China’s pre-modern economy.</p> <p>The tribute system , the Canton system and their collapse</p> <p>Opium wars and treaties with imperialist powers and struggle for concessions in China.</p> <p>Increasing Western economic interest—emergence of a costal enclave economy – rise of comprador bourgeoisie - open-door policy.</p> <p>Background and causes of Taiping Revolt.</p> <p>Nature of this Revolt.</p> <p>Causes of failure</p> <p>Legacy of the Revolt</p> <p>Other near contemporary rebellions – Nien, Muslim rebellions (1855-74), Miao insurrection (1850-1872)</p>	<p>SN</p>
<p>4.1 Tungchi Restoration 4.2 The Self-strengthening Movement 4.3 The Reform Movement of 1898 – Boxer Rebellion and its consequences ; Late Ching Reforms (1901-08) ; Republican Revolution of 1911 – role of various social classes. 4.4 Sun Yat Sen – principal and politics 5.1 Emergence of the Republic and Yuan Shi Kai 5.2 Warlordism (1916-1925) 5.3 New Intellectual ideas and May Fourth Movement – origin, nature, and significance 5.4 Problem of early industrialization 5.5 Political crisis in the 1920’s – The Kuomintang – The first United Front – The Kuomintang-communist Conflict – Ten years of Nanking Government.</p>	<p>AD</p>

<p>1.1 The Tokugawa Shogunate – the feudal society and government 1.2 Encounter with the West – the Perry Mission and the opening up of Japan to the West 1.3 The crisis and fall of Shogunate 2.1 Meiji Restoration (1867-68) – Its nature and character 2.2 Different social classes and groups behind the Restoration. 2.3 Processes of modernization – social, military, political and educational 2.4 Contrasting response of China and Japan to the impact of the west. 3.1 Satsuma rebellion 3.2 Popular rights movement 3.3 Movements leading to the Meiji constitution 3.4 Rise of political parties</p>	MS
<p>4.1 Abolition of feudalism and economic growth 4.2 New land settlement pattern 4.3 Industrialisation and the role of state and private entrepreneurs , Zaibatsu 5.1 The Sino-Japanese war 5.2 The Anglo-Japanese alliance 5.3 The Russo Japanese War 5.4 World War I and after – Japan in the Pacific and the Washington conference 5.5 Manchurian Crisis 5.6 Failure of the Democratic system and the rise of militarism in the 1930’s and 1940’s 5.7 Japan and World War II 5.8 Post War Japan under General MacArthur.</p>	SS

PAPER - VI (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>East India Company as a super-ordinate power - colonial state and ideology Orientalism, Utilitarianism in relation to India. 1.3 Theory of rent and classes 5.1 The Revolt of 1857 : causes, interpretations and consequence 6.1 Differential impact, growth of a new intelligentsia, formation of early political organizations leading to the formation of the Indian National Congress. 6.2 Revivalist and reform movements. 6.3 Women and recipients and agents of change in Modern India with reference to women’s writings (to be discussed along with some specific and prominent examples)</p>	SN
<p>1.1 Early Congress and rise of Extremism. 1.2 Partition of Bengal and the Swadesi. 1.3 British response and Morley-Minto Reforms. 1.4 Revolutionaries in India and abroad. 1.5 Rise of Gandhi. 1.6 Trends in Muslim politics – Aligarh Movement, The Muslim League Demand for separate electorate, Lucknow Pact. 2.1 Rowlatt Act and Rowlatt Satyagraha. 2.2 Montague Chelmsford Reforms. 2.3 Khilafat and Non-Cooperation 2.4 Simon commission, Nehru Report and Round Table Conference. 2.5 Civil Disobedience. 2.6 Quit India Movement.</p>	SS

3.1 Impact of Colonial Land Revenue Settlements , Permanent Settlement in Operation and Commercialization of Agriculture and effect of rural indebtedness on the peasants. 3.2 Peasant response with special reference to the tribal dimension , taking Santhal, Oraon and Munda Revolts as examples. 4.1 The process of Deindustrialization and the related debates. 4.2 Banking : indigenous and modern. 4.3 Emergence of modern industries – railway, jute, cotton and steel.	MS
3.1 Role of social groups and classes including Dalits. 3.2 Ideological trends in the Congress. 3.3 Kisan Sabha Agitations and Trade Union Movements, People’s Movements . 3.4 Left Movements and the formation of the Communist Party abroad. 3.5 Subhas Chandra Bose and the INA. 4.1 Govt. of India Act 1935. 4.2 Working of the Provincial Ministries. 4.3 Cripps Mission, Wavell Plan and Cabinet Mission.	SM
6.1 Growth of Hindu Fundamentalism and Muslim Separatism. 6.2 Demand for Pakistan, Response to the Demand. 6.3 National and Regional , British Policies. 6.4 Partition and Independence 7.1 Partition , Migration and Rehabilitation 6.5 Integration of Princely States. 6.6 Framing of Indian Constitution . 7.3 Agrarian Reforms . Tebhaga and Telengana. 7.3 Framing of the Indian Constitution and establishment of Parliamentary Democracy. 7.4 Making of Indian Foreign Policy and Non-Alignment .	AD
2.1 Ram Mohun, Vidyasagar and the Young Bengal Movement. 2.2 Socio-religious movements in other parts of India. 5.1 Post War Upsurges : INA Movement, Naval Mutiny	PB

PAPER - VII (100 MARKS)

TOPICS	ASSIGNED TEACHERS
1.1 Understanding the 18th century Europe. 1.2 Enlightened despotism 1.3 Socio – economic and political background of the French Revolution – philosophers. 2.1 Trends in the French Revolution 2.2 Aristocratic revolt – bourgeois popular and peasant revolt. 2.3 The Constituent assembly and its achievements. 2.4 Girondins and Jacobins – the reign of Terror and the rise and fall of the Jacobin Republic. 2.5 The Thermidorian reaction and the Directory. 2.6 Interpreting the French Revolution. 2.7 Role of Women in French Revolution.	SN

2.1 The Third Republic , Paris Commune and the new German Reich 2.2 Europe in 1871 – Bismarckian diplomacy – new balance of power – Kaiser William II and the new course in the German foreign policy 3.1 The eastern question in later 19th century with reference to the Crimean War and the Balkan Nationalism. 4.1 Age of imperialism (1871 - 1914) – The impetus behind colonial expansion – Scramble for colonies. 4.2 Anglo German antagonism – Triple Alliance – Triple Entente and the emergence of two armed camps – origin of the First World war.	SS
3.1 Napoleon Bonaparte : the revolution legacy 3.2 The reorganization of France and Europe – fall of Bonaparte 3.3 Conflicting estimation of Napoleon’s character and achievements.	MS
5.1 The emergence of nation states in Central Europe 5.2 Unification of Italy and Germany 5.3 Russian modernization 5.4 France under the second Empire. 5.1 The impact of the War on the old order – Collapse of the Dynastic empire. 5.2 Revolution in Russia – origin of the October Revolution and the Success of the Bolsheviks 5.3 Fourteen points of Wilson.	SM
1.1 Industrialisation in Europe – difference in the industrialization process between England and the Continent – France, German and Russian industrialization. 1.2 Rise of the Working class movements and the Socialist thought (Utopian Socialism, Marxism) 1.3 Art and Culture, literature and Science of the 18th century Europe with special reference to Romanticism and its culture and political aspects.	AD
4.1 The Vienna Congress 4.2 Metternich and the Conservative order.4.3 An overview of the revolution in France and other central European countries – collapse of the revolution.	PB

PAPER - VIII (100 MARKS)

TOPICS	ASSIGNED TEACHERS
4.1 Reunification of Germany 4.2 The end of Socialist regime and the disintegration of USSR 5.1 The end of the Cold War. 5.2 The onset of Globalisation 5.3 American Uni-polarism and its significance for international politics.	SN
5.1 USSR’s relation with the East European countries (1945-64) 5.2 The US foreign policy in the Post war period : Truman Doctrine and Marshall Plan. 1.1 Bi-polarism and regional conflicts : War in Korea – Crisis in Cuba . 1.1 Conflict in the Middle East (Arab- Israel wars of 1948-49,67, 1973 – Activities of P.L.O. – Intifadah – Gulf War of 1990-91) 1.2 Disintegration of European	SS

Empires and the Emergence of the Third World 1.3 The Non-Aligned Movement. 1.4 The politics of Détente.	
3.1 Indo-Pakistan relations 3.2 India and the liberation war of Bangladesh. 3.3 The Liberation Struggle of Vietnam (1945-54 and 1954-1975)	MS
1.1 The Versailles Settlement of 1919. 1.2 The League of Nations. 1.3 Efforts outside the League to preserve peace and security : The Locarno Treaty, the Kellogg Briand Pact. 2.1 The reparation issue and its impact on international relations 2.2 The Great Depression and its international repercussions. 2.3 European Dictatorships : Origin of Fascism in Italy and Nazism in Germany – Impact on World politics.	SM
4.1 Background of the foundation of UNO 4.2 Debate on the origins and nature of the Cold War. 4.3 Cold War and the emergence of Soviet and American economy and military alliance : NATO, WTO, IMF, World Bank, Warsaw, COMECON 2.1 Impact of the emergence of communist China on world politics. 2.2 Sino- Soviet relations 2.3 Sino-U.S. relations.	AD
3.1 Responsibility of Hitler for the outbreak of Second World War 3.3 The Spanish Civil War. 3.2 Diplomatic background of the Second World War – Policy of Appeasement – the Munich Pact – Nazi-Soviet Non Aggression Pact.	PB

HISTORY GENERAL

SEMESTER - I

CC/GE - 1 (65 MARKS)

CC – 1 / GE - 1	Teachers Name	
	Section - A	Section - B
I. Sources & Interpretation; II. A broad survey of Palaeolithic, Mesolithic and Neolithic Cultures. III. Harappan Civilization : Origin, Extent, dominant features & decline, Chalcolithic age.	Prof. Monalisa Sreemani	Dr. Sarmistha Nath
IV. The Vedic Period : Polity, Society, Economy and Religion, Iron Age with reference to PGW & Megaliths. V. Territorial States and the rise of Magadha, Conditions for the rise of Mahajanpadas and the Causes of Magadha's success. VI. Iranian and Macedonian Invasions,	Prof. Sandipan Sarkar	Prof. Sandipan Sarkar

Alexander's Invasion and impact.		
VII. Jainism and Buddhism : Causes, Doctrines, Spread, Decline and Contributions. VIII. Emergence and Growth of Mauryan Empire; State Administration, Economy, Ashoka's Dhamma, Art & Architecture.	Prof. Purbali Basu	Prof. Sudeshna Mallick
IX. The Satavahanas Phase : Aspects of Political History, Material Culture, Administration, Religion. X. The Sangam Age : Sangam Literature, The three Early Kingdoms, Society & the Tamil language. XI. The age of the Indo-Greeks, Shakas : Parthians & Kushanas : Aspects of Polity, Society, Religion, Art & Crafts, Coins, Commerce and Towns.	Prof. Animesh Das	Prof. Sudeshna Mallick

SEMESTER - II

CC/ GE -2 (65 MARKS)

CC – 2 / GE - 2	Teachers Name	
	Section - A	Section - B
III. South India : Polity, Society, Economy & Culture. IV. Towards the Early Medieval : Changes in Society, Polity Economy and Culture with reference to Pallavas, Chalukayas and Vardhanas.	Dr. Sarmistha Nath	Dr. Sarmistha Nath
I. The Rise and Growth of the Guptas : Administration, Society, Economy, Religion, Art, Literature and Science & Technology. II. Harsha & His Times : Harsha's Kingdom, Administration, Buddhism & Nalanda.	Prof. Sandipan Sarkar	Prof. Sandipan Sarkar
V. Evolution of Political structures of Rashtakutas, Pala & Pratiharas. VI. Emergence of Rajputa States in Northern India : Polity, Economy & Society.	Prof. Monalisa Sreemani	Prof. Sudeshna Mallick
VII. Arabs in Sindh : Polity, Religion &		

Society. VIII. Struggle for Power in Northern India & establishment of Sultanate.	Prof. Animesh Das	Prof. Sudeshna Mallick
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PART - II

PAPER - II (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>Module -1</p> <p>Akbar and the Political expansion of Mughal Empire. Akbar's relation with the Rajputs. Evolution of Akbar's religious policy.</p> <p>Module -2</p> <p>The Manasabdari System and the emergence of a composite ruling class. Expanding frontiers of Mughal Empire in post-Akbar India.</p> <p>Module -4</p> <p>Mughal economy: land revenue - commercial expansion. Mughal art and architecture. Historiographical debate on the break up of the Mughal Empire .</p> <p>Module -3</p> <p>Climax and crisis of the Mughal Empire under Aurangzeb: Aurangzeb's entanglements in the Deccan . Rise of Shivaji and the Mughal –Maratha Contest for supremacy. Changes in the Rajput policy and the religious policy of the Mughals in the reign of Aurangzeb.</p> <p>Module -5</p> <p>Political ascendancy of the English East India Company in Bengal (1757-65) English East India Company's relation with the Indian states – Marathas, Mysore , Sikhs . British policies of colonial annexation – subsidiary alliance, Doctrine of Lapse.</p>	SN

<p>Module -1 Colonial economy: Land revenue settlements - Bengal, North India, South and west India. Drain of wealth. De-industrialization.</p> <p>Module -2 English education in Bengal up to 1857. Indian response to westernization: Raja Ram Mohan Roy – Young Bengal, Vidyasagar - Prarthana Samaj - Arya Samaj . Aligarh movement and the modernization of Islam.</p> <p>Module -3 Early resistance to colonial rule: Wahabi and Faraizi movements – Santal rebellion. The revolt of 1857. Growth of National Consciousness: Politics of Association - The Birth of Indian National Congress.</p> <p>Module -4 The nature of early Congress under moderate leadership. Ideology and programme of militant nationalists. The Swadeshi movement. The birth of All India Muslim League. Revolutionary terrorism in Bengal and Punjab. Impact of the First World War on Indian economy, society and polity.</p>	SS
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PAPER: III (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>Module – 1 Background – Renaissance and Reformation Geographical Discoveries Scientific Revolution, Advent of Capitalism (A brief overview)</p> <p>Module – 2 2.1 The French Revolution – socioeconomic bakground: Role of the phierophers.</p>	AD

2.2 Progress of the Revolution: Popular Movements: Jacobins and Girondins.

Module – 3

Rise of Napoleon: Internal Reconstruction

Napoleon and Europe. Napoleon and revolution.

Module – 4

Political Developments in Europe from (1815 – 1870)

Triumph of conservatism – The Metternich System Stages of Italian Unification

Unification and Consolidation of Germany

Russia: Attempts at Reforms by Alexander II.

Module – 5

Society and Economy in Nineteenth Century Europe

Industrial Advances in England and the Continent

Utopian Socialism and Marxism

Art, Culture, Literature and Science.

Module – 1

Europe between 1871-1914: New Balance of Power, scramble for colonies in Asia and Africa

Module – 2

The Eastern Question: Main Issues – Crimean War, Balkan Nationalism (A brief overview)

Module – 3

Triple Alliance, Triple Entente and the emergence of two armed camps;

Origins of the First World War – Issues and Stakes;

Russian Revolution of 1917.

Module – 4

Peace settlement of 1919: Its long term consequences

Birth of the German Republic.

Module – 5

Europe in the Inter War period (1919-1939).

Consolidation of economic and political power of the Soviet

State; Rise of Fascism in Italy; Rise of Nazism in Germany; Aggressive foreign politics; Outbreak of the second World War.	
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PART - III

PAPER - IV (100 MARKS)

TOPICS	ASSIGNED TEACHERS
<p>Module-1 Understanding the causes of the partition of India . Impact of Partition on Indian polity, economy , society and culture .</p> <p>Module-2 Adoption of a republican constitution in 1950 : Salient features of the Indian Constitution. Nehru and the development of Parliamentary democracy in India .</p>	SN
<p>Module-3 Economic Planning : First three five year plans .</p> <p>Module-4 Social movements in contemporary India .</p> <p>Module-5 Indo-Pakistan relations . India and the Non-Aligned Movement .</p>	SS
<p>Module-1 Debate on the origins of the cold war.</p> <p>Module-2 Cold war and the emergence of the U.S and Soviet military and economic alliances – NATO , IMF , WARSAW , WTO . U.S. Foreign policy in the post-war period; Truman Doctrine and Marshall</p>	MS

<p>Plan .</p> <p>Module-3</p> <p>Bipolarism and regional conflicts :</p> <p>War in Korea</p> <p>Conflict in the Middle East: Arab-Israel War of 1948-49 , 1967 , 1973 .</p>	
<p>Module-4</p> <p>Impact of the emergence of China on the Worlds Politics.</p> <p>Sino-Indian relations.</p> <p>Module-5</p> <p>India and the liberation war of Bangladesh.</p> <p>The liberation struggle of Vietnam (1954-75).</p> <p>Module-6</p> <p>End of the socialist regime and the disintegration of U.S.S.R.</p>	<p>PB</p>

PHILOSOPHY HONOURS

Semester 1	ASSIGNED TEACHERS
Core course(H) 1 PHIA-A-CC-1: Indian Philosophy – I (84 Credits)	
<p>A. Introduction: Division of Indian Philosophical Schools:Āstika and Nāstika (4)</p> <p>B. Cārvāka School—Epistemology, Metaphysics, Ethics.(8)</p>	<p>SB</p>
<p>C. Jainism—Concept of Dravya, Sat, Guṇa, Paryāya Anekāntavāda, Syādvāda and Saptabhaṅginaya.(10)</p> <p>D. Buddhism— Four noble Truths, Theory of Dependent Origination (Pratītyasamutpādvāda), Definition of Reality (Arthakriyākāritva), Doctrine of Momentariness, (Kṣanabhangavāda), Theory of no-soul (Nairātmyavāda), Four Schools of Buddhism (Basic tenets).(12)</p>	<p>SM</p>

E. Nyāya –Pramā and Pramāṇa, Pratyakṣa (Definition), Sannikarṣa, Classification of Pratyakṣa: Nirvikalpaka, Savikalpaka, Laukika, Alaukika; (12) F. Anumiti, Anumāna (Definition), vyāpti, parāmarśa, Classification of Anumāna: pūrvavat, śesavat, smānyatodṛṣṭa, kevalānvayī, kevalavyātirekī, anvayavyātirekī, svārthānumāna, parārthānumāna, Upamāna (definition), Śabda (definition),(12)	MB
G. Vaiśeṣika—Seven Padārthas, dravya, guṇa, karma, sāmānya, viśeṣa, samavāya, abhāva, (14)	CM
H. Different types of causes: samavayī, asamavayī and nimitta. Asatkāryavāda.(12)	SD
Core Course (H) 2 PHIA-A-CC-2: History of Western Philosophy – I (84 Credits)	
A. Pre Socratic Philosophy: A brief outline (8)	SD
B. Plato: Theory of Knowledge, Theory of Forms.(10) C. Aristotle : Critique of Plato’s theory of Forms, Doctrine of four causes, Form and Matter (12)	CM
D. St. Thomas Aquinas: Faith and Reason, Essence and Existence.(8)	SD
E. Descartes: Cartesian method of doubt, cogito ergo sum, criterion of truth, types of ideas, Proofs for the existence of God, Mind- body dualism Proofs for the existence of the external world, (14)	MB
F. Spinoza: Doctrine of substance, Attributes and Modes, Existence of God, Pantheism, Three orders of knowing.(14)	SB
G. Leibniz: Monads, Truths of reason, Truths of facts, Innate ideas, Some metaphysical principles : Law of Identity of indiscernibles, Law of sufficient reason, Law of continuity, Doctrine of Pre-established harmony.(18)	SM

Semester 2	ASSIGNED TEACHERS
Core course (H) 3 PHIA-A-CC-3 Outlines of Indian Philosophy – II (84 Credits)	
A. Sāmkhya—Satkāryavāda, Nature of Prakṛti, its constituents and proofs for its existence. Nature of Puruṣa and proofs for its existence, Plurality of Puruṣas, theory of evolution. (20)	MB

B. Yoga—Citta, Cittavṛtti, Cittabhūmi. Eight fold path of Yoga, God. (14 classes)	SB
C. Mīmāṃsā (Prābhakara and Bhāṭṭa) :Anvitābhīdhānvāda and avihitānvayavāda, Arthāpatti and Anupalabdhi as sources of knowledge (22 classes)	SD
D. Advaita Vedānta—Sankara’s view of Brahman, Saṅḡa and Nirḡḡa Brahman, Three grades of Sattā: prātibhāsika, vyavahārika and pāramārthika, Jīva, Jagat and Māyā.(24 classes)	SM
E. Viśistādvaita—Rāmānuja’s view of Brahman, Jīva, Jagat. Refutation of the doctrine of Māyā. (10 classes)	CM
Core Course (H) 4 PHIA-A-CC-4 History of Western Philosophy – II (84 Credits)	
A. Locke : Refutation of innate ideas, the origin and formation of ideas, simple and complex ideas, substance, modes and relations, nature of knowledge and its degrees, limits of knowledge, primary and secondary qualities, representative realism.(22)	SB
B. Berkeley: Refutation of abstract ideas. Criticism of Locke’s distinction between primary and secondary qualities, Immaterialism, esse-est-percipi, role of God.(18)	SM
C. Hume:Impression and ideas, association of ideas, distinction between judgements concerning relations of ideas and judgements concerning matters of fact, theory of causality, theory of self and personal identity, scepticism. (24)	MB
D. Kant :Conception of critical Philosophy, distinction between a priori and a posteriori judgements, distinction between analytic and synthetic judgements. Synthetic a priori judgements, General problem of the Critique, Copernican Revolution in Philosophy, Transcendental Aesthetic : Space & time— Metaphysical & Transcendental expositions of the ideas of space & time.(26)	CM SD

Part-II
PAPER-III (HISTORY OF WESTERN PHILOSOPHY)
100 marks
Half-I (50 marks)
Half –II (50 marks)

TOPICS	ASSIGNED TEACHERS
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<p>Half-I Unit-I A. Plato: Theory of Knowledge , Theory of Forms. B. Aristotle : Critique of Plato’s theory of Forms, theory of Causation.</p>	<p>SD</p>
<p>Ist Half -- Unit-II</p> <p>A. Descartes : Cartesian method of doubt, cogito ergo sum, criterion of truth, types of ideas, Proofs for the existence of God, Proofs for the existence of the external world. B. Spinoza : Doctrine of substance, attributes and modes, existence of God, Pantheism, three orders of knowing. C. Leibniz : Monads, truths of reason, truths of facts, innateness of ideas, Some metaphysical principles : Law of Identity of indiscernibles, Law of sufficient reason, Law of continuity, Doctrine of Pre-established harmony.</p>	<p>SB</p>
<p style="text-align: center;">Half-II (50 marks)</p> <p>Unit—III A. Locke : Refutation of innate ideas, the origin and formation of ideas, simple and complex ideas, substance, modes and relations, nature of knowledge and its degrees, limits of knowledge, primary and secondary qualities, representative realism. B. Berkeley : Refutation of abstract ideas. Criticism of Locke’s distinction between primary and secondary qualities, Immaterialism, esse-est-percipi, role of God. C. Hume : Impression and ideas, association of ideas, distinction between judgements concerning relations of ideas and judgements concerning matters of fact, theory of causality, theory of self and personal identity, Scepticism.</p> <p>Unit—IV A. Kant : Conception of critical Philosophy, distinction between a priori and a posteriori judgements, distinction between analytic and synthetic judgements. Possibility of Synthetic a priori judgements, General problem of the Critique. Transcendental Aesthetic : Space & time—Metaphysical & Transcendental expositions of the ideas of space & time.</p>	<p>MB</p>

Part-II
PAPER-IV (WESTERN LOGIC)
100 marks
Half-I (50 marks)
Half –II (50 marks)

TOPICS	ASSIGNED
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	TEACHERS
<p>Half-I Unit—I</p> <p>A. Logic and Arguments, Deductive and Inductive Arguments, Truth and Validity. Categorical propositions and classes: quality, quantity and distribution of terms, Translating categorical propositions into standard form. B. Immediate inferences: Conversion, Obversion and Contraposition, Traditional square of opposition and Immediate Inferences based there on; Existential Import, symbolism and Diagrams for categorical propositions. C. Categorical Syllogism: Standard Form categorical Syllogism; The Formal nature of Syllogistic Argument, Rules and Fallacies, General Rules; To test Syllogistic Arguments for validity (by applying general rules for syllogism); To solve problems and prove theorems concerning syllogism. D. Boolean Interpretation of categorical propositions; Review of the Traditional Laws of Logic concerning immediate inference and syllogism; Venn Diagram Technique for Testing Syllogisms, Hypothetical and Disjunctive Syllogisms, Enthymeme, The Dilemma.</p>	CM
<p>Ist Half -- Unit-II</p> <p>A. Induction: Argument by Analogy, Appraising Analogical Arguments, Refutation by Logical Analogy. B. Causal Connections: Cause and Effect, the meaning of “Cause”; Induction by Simple Enumeration; Mill’s Method of Experimental Inquiry; Mill’s Method of Agreement, Method of Difference, Joint Method of Agreement and Difference, Method of Residues, Method of Concomitant Variations; Criticism of Mills Methods, Vindication of Mill’s Methods. C. Science and Hypothesis: Explanations; Scientific and Unscientific, Evaluating Scientific Explanations; The pattern of Scientific Investigation; Crucial Experiments and Ad Hoc Hypotheses. D. Probability: Alternative Conception of Probability; The Probability Calculus; Joint Occurrences; Alternative Occurrences.</p>	SM
<p style="text-align: center;">Half-II (50 marks)</p> <p>Unit—III</p> <p>A. Symbolic Logic: The value of special symbols; Truth-Functions; Symbols for Negation, Conjunction, Disjunction, Conditional Statements and Material Implication; Argument Forms and Arguments, Statement Forms and Statements; Material Equivalence and Logical Equivalence; B. Tautologous, Contradictory and Contingent Statement-Forms; The Paradoxes of Material Implication; The Three Laws of Thought. C. Testing Argument Form and Argument; Statement-Form and Statement for Validity by a) The Method of Truth-table. b) The Method of Resolution (Fellswoop & Full Sweep)[dot notation excluded]; D. The Method of Deduction: Formal Proof of Validity: Difference between Implicational Rules and the Rules of Replacement; Construction of Formal Proof of Validity by using nineteen rules; Proof of invalidity by assignment of truth-values.</p>	SM
<p>Unit—IV</p> <p>A. Quantification Theory: Need for Quantification Theory, Singular Propositions; Quantification; Translating Traditional subject predicate proposition into the logical notation of propositional function and quantifiers; B. Quantification Rules and Proving Validity; Proving Invalidity for arguments involving quantifiers</p>	CM

Part-III

TOPICS	ASSIGNED TEACHERS
PAPER-V (INDIAN LOGIC AND EPISTEMOLOGY)	MB

<p style="text-align: center;">100 marks</p> <p style="text-align: center;">Recommended Text: Tarkasaūgraha with Dīpikā by Annambhatta. (Buddhikhanda- from the definition of cognition to the division of memory into two kinds)</p> <p style="text-align: center;">Half-I (50 marks)</p> <p>Unit-I A. Definition of buddhi or jñāna (cognition), its two kinds; Definition of smṛti; Two kinds of smṛti (memory); Definition of anubhava, its division into veridical(yathārtha) and non-veridical(ayathārtha);Three kinds of non-veridical anubhava; Definitions clarified in Tarkasaūgraha Dīpikā. B. Four-fold division of pramā and pramāḍa. Definition of “Karaḍa” (special causal condition) and “kāraḍa” (general causal condition). The concept of anyathāsiddhi (irrelevance) and its varieties. The definition of kārya (effect). Kinds of cause: smavāyi, a-samavāyi and nimiñña kāraḍa (definitions and analysis).</p> <p>Unit-II A. Definition of pratyakūa and its two-fold division : nirvikalpaka and savikalpaka jñāna. Evidence for the actuality of nirvikalpaka. B. Sannikarūa and its six varieties. Problem of transmission of sound; the claim of “anupalabdhī” as a distinctive pramāḍa examined.</p> <p style="text-align: center;">Half-II (50 marks)</p> <p>Unit-III A. Definiton of anumāna, anumiti and parāmarśa. Analysis of pakṣatā. Definition of vyāpti; Vyāptigraha. B. Definition of pakūadharmatā—svārthānumiti and parārthānumiti; Analysis of pañcāvayavi Nyāya. Necessity of parāmarśa. Three kinds of linga or hetu: kevalānvayi, kevalayatirekī and anvayavyatirekī. Definiton of pakūa, Sa-pakūa and vipakṣa with illustrations. Marks of sadhetu. C. Hetvābhāsa-two types of definition. Five kinds of hetvābhāsa: (1) “Savyabhicāra and its three kinds-defined and illustrated; (2) “Viruddha” defined and illustrated; (3) “Satpratipakūa” defined and illustrated; (4) Three kinds of “Asiddha” enumerated; (a) 16 āśrayāsiddhi (b) svarūpāsiddhi and (c) vyāpyatvāsiddhi. Vyāpyatvāsiddhi defined as“sopādhika hetu”. Upādhi and its four kinds (definition and illustration) (5) “Bādhita” (definition and illustration).</p> <p>Unit-IV A. “Upamāna pramāḍa” :Definition and analysis. “Śabda pramāna” : Definition and analysis. “Śakti” (the direct signifying power), the pada- padārtha-sambandha considered as Īśvara-samketa, Controversy between the Mīmāūsakas and the Naiyāyikas regarding the nature of Śakti as universal or particular, B. “Śaktigraha” (ascertainment of the meaning-relation), laksana, varieties of laksana, Analysis of “Gauḍī vṛtti” (the secondary signifying power of a term), “Vyāñjanā-vṛtti” (the suggestive power of a term) analysed as a kind of śakti or lakūaḍa, C. The question of lakūanā-bīja tātparya, The concept of “yoga-rūḍhi”. The three conditions of “śābda-bodha”—ākānkūā, yogyatā and sannidhi. Two kinds of statements distinguished— Vaidika and Laukika. D. “Arthāpatti” as a distinctive pramāḍa: Controversy between the Mīmāūsakas and the Naiyāyikas. E. The theory of prāmānya:the issue between svataḥ-prāmānyavada and parataḥ-prāmānyavada regarding utpatti and jñapti;the Prābhākara theory of akhyāti.</p>	
<p style="text-align: center;">PAPER--VI (PHILOSOPHY OF LANGUAGE, EPISTEMOLOGY AND METAPHYSICS [WESTERN]) 100 marks Recommended Text: An Introduction to Philosophical Analysis—John Hospers Half-I (50 marks)</p> <p>Unit-I Meaning and Definition:</p>	SM

<p>A. Word-meaning, Definitions, B. Vagueness, C. Sentence-meaning.</p> <p>Unit-II</p> <p>Knowledge A. Concepts, Truth, B. Sources of Knowledge, C. Some Principal uses of the verb “To know”, Conditions of Propositional Knowledge, Strong and weak senses of “know”. Necessary Truth A. Analytic truth and logical possibility, B. The apriori, C. The Principles of Logic.</p> <p style="text-align: center;">Half-II (50 marks)</p> <p>Unit-III</p> <p>Empirical Knowledge: A. Law, Theory and Explanation, B. The Problem of Induction, C. Testability and Meaning. Cause, Determinism and Freedom: A. What is Cause? B. The Causal Principles, C. Determinism and Freedom.</p> <p>Unit-IV</p> <p>Our Knowledge of the Physical World: A. Realism, Idealism, B. Phenomenalism Some Metaphysical Problems C. Substance and Universal</p>	
<p style="text-align: center;">PAPER—VII (ETHICS AND PHILOSOPHY OF RELIGION) 100 marks Half-I (50 marks) ETHICS</p> <p style="text-align: center;">Unit-I-- Indian Ethics</p> <p>Indian Ethics A. Introduction: Concerns and Presuppositions Concept of Sthitaprañjna Karmayoga: (Gīta) Puruūārthas and their inter-relations. B. Meaning of Dharma, Concept of èōa and èta. Classification of Dharma: Sāmānya dharma, vişeùadharma, sādharmaadharma, C. Pancaśīla, Brahmavihārabhāvanā (Bauddha) Anuvrata, Mahāvratā, Ahimsā. (Jaina)</p> <p style="text-align: center;">Unit-II- Western Ethics</p> <p>Western Ethics A. Nature and Scope of Ethics Moral and Non-moral actions, Object of Moral Judgement—Motive and Intention B. Standards of Morality: Hedonism—Ethical, Psychological. Utilitarianism: Act—utilitarianism, Rule-utilitarianism. Deontological Theories: Act-Deontological Theories, Rule-Deontological Theories—Kant’s Theory. C. Theories of punishment.</p>	<p>SB</p>

<p style="text-align: center;">Half-II (50 marks) Philosophy of Religion</p> <p style="text-align: center;">Unit-III</p> <p>A. Nature and scope of Philosophy of Religion. Doctrine of karma and rebirth, doctrine of liberation, (Hindu, Bauddha and Jaina views). B. The Philosophical teachings of the Holy Quoran: God the ultimate Reality, His attributes, His relation to the world and man. C. Some basic tenets of Christianity: The doctrine of Trinity, The theory of Redemption</p> <p style="text-align: center;">Unit-IV</p> <p>A. Arguments for the existence of God: Cosmological, Teleological and Ontological arguments, Nyāya arguments B. Grounds for Disbelief in God: Sociological theory (Durkheim), Freudian theory, Cārvāka, Bauddha and Jaina views C. The Peculiarity of Religious Language: The doctrine of analogy, Religious statements as Symbolic, Religious language as Non-Cognitive (Randal's view), the language game theory (D.Z. Phillip).</p>	
<p style="text-align: center;">Paper—VIII (OPTIONAL PAPER)</p> <p style="text-align: center;">An Enquiry Concerning Human Understanding: David Hume</p> <p style="text-align: center;">Half-I (50 marks)</p> <p>Unit-I Chapter 1—3</p> <p>Unit-II Chapter 4—6</p> <p style="text-align: center;">Half-II (50 marks)</p> <p>Unit-III Chapter 7—9</p> <p>Unit-IV Chapter 10—12</p>	<p style="text-align: center;">CM</p> <p style="text-align: center;">SD</p>

PHILOSOPHY GENERAL

**Ist Year General Course
CBCS**

Semester 1: [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2 nd subject (CC-G-)) and Students for Philosophy as third subject in Pure General (GE-1)]	ASSIGNED TEACHERS
Core Course- CC(G)-1/GE(H)/GE-1-Indian Epistemology and Metaphysics (60 CREDITS) A. Cārvāka Epistemology: Perception as the only source of knowledge; Refutation of Inference and Testimony as source of knowledge. (8)	SB
B. Nyāya Epistemology: The nature of perception; laukikasannikarṣa; Determinate (savikalpaka) and Indeterminate (nirvikalpaka): anumāna; sādhyā, pakṣa, hetu, vyāpti, parāmarśa and vyāptigraha. svārthānumiti and parārthānumiti, pañcāvayavīnyāya. (20)	MB X
C. Vaiśeṣika Metaphysics: Categories – dravya, guna, karma, sāmānya, viśeṣa, samavāya and abhāva. (20)	CM
D. Advaita Metaphysics: Brahman, māyā, The relation between jīva and Brahman. (12)	SM
Semester 2: [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2 nd subject (CC-G-)) and Students for Philosophy as third subject in Pure General (GE-1)]	
Core Course- CC(G)-1/GE(H)/GE-1- Western Epistemology and Metaphysics (60 CREDITS) A. Different senses of ‘Know’. Conditions of Propositional Knowledge, Origin of Concepts. Concept Rationalism-Views of Descartes and Leibniz, Concept Empiricism –Views of Locke, Berkeley and Hume. (14 CLASSES)	SM
B. Theories of the origin of Knowledge: Rationalism, Empiricism, Kant’s Critical Theory.(12 CLASSES)	MB
C. Realism: Naive Realism, Locke’s Representative, Realism, Subjective Idealism (Berkeley). (12CLASSES)	CM
D. Causality: Entailment Theory, Regularity Theory. (8CLASSES)	X
E. Mind- Body Problem: Interactionism, Parallelism and the Identity Theory.(14 CLASSES)	SB

**PART-II
PAPER—II
(WESTERN LOGIC AND PSYCHOLOGY)
100 marks
Half-I (50 marks)
Unit-I**

TOPICS	ASSIGNED TEACHERS
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<p style="text-align: center;">Half-I (50 marks) Western Logic</p> <p style="text-align: center;">Unit-I</p> <p>A. Introductory topics: Sentence, Proposition, argument, truth and validity. B. Aristotelian classification of categorical propositions, distribution of terms, Existential Import Boolean interpretation of categorical propositions. Immediate inference. Immediate inference based on the square of opposition, conversion, obversion and contraposition. C. Categorical syllogism: Figure, mood, rules for validity, Venn Diagram method of testing validity, fallacies.</p> <p style="text-align: center;">Unit-II</p> <p>A. Symbolic Logic: Use of symbols Truth-functions: Negation, Conjunction, disjunction, implication, equivalence. B. Tautology, Contradiction, Contingent statement forms. Construction of truth-table, using truth-tables for testing the validity of arguments and statement forms. C. Mill's methods of experimental inquiry.</p>	CM
<p style="text-align: center;">Half –II (50 marks) PSYCHOLOGY</p> <p style="text-align: center;">Unit-III</p> <p>A. Sensation: What is sensation? Attributes of sensation. Perception: What is perception? Relation between sensation and perception, Gestalt theory of perception, illusion and hallucination. B. Consciousness: Conscious, Subconscious, Unconscious, Evidence for the existence of the Unconscious, Freud's theory of dream.</p>	MB
<p style="text-align: center;">Half –II (50 marks) PSYCHOLOGY</p> <p style="text-align: center;">Unit-IV</p> <p>A. Memory: Factors of memory, Laws of association, Forgetfulness. Learning: The Trial and Error theory, Pavlov's Conditioned-Response theory, Gestalt theory. B. Intelligence: Measurement of Intelligence, I.Q., Test of Intelligence, Binnet-Simon test.</p>	SB

PART-II
PAPER—III
(ETHICS AND PHILOSOPHY OF RELIGION)
100 marks

TOPICS	ASSIGNED TEACHERS
<p style="text-align: center;">Half-I (50 marks) Ethics (Indian and Western)</p> <p style="text-align: center;">Unit-I</p> <p>A A. Four Puruùārthas- Dharma, artha, kāmà and mokùà and their interrelation Karma (Sakāmà & Niùkāmà) Cārvāka Ethics B. Buddhist Ethics: The Four Noble Truths and the Eight-fold Path</p>	SM

Unit-II Ethics (Western) A. Moral and Non-moral Actions Object of Moral Judgement B. Teleological Ethics: Utilitarianism (Bentham and Mill) Deontological Ethics: Kant's Moral Theory C. Theories of Punishment	X
Half-II (50 marks) Applied Ethics and Philosophy of Religion	
Unit-III A. Concept of Applied Ethics. B. Killing: Suicide, Euthanasia.	SM
Unit-III C. Famine, Affluence and Morality. D. Environmental Ethics: Value Beyond Sentient Beings, Reverence for life, Deep Ecology	X
Unit-IV A. Nature & Concerns of Philosophy of Religion. Argument for the existence of God: Cosmological argument, Ontological argument and Teleological argument. B. Problem of Evil and Suffering. C. Grounds for disbelief in God: Sociological theory of Durkheim, Freudian Theory, Carvaka View	MB

PART-III
PAPER—IV
(SOCIAL-POLITICAL PHILOSOPHY AND CONTEMPORARY INDIAN
THOUGHT)
100 marks

TOPICS	ASSIGNED TEACHERS
Half-I (50 marks) (Social-Political Philosophy Unit-I A. Primary Concepts: Society, Community, Association, Institution. B. Social Groups: Its Different Forms. Family: Its Different Forms. C. Social class and Caste: Principles of Class and Caste; Marxist conception of class; Class Attitudes and Class consciousness.	CM
Unit-II A. Social Codes: Religious and Moral Codes; Custom and Law; Culture and Civilization. B. Political Ideals: Democracy: Its Different Forms. Socialism: Utopian and Scientific Socialism.	MB
Half-II (50 marks) (Contemporary Indian Thought: Swami Vivekananda, M.K.Gandhi and B.R.Ambedkar)	

Unit-III A. Swami Vivekananda: Nature of man, nature of religion. B. The ideal of a universal religion, Practical Vedānta.	X
Unit-IV A. Gandhi: Nature of man, non-violence, satyāgraha, theory of trusteeship. B. Ambedkar: Critique of social evils, Dalit movement.	

POLITICAL SCIENCE HONOURS

SEMESTER I

Core Courses

**Paper : UNDERSTANDING POLITICAL THEORY: CONCEPT (PAPER
CODE: PLS-A-CC-1-1-TH+TU)**

**FULL MARKS 100 (TH=65, INT. ASSESSMENT=10, TU=15,
ATTENDANCE=10)**

MODULE	TOPIC	TEACHERS ASSIGNED
I	1	NB
I	2	NB & BL
I	3	DD
II	4	SJ
II	5	SJ & DD
II	6	DS

**Paper : UNDERSTANDING POLITICAL THEORY: APPROACHES &
DEBATES (PAPER CODE: PLS-A-CC-1-2-TH+TU)**

**FULL MARKS 100 (TH=65, INT. ASSESSMENT=10, TU=15,
ATTENDANCE=10)**

MODULE	TOPIC	TEACHERS ASSIGNED
I	1	NB
I	2	SJ

I	3	NB
II	4	DD
II	5	NB & DD
II	6	BL , DS, & SJ

SEMESTER II

Core Courses

**Paper : CONSTITUTIONAL GOVERNMENT IN INDIA (PAPER CODE:
PLS-A-CC-2-3-TH+TU)**

**FULL MARKS 100 (TH=65, INT. ASSESSMENT=10, TU=15,
ATTENDANCE=10)**

MODULE	TOPIC	TEACHERS ASSIGNED
I	1	NB & SJ
I	2	SJ
I	3	NB
I	4	NB
II	5	DD & SJ
II	6	DD
II	7	BL
II	8	BL

**Paper : POLITICS IN INDIA : STRUCTURES & PROCESSES (PAPER
CODE: PLS-A-CC-2-4-TH+TU)**

**FULL MARKS 100 (TH=65, INT. ASSESSMENT=10, TU=15,
ATTENDANCE=10)**

MODULE	TOPIC	TEACHERS ASSIGNED
I	1	NB
I	2	BL
I	3	NB & DD
II	4	SJ
II	5	NB
II	6	DD

PART II: SECOND YEAR (200 MARKS)

PAPER III: INDIAN POLITICAL THOUGHT & MOVEMENT

FULL MARKS 100 (25 X 4 MODULES)

MODULE	TOPICS	TEACHERS ASSIGNED
I	3.1.1.	NB
I	3.1.2.	DD
I	3.1.3	DD
I	3.1.4.	BL
II	3.2.1.	NB
II	3.2.2.	DS
II	3.2.3	SJ
II	3.2.4	SJ
III	3.3.1.	SJ
III	3.3.2.	SJ
III	3.3.3.	BL & DS
III	3.3.4.	NB
IV	3.4.1.	NB

IV	3.4.2.	DD
IV	3.4.3.	SJ

PAPER IV: COMPARATIVE GOVERNMENT & POLITICS

FULL MARKS 100 (25 X 4 MODULES)

MODULE	TOPICS	TEACHERS ASSIGNED
I	4.1.1.	NB
I	4.1.2.	NB
I	4.1.3.	DS
II	4.2.1.	DD
II	4.2.2.	DD
III	4.3.1.	BL
III	4.3.2.	SJ
IV	4.4.1.	SJ
IV	4.4.2.	SJ
IV	4.4.3.	BL

PART III : THIRD YEAR (400 MARKS)

PAPER V : WESTERN POLITICAL THOUGHT

FULL MARKS 100 (25 X 4 UNITS)

TOPICS	TEACHERS ASSIGNED
UNIT I	SJ
UNIT II	DD
UNIT III	DS
UNIT IV	NB

PAPER VI: INDIAN POLITICAL THOUGHT & MOVEMENT

FULL MARKS 100 (25 X 4 UNITS)

TOPICS	TEACHERS ASSIGNED
UNIT I	DS
UNIT II	DS
UNIT III	SJ
UNIT IV	SJ

PAPER VII: POLITICAL SOCIOLOGY

FULL MARKS 100 (25 X 4 UNITS)

TOPICS	TEACHERS ASSIGNED
UNIT I	DD
UNIT II	NB
UNIT III	NB
UNIT IV	DD

PAPER VIII: PUBLIC ADMINISTRATION

FULL MARKS 100 (25 X 4 UNITS)

TOPICS	TEACHERS ASSIGNED
UNIT I	NB
UNIT II	NB
UNIT III	BL
UNIT IV	BL

**POLITICAL SCIENCE GENERAL- CBCS SYLLABUS – FIRST YEAR
(SESSION 2018-19)**

SEMESTER I

CORE COURSES

**Paper : INTRODUCTION TO POLITICAL THEORY: CONCEPT (PAPER
CODE: PLS-G-CC-1-1-TH+TU)**

**FULL MARKS 100 (TH=65, INT. ASSESSMENT=10, TU=15,
ATTENDENCE=10)**

MODULE	TOPIC	TEACHERS ASSIGNED
I	1	BL
I	2	SJ & DS
I	3	DD
I	4	BL
II	5	SJ
II	6	DD
II	7	DS

SEMESTER II

CORE COURSES

**Paper : COMPARATIVE GOVT. & POLITICS (PAPER CODE:
PLS-G-CC-2-2-TH+TU)**

**FULL MARKS 100 (TH=65, INT. ASSESSMENT=10, TU=15,
ATTENDENCE=10)**

MODULE	TOPIC	TEACHERS ASSIGNED
I	1	DD
I	2	SJ
I	3	BL & DD
II	4	BL

II	5	SJ
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**POLITICAL SCIENCE GENERAL, SECOND YEAR, PART-II -200
MARKS**

**PAPER-II: COMPARATIVE POLITICS AND GOVERNMENT
FULL MARKS-100**

TOPICS	TEACHERS ASSIGNED
1	NB
2	BL
3	DS
4	SJ
5	DD

**PAPER-III: GOVERNMENT AND POLITICS IN INDIA
FULL MARKS-100**

TOPICS	TEACHERS ASSIGNED
1	SJ
2	SJ
3	NB
4	NB
5	DS
6	DD
7	SJ
8	BL
9	NB

10	BL
11	DS
12	DD

POLITICAL SCIENCE GENERAL, THIRD YEAR, PART-III -100 MARKS

PAPER-IV: CONTEMPORARY POLITICAL AND ADMINISTRATIVE ISSUES IN INDIA FULL MARKS-100

TOPICS	TEACHERS ASSIGNED
1	DS
2	DD
3	BL
4	DD
5	DS
6	BL
7	DD
8	DS

**CBCS
2018 (July-Dec) ODD SEMESTER
Sanskrit Honours
SANA**

Semester-1

SANA CC-1

Sl. No.	Topic	Faculty
1	Raghuvamsa Canto.1, Verses-1-10 & 11-25	AS & SN
2	Kumarsambhavam Canto.5, Verses 1-15 & 16-30	AM & SP
3	Kiratarjuniyam Canto.1, Verses 1-16 & 17-25	AM & AS
4	Nitisatakam 1-10 & 11-20	SN & AS
5	Origin & development of Mahakavya & Gitikavya	AS & SP

SANA CC-2

Sl. No.	Topic	Faculty
1	Vedic Literature –Samhita	SN
2	Brahamana, Aranyaka, Upanisad	AS
3	Ramayana	AM
4	Mahabharata	AS
5	Purana	SP
6	General introduction to vyakarana , Darsana, Sahitya	AM & AS & SP

CBCS
2019 (Jan-June) EVEN SEMESTER

SEMESTER 2
SANA CC-3

Sl. No.	Topic	Faculty
1	Sukanashopadesha	AS
2	Rajbahanacharitam	AM
3	Origin & development of prose ,Important prose romances & Fables	SP

SANA CC-4
Self Management in the Gita

Sl. No.	Section	Topic	Faculty
1	A	Gita –Cognition & emotive apparatus	AM
2	B	Gita- Controlling the mind confusion & conflict	AS
3	C	Gita- Self Management through devotion	SP

Sanskrit General

YEAR -I

SANG CC-A-1

Sl. NO.	Topic	Faculty
1	Raghuvamsam Canto.1, Verses 1-10 & 11-25	AS & SP
2	Sishupalabadha Canto.1, Verses 1-15 & 16-30	AM & SP
3	NItisatakam Verses-1-10 & 11-20	SN & AS
4	History of Sanskrit Poetry	AM & AS

SANG CC-A 2**Sanskrit Prose**

Sl. No.	Section	Topic	Faculty
1	A	Sukanasopadesha	AS
2	B	Sivarajavijayam Nivasa-1	AM
3	C	Survey of Sanskrit Literature	SP

PART -2**SANG (Old Syllabus)****PAPER -2**

Sl. NO.	Topic	Faculty
1	Abhijnanasakuntala of Kalidasa	AM
2	Raghuvamsa of Kalidasa	AS
3	General Grammar –Samasa, taddhita, Krit	SN
4	Translation –Sanskrit to Bengali	SP

PAPER—3

Sl. No.	Topic	Faculty
1	History of Classical Sanskrit Literature	AS
2	Ishopanisad	SN
3	Valmiki Ramayan-Balakanda	AM
4	Manusamhita Chapter-7	AM

PART –3**SANG (Old Syllabus)****Paper -4**

Sl. No	Topic	Faculty
1	Sahityadarpana of Visvaanath	AM
2	History of Scientific work	SP
3	Mahabharata	AS
4	Comprehension In Sanskrit	AM

Department of Education
General/ Pass Stream

CC1/ GE1- Paper Name: - Introduction to Education (1st Semester)

UNIT	TOPIC	TEACHER
I	Concept of Education	PM
II	Factors of Education	PM
III	Agencies of Education	PM
IV	Child Centricism and Play-way in Education	PM

CC2/ GE2- Paper Name: - Psychological Foundation of Education (2nd Semester)

UNIT	TOPIC	TEACHER
I	Relation between Psychology and Education	PM
II	Stages and types of human development and their educational significance	PM
III	Learning concept and theories	PM
IV	Intelligence	PM

SEMESTER – I BOTANY HONOURS
(CORE COURSE 1 + CORE COURSE 2)

CORE COURSE 1

PHYCOLOGY AND MICROBIOLOGY (BOT-A-CC-1-1-TH)
THEORETICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>PHYCOLOGY</p> <ol style="list-style-type: none"> General account : 1.1. Thallus organization, Structure of algal cell, 1.2. Ultrastructure of Plastids and Flagella, 1.3. Origin and evolution of sex, 1.4. Life cycle patterns, 1.5. Significant contributions of important phycologists (Fritsch, Smith, R. N. Singh, T.V. Desikachary, H.D. Kumar, M.O.P. Iyengar) Classification: 2.1. Criteria and basis of Fritsch's classification Classification by Lee (2008) upto phylum with examples Salient features of Cyanobacteria, Rhodophyta, Chlorophyta, Charophyta, Bacillariophyta, Xanthophyta, Phaeophyta, Heterokantophyta. Cyanobacteria: 3.1. Ultrastructure of cell, 3.2. Heterocyst - structure and function, 3.3. Ecology. Bacillariophyta: 4.1. Cell structure, 4.2. Cell division, 4.3. Auxospore formation in Centrales and Pennales. Life History: 5.1. <i>Chlamydomonas</i>, 5.2. <i>Oedogonium</i>, 5.3. <i>Chara</i>, 5.4. <i>Ectocarpus</i>, 5.5. <i>Polysiphonia</i>, 5.6. Evolutionary significance of <i>Prochloron</i>. 	<p>NH (Unit 1,2,5)</p> <p>DT (Unit 3,4)</p>
<p>MICROBIOLOGY</p> <ol style="list-style-type: none"> Virus: 1.1. Discovery, 1.2. Plant virus- types, 1.3. Transmission and translocation of Plant virus, 1.4. TMV- Physicochemical characteristics and Multiplication, 1.5. One step growth curve, 1.6. Lytic cycle (T4 phage) and Lysogenic cycle (Lambda 	<p>SG</p>

<p>phage), Significance of lysogeny, 1.7. Viroids and Prions.</p> <p>2. Bacteria: 2.1. Discovery, 2.2. Distinguishing features of Archaea and Bacteria, 2.3. Characteristics of some major groups: Proteobacteria (Enterobacteria), Firmicutes, Mollicutes, Actinobacteria, Spirochaetes, Chlamydiae, 2.4. Bacterial growth curve and generation time, 2.5. Flagella (ultrastructure) & Pili, 2.6. Cell wall – chemical structure and differences between Gram +ve & Gram – ve bacteria, 2.7. Bacterial genome and plasmid, 2.8. Endospore - formation, structure and function, 2.9. Genetic Recombination (a) Transformation – with special emphasis on Natural and Induced competence and DNA uptake, (b) Conjugation— F- factor, F+ X F–, Hfr X F–, concept of F', chromosome mobilization, (c) Transduction— Generalised and specialized.</p>	BKP
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CORE COURSE 1
PHYCOLOGY AND MICROBIOLOGY (BOT-A-CC-1-1-P)
PRACTICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>ALGAE</p> <p>1. Work out of the following algae with reproductive structure (Free hand drawing and drawing under drawing prism with magnification): <i>Oedogonium, Chara, Ectocarpus</i>.</p> <p>2. Study of (a) Permanent slides : <i>Gloetrichia, Volvox, Vaucheria, Coleochaete, Polysiphonia, Centric and Pennate diatom;</i> (b) Macroscopic specimens : <i>Laminaria, Sargassum</i></p>	NH
<p>MICROBIOLOGY</p> <p>1. Preparation of bacterial media – (a) Nutrient agar and nutrient broth, (b) Preparation of slants and pouring Petri-plates.</p> <p>2. Sub-culturing of bacterial culture.</p> <p>3. Gram staining from bacterial culture.</p> <p>4. Microscopic examination of bacteria from natural habitat (curd) by simple staining</p>	NH
<p>FIELD WORK</p> <p>1. At least one local excursion to be conducted for study and collection of algae (only 5 from natural habitat) and</p> <p>2. Another local excursion should be conducted to give an</p>	NH SG

introductory idea about plant diversity (Collection not required).	
CLASSROOM PERFORMANCE <ol style="list-style-type: none"> Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes. Slides (permanent) prepared during practical classes. Submission (5 algae collected from natural habitat and identified latter) 	Respective Teachers

CORE COURSE 2
MYCOLOGY AND PHYTOPATHOLOGY (BOT-A-CC-1-2-TH)
THEORETICAL PAPER

TOPICS	ASSIGNED TEACHERS
MYCOLOGY <ol style="list-style-type: none"> General Account: 1.1. Hyphal forms, 1.2. Fungal spore forms and mode of liberation, 1.3. Sexual reproduction and degeneration of sex, 1.4. Parasexuality and sexual compatibility, 1.5. Life cycle patterns Classification: 2.1. Classification of Fungi (Ainsworth, 1973) upto sub-division with diagnostic characters and examples. 2.2. General characteristics of Myxomycota, Oomycota, Zygomycota, Ascomycota, Basidiomycota, Deuteromycota Life history: 3.1. <i>Synchytrium</i>, 3.2. <i>Rhizopus</i>, 3.3. <i>Ascobolus</i>, 3.4. <i>Agaricus</i>. Mycorrhiza: 4.1. Types with salient features, 4.2. Role in Agriculture & Forestry. Lichen: 5.1. Types, 6.2. Reproduction, 6.3. Economic and ecological importance 	PG
PHYTO-PATHOLOGY <ol style="list-style-type: none"> Terms and Definitions : 1.1. Disease concept, 1.2. Symptoms, 1.3. Etiology & causal complex, 1.4. Primary and secondary inocula, 1.5. Infection, 1.6. Pathogenecity and pathogenesis, 1.7. Necrotroph and Biotroph, 1.8. Koch's Postulates, 1.9. Endemic, Epidemic, Pandemic and Sporadic disease, 1.10. Disease triangle, 1.11. Disease cycle (monocyclic, polycyclic and polyetic). Host – Parasite Interaction: 2.1. Mechanism of infection (Brief idea about Pre-penetration, Penetration and Post-penetration), 2.2. Pathotoxin (Definition,criteria and example), 2.3. Defense mechanism with special reference to Phytoalexin, 2.4. Resistance- Systemic acquired and Induced 	SG

<p>systemic.</p> <p>3. Plant Disease Management : 3.1. Quarantine, 3.2. Chemical, 3.3. Biological, 3.4. Integrated.</p> <p>4. Symptoms , Causal organism, Disease cycle and Control measures of: 4.1. Late blight of Potato, 4.2. Brown spot of rice, 4.3. Black stem rust of wheat, 4.4. Stem rot of jute.</p>	
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CORE COURSE 2
MYCOLOGY AND PHYTOPATHOLOGY (BOT-A-CC-1-2-P)
PRACTICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>MYCOLOGY</p> <p>1. Work out of the following fungi with reproductive structures (including microscopic measurement of Reproductive structures): <i>Rhizopus</i> (asexual), <i>Ascobolus</i> , <i>Agaricus</i> .</p> <p>2. Study from permanent slides: Zygosporangium of <i>Rhizopus</i>, Conidia of <i>Fusarium</i>, Conidiophore of <i>Penicillium</i>.</p> <p>3. Morphological study of Fungi (fruit body of <i>Polyporus</i>, <i>Cyathus</i>), Lichens (fruticose and foliose).</p>	PG
<p>PHYTO- PATHOLOGY</p> <p>1. Preparation of fungal media (PDA).</p> <p>2. Sterilization process.</p> <p>3. Isolation of pathogen from diseased leaf.</p> <p>4. Inoculation of fruit and subculturing.</p> <p>5. Identification : Pathological specimens of Brown spot of rice, Bacterial blight of rice , Loose smut of wheat, Stem rot of jute, Late blight of potato; Slides of uredial, telial, pycnial & aecial stages of <i>Puccinia graminis</i>.</p>	PG
<p>FIELD WORK</p> <p>1. At least one local excursion to be conducted for study and collection of macrofungi (only 5).</p>	SG +DT
<p>CLASSROOM PERFORMANCE</p> <p>1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes.</p> <p>2. Slides (permanent) prepared during practical classes.</p> <p>3. Submission (5 fungi collected from natural habitat and identified latter)</p>	Respective Teachers

SEMESTER – II BOTANY HONOURS
(CORE COURSE 3 + CORE COURSE 4)
CORE COURSE 3
PLANT ANATOMY (BOT-A-CC-2-3-TH)
THEORETICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>PLANT ANATOMY</p> <ol style="list-style-type: none"> 1. Cell wall: 1.1. Ultrastructure & Chemical constituents, 1.2. Plasmodesmata- ultrastructure, 1.3. Concept of Apoplast and Symplast, 1.4. Growth and Thickening of cell wall. lectures 2. Stomata: 2.1. Types (Metcalf and Chalk, Stebbins and Khush). lectures 3. Stele: 3.1 Leaf-trace and leaf-gap, 3.2. Stelar types & evolution 4. Primary structure of stem and root- Monocot and Dicot. Leaf- dorsiventral and isobilateral. 5. Secondary growth: 5.1. Normal (intra- & extra-stelar), 5.2. Anomalous (stem of <i>Bignonia</i>, <i>Boerhavia</i>, <i>Tecoma</i>, <i>Dracaena</i> and root of <i>Tinospora</i>). 6. Mechanical tissues and the Principles governing their distribution in plants. 7. Developmental Anatomy: 7.1. Organisation of shoot apex (Tunica–Corpus) and Root apex (Körper-Kappe), 7.2. Plastochrone. 8. Ecological Anatomy: Adaptive anatomical features of 8.1. Hydrophytes, 8.2. Xerophytes. 9. Scope of plant anatomy: application in systematics, forensics and pharmacognosy. 	<p>PG (Unit- 1,2,3,6,7,8)</p> <p>SG (Unit- 4,5,9)</p>

CORE COURSE 3
PLANT ANATOMY (BOT-A-CC-2-3-P)
PRACTICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>PLANT ANATOMY</p> <ol style="list-style-type: none"> 1. Microscopic studies on: Types of stomata, sclereids, raphides (<i>Colocasia</i>), cystolith (<i>Ficus</i> leaf) starch grains, aleurone grains, laticiferous ducts, oil glands 	

<p>2. Study of anatomical details through permanent slides/ temporary stained mounts- a) Root Monocot and dicot, b) Stem- Monocot and dicot, c) Leaf- Monocot and dicot</p> <p>3. Study of anomalous secondary structure in stem of <i>Bignonia</i>, <i>Boerhaavia</i>, <i>Tecoma</i>, <i>Dracaena</i> and root of <i>Tinospora</i></p> <p>4. Study of adaptive anatomical features: Hydrophytes (<i>Nymphaea</i> – petiole) and Xerophyte (<i>Nerium</i> – leaf).</p>	PG
<p>CLASSROOM PERFORMANCE</p> <p>1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes.</p> <p>2. Slides (permanent) prepared during practical classes.</p>	Respective Teachers

CORE COURSE 4
ARCHEGONIATE (BOT-A-CC-2-4-TH)
THEORETICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>BRYOPHYTES</p> <p>1. General Account : 1.1. General characteristics and adaptations to land habit, 1.2. Classification (Strotler and Crandle Strotler, 2009) up to class with diagnostic characters and examples.</p> <p>2. Life History: Gametophyte structure and Reproduction, Development and Structure of sporophyte, Spore dispersal in: <i>Marchantia</i>, 2.2. <i>Anthoceros</i>, 2.3. <i>Funaria</i>.</p> <p>3. Phylogeny: 3.1. Unifying features of archaegoniates; transition to land habit, 3.2. Origin of Alternation of Generations (Homologous and Antithetic theory), 3.3. Evolution of Sporophytes (Progressive and Regressive concept), 3.4. Origin of Bryophytes.</p> <p>4. Importance : Role of bryophytes in: 4.1. Plant succession, 4.2. Pollution Monitoring, 4.3. Economic importance of bryophytes with special reference to Sphagnum.</p>	BKP
<p>PTERIDOPHYTES</p> <p>1. General Account: 1.1. Colonisation and rise of early land plants, 1.2. Classification of vascular plants by Gifford & Foster (1989) upto division (Rhyniophyta to Filicophyta) with diagnostic characters and examples.</p> <p>2. Life History: Sporophyte structure, Reproduction and Structure of gametophyte in 2.1. <i>Psilotum</i>, 2.2. <i>Selaginella</i>, 2.3. <i>Equisetum</i>, 2.4. <i>Pteris</i>.</p>	DT

<ol style="list-style-type: none"> Telome concept and its significance in the origin of different groups of Pteridophytes. Heterospory and Origin of Seed habit Economic importance as food, medicine and Agriculture. 	
<p>GYMNOSPERMS</p> <ol style="list-style-type: none"> Classification of vascular plants by Gifford & Foster (1989) upto division (Progymnospermophyta to Gnetophyta) with diagnostic characters and examples. Progymnosperms : Diagnostic characters of the group, 2.2. Vegetative and reproductive features of Archeopteris, 2.3. Phylogenetic importance Life History : Distribution in India; Vegetative and Reproductive structure of sporophyte, Development of gametophyte in : 3.1. <i>Cycas</i> , 3.2. <i>Pinus</i> and 3.3. <i>Gnetum</i> Economic Importance with reference to Wood, Resins, Essential oils, and Drugs. 	NH

CORE COURSE 4
ARCHEGONIATE (BOT-A-CC-2-4-P)
PRACTICAL PAPER

TOPICS	ASSIGNED TEACHERS
<p>BRYOPHYTES</p> <ol style="list-style-type: none"> Morphological study of the plant body: Genera as mentioned in theoretical syllabus and <i>Riccia</i>, <i>Porella</i>. Study from permanent slides : <i>Riccia</i> (V.S. of thallus with sporophyte), <i>Marchantia</i> (L.S. through gemma cup, antheridiophore , archegoniophore) , <i>Anthoceros</i> (L.S. of sporophyte) , <i>Funaria</i> (L.S. of capsule). 	NH
<p>PTERIDOPHYTES</p> <ol style="list-style-type: none"> Morphological study of the sporophytic plant body: Genera as mentioned in the theoretical syllabus and <i>Lycopodium</i>, <i>Ophioglossum</i> and <i>Marsilea</i>. Workout of the reproductive structures: <i>Selaginella</i>, <i>Equisetum</i>, <i>Pteris</i>. Study from permanent slides: <i>Psilotum</i> (T.S. of synangium), <i>Lycopodium</i> (L.S. of strobilus), <i>Ophioglossum</i> (L.S. of spike), <i>Dryopteris</i> (gametophyte), <i>Marsilea</i> (L.S. of sporocarp). 	DT
<p>GYMNOSPERMS</p> <ol style="list-style-type: none"> Morphological study: <i>Cycas</i> (microsporophyll and 	NH

<p>megasporophyll), <i>Pinus</i> (female and male cone), <i>Gnetum</i> (female and male cone).</p> <p>2. Study from permanent slides: <i>Cycas</i> (L.S. of ovule), <i>Pinus</i> (L.S. of male and female cone), <i>Ginkgo</i> (L.S. of female strobilus), <i>Gnetum</i> (L.S. of male cone and ovule).</p>	
<p>FIELD STUDY</p> <p>1. Botanical excursion to familiarize the students with the natural habitats of these groups is desirable. No individual collection should be allowed. Students should submit only photographs in their field report</p>	SG
<p>CLASSROOM PERFORMANCE</p> <p>1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes.</p> <p>2. Slides (permanent) prepared during practical classes.</p>	Respective Teachers

PART – II BOTANY HONOURS
PAPER – III
MODULE-V

TOPICS	ASSIGNED TEACHERS
<p>PTERIDOPHYTES 25 Marks</p> <p>1. General Account : 1.1. Colonisation and rise of early land plants , 1.2. Classification of vascular plants by Gifford & Foster (1989) upto division (Rhyniophyta to Filicophyta) with diagnostic characters and examples.</p> <p>2. Life History : Sporophyte structure, Reproduction and Structure of gametophyte in 2.1. <i>Psilotum</i>, 2.2. <i>Selaginella</i>, 2.3. <i>Equisetum</i>, 2.4. <i>Dryopteris</i>.</p> <p>3. Fossil Pteridophytes : Structural features, Geological distribution and Evolutionary significance of 3.1. <i>Rhynia</i>, 3.2. <i>Lepidodendron</i> (Reconstructed), 3.3. <i>Calamites</i> (Reconstructed).</p> <p>4. Telome concept and its significance in the origin of different groups of Pteridophytes.</p> <p>5. Heterospory and Origin of Seed habit.</p> <p>6. Economic importance as food, medicine and Agriculture</p>	DT
<p>GYMNOSPERMS 25 Marks</p> <p>1. Classification of vascular plants by Gifford & Foster (1989) upto division (Progymnospermophyta to Gnetophyta) with</p>	NH

<p>diagnostic characters and examples.</p> <p>2. Progymnosperms : 2.1. Diagnostic characters of the group, 2.2. Vegetative and reproductive features of <i>Archeopteris</i>, 2.3. Phylogenetic importance.</p> <p>3. Life History : Distribution in India; Vegetative and Reproductive structure of sporophyte, Development of gametophyte and Embryogeny in : 3.1. <i>Cycas</i> , 3.2. <i>Pinus</i> and 3.3. <i>Gnetum</i> .</p> <p>4. Fossil gymnosperms :Structural features and Geological distribution of reconstructed genera: 4.1. <i>Lyginopteris</i>, 4.2. <i>Williamsonia</i>, 4.3. <i>Cordaites</i>.</p> <p>5. Economic Importance with reference to Wood, Resins, Essential oils, and Drugs.</p>	
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PAPER – III
MODULE-VI

TOPICS	ASSIGNED TEACHERS
<p>ECOLOGY 25Marks</p> <p>1. Preliminary idea on : 1.1. Habitat and Niche, 1.2. Ecotone and edge-effect, 1.3. Microclimate, 1.4. Ecads, ecotype and ecoclines, 1.5. Carrying capacity.</p> <p>2. Community ecology : 2.1. Community- Characteristics and diversity, 2.2. Ecological succession –Primary and secondary, Seral stages (with reference to Hydrosere), autogenic and allogenic succession.</p> <p>3. 3.1. Plant indicators (metallophytes); 3.2. Phytoremediation</p> <p>4. Conservation of Biodiversity: 4.1. Level of Biodiversity: genetic, species & ecosystem diversity, 4.2. Biodiversity hot spots- criteria, Indian hotspots, 4.3. In- situ and ex-situ conservation, 4.4. Seed-banks, 4.5. Cryopreservation, 4.6. Geographic Information System and Remote Sensing (brief idea).</p> <p>PLANT GEOGRAPHY</p> <p>5. Phytogeographical regions : 5.1. Phytogeographical regions of India (Chatterjee 1960); 5.2. Dominant flora of Eastern Himalaya, Western Himalaya and Sunderban.</p> <p>6. Endemism : 6.1. Endemic types and Factors; 6.2. Age &</p>	SG

Area hypothesis and Epibiotic theory; 6.3. Endemism in Indian flora.	
ANATOMY 25 Marks <ol style="list-style-type: none"> Cell wall: 1.1. Ultrastructure & Chemical constituents, 1.2. Plasmodesmata- ultrastructure, 1.3. Concept of Apoplast and Symplast, 1.4. Growth and Thickening of cell wall. Stomata : 2.1. Types (Metcalfe and Chalk, Stebbins and Khush), 2.2. Ontogeny. Ontogeny of 3.1. Trachea and 3.2. Sieve-tube. Stele : 4.1 Leaf-trace and leaf-gap, 4.2. Stelar types & evolution Secondary growth: 5.1. Normal (intra- & extra-stelar), 5.2. Anomalous (stem of Bignonia, Boerhavia, Tecoma, Dracaena and root of Tinospora). Mechanical tissues and the Pinciples governing their distribution in plants. Developmental Anatomy : 7.1. Organisation of shoot apex (Tunica–Corpus) and Root apex (Korper-Kappe), 7.2. Plastochrone Ecological Anatomy: Adaptive anatomical features of Hydrophytes , 8.2. Xerophytes . 	PG

PAPER – IVA
MODULE-VII

TOPICS	ASSIGNED TEACHERS
MORPHOLOGY OF ANGIOSPERMS 10 Marks <ol style="list-style-type: none"> Inflorescence types with examples. Flower : Corolla- forms, aestivation; Stamen- types; Placentation-types; Ovule - structure and forms. Fruit - types with examples. 	DT
TAXONOMY OF ANGIOSPERMS 40 Marks <ol style="list-style-type: none"> Introduction : 1.1. Components of Systematics: Nomenclature, Identification, Classification; 1.2. Taxonomy and its phases - Pioneer, Consolidation , Biosystematic and Encyclopaedic ; alpha- and omega- taxonomy . Nomenclature : Elementary knowledge of ICBN: Principles; Rank of taxa, Retention and rejection of names; Type method; Principle of priority; Effective and valid 	DT

<p>publication; Author Citation.</p> <p>3. Systems of classification : Broad outline of Bentham & Hooker (1862-1883), Cronquist's (1988) system of classification with merits and demerits</p> <p>4. Systematics in Practice : 4.1. Herbaria and Botanical Gardens – their role; important Indian Herbaria and Botanical Gardens; 4.2. Dichotomous keys – indented and bracketed.</p> <p>5. Phenetics and Cladistics : Brief idea on Phenetics, Numerical taxonomy; Cladistics; Monophyletic, polyphyletic and paraphyletic groups; Plesiomorphy and apomorphy.</p> <p>6. Data sources in Taxonomy: Supportive evidences from : Phytochemistry, 6.2. Cytology, 6.3. Anatomy.</p> <p>7. Diagnostic features, Systematic position (Bentham & Hooker and Cronquist), Economically important plants (parts used and uses) of the following families: 7.1. Dicotyledons : Magnoliaceae, Malvaceae, Leguminosae (subfamilies), Euphorbiaceae, Umbelliferae (Apiaceae), Solanaceae, Scrophulariaceae, Acanthaceae, Labiatae (Lamiaceae), Cucurbitaceae, Rubiaceae, Compositae (Asteraceae). 7.2. Monocotyledons: Alismataceae, Palmae (Arecaceae), Gramineae (Poaceae), Liliaceae, Zingiberaceae,</p>	
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PAPER – IVB
MODULE-VIII

TOPICS	ASSIGNED TEACHERS
<p>PTERIDOPHYTES</p> <p>1. Morphological study of the sporophytic plant body: Genera as mentioned in the theoretical syllabus and <i>Lycopodium</i>, <i>Ophioglossum</i>, <i>Marsilea</i> and <i>Pteris</i>.</p> <p>2. Workout of the reproductive structures : <i>Selaginella</i> , <i>Equisetum</i> , <i>Pteris</i>.</p> <p>3. Study from permanent slides : <i>Psilotum</i> (T.S. of synangium), <i>Lycopodium</i> (L.S. of strobilus), <i>Ophioglossum</i> (L.S. of spike), <i>Dryopteris</i> (gametophyte), <i>Marsilea</i> (L.S. of sporocarp)</p>	SG
<p>ANGIOSPERMS</p> <p>1. Study of types of inflorescence, flower and fruit with labelled sketches.</p> <p>2. Work out, description, preparation of floral formula and floral diagram, identification up to genus with the help of suitable literature of wild plants from the following families: Malvaceae, Fabaceae (Papilionaceae), Solanaceae, Scrophulariaceae, Acanthaceae, Labiatae (Lamiaceae),</p>	DT

Rubiaceae. 3. Spot identification (Binomial, Family) of plants from families included in the theoretical syllabus.	
FIELD WORK 1. At least four excursions including one long excursion to a specialized phytogeographical zone of India and one to Acharya Jagadish Chandra Bose Indian Botanic Garden (Shibpur, Howrah) and Central National Herbarium (CNH). 2. Study of community structure by quadrat method and determination of (i) Minimal size of the quadrat, (ii) Frequency, density and abundance of components (to be done during excursion)	All teachers in different Excursion DT
FIELD RECORDS 1. Field Note Book (authenticated) with ecological notes on the plants of the area of excursion and voucher specimen book. 2. Herbarium specimen: Preparation of 25 angiospermic specimens (identified with author citation, voucher number and arranged following Bentham & Hooker's system of classification) to be submitted in the University Examination.	DT + SG
GYMNOSPERMS 1. Morphological study: Cycas (microsporophyll and megasporophyll), Pinus (female and male cone), Gnetum (female and male cone). 2. Study from permanent slides: Cycas (L.S. of ovule), Pinus (L.S. of male and female cone), Ginkgo (L.S.of female strobilus), Gnetum (L.S. of male cone and ovule).	NH
PALAEOBOTANY AND PALYNOLOGY 1. Morphological study : Ptilophyllum and Glossopteris leaf fossils. 2. Study from permanent slides : T.S. of stem of Rhynia, Lepidodendron, Calamites, Lyginopteris, Cordaites 3. Study of Pollen types (colpate,porate and colporate) from permanent slides. Slides may be prepared from specimens: Colpate (Leonurus sibiricus/ Brassica sp.), Porate (Hibiscus rosa-sinensis), Colporate (Cassia sophera/ C.tora).	NH
LABORATORY RECORDS 1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes. 2. Slides (prepared during practical classes).	Respective Teachers

PART – III BOTANY HONOURS
PAPER – V
MODULE-IX

	ASSIGNED
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TOPICS	TEACHERS
<p>BIOCHEMISTRY 35 Marks</p> <ol style="list-style-type: none"> 1. Biochemical Foundations : 1.1. Covalent and non-covalent bonds ; hydrogen bond ; Van der Waal's forces ; 1.2. Structure and properties of water ; 1.3. pH and buffer (inorganic and organic); 1.4. Handerson-Hasselbalch equation; 1.5. Isoelectric point. 2. Molecules of life : 2.1. Nucleic Acids – structure of nucleosides and nucleotides ; oligo- and poly nucleotides , B & Z form of DNA, RNA- different forms; nucleotide derivatives (ATP, NADP), 2.2. Proteins – structure and classification of amino acids; primary, secondary, tertiary and quaternary structure of proteins; 2.3. Carbohydrates - structure of mono-, di- and polysaccharide; stereoisomers, enantiomers and epimers; 2.4. Lipids - structure of simple lipid and compound lipid (phospholipids and glycolipids), fatty acids- saturated and unsaturated 3. Energy flow and enzymology : 3.1. Bioenergetics-Thermodynamic principles; free energy; energy rich bonds- phosphoryl group transfer and ATP; redox potentials and Biological redox reactions, 3.2. Enzymes – classification and nomenclature (IUBMB); Co-factors and co-enzymes; isozymes, 3.3. Mechanism of enzyme action; enzyme inhibition; 3.4. Enzyme kinetics (Michaelis Menten equation) and simple problems. 4. Cell membrane and Biosignalling : 4.1. Membrane chemistry, 4.2. Membrane transport (uniport, symport, antiport), mechanism of ion uptake 4.3. Signal transduction pathway and second messenger concept - G-protein and Ca²⁺ as messenger. 5. Phosphorylation : ATP Synthesis- Chemiosmotic model, Oxidative and Photophosphorylation- Mechanism and differences. 	<p>BKP</p>
<p>PHARMACOGNOSY 15 Marks</p> <ol style="list-style-type: none"> 1. General account : 1.1 Pharmacognosy and its importance in modern medicine , 1.2 Crude drugs, 1.3 Classification of drugs- chemical and pharmacological , 1.4 Drug evaluation – organoleptic , microscopic, chemical, physical and biological. 2. Secondary metabolites : 2.1 Definition of secondary 	<p>BKP</p>

<p>metabolites and difference with primary metabolites , 2.2 Interrelationship of basic metabolic pathways with secondary metabolite biosynthesis (outlines only), 2.3 Major types–terpenoids, phenolics, flavonoids, alkaloids and their protective action against pathogenic microbes and herbivores.</p> <p>3. Pharmacologically active constituents : Source plants (one example) parts used and uses of : 3.1 Steroids (Diosgenin, Digitoxin), 3.2 Tannin (Catechin), 3.3 Resins (Gingerol, Curcuminoids), 3.4 Alkaloids (Quinine, Strychnine, Reserpine, Vinblastine).</p>	
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PAPER – V
MODULE-X

TOPICS	ASSIGNED TEACHERS
<p>PLANT PHYSIOLOGY 50 Marks</p> <p>1. Plant-water relations: 1.1 Concept of water potential , components of water potential in plant system , 1.2 Soil-plant-Atmosphere continuum concept, Cavitation in xylem and embolism, 1.3 Stomatal physiology-mechanism of opening and closing, Role of carbon di-oxide, potassium ion, abscisic acid and blue light in stomatal movement,Antitranspirants.</p> <p>2. Organic Translocation : 2.1 Phloem sap, P-protein, 2.2Phloem loading and unloading, 2.3 Mass-flow (pressure flow) hypothesis and its critical evaluation.</p> <p>3. Photosynthesis : 3.1 Chemical structure of chlorophyll a and b , absorption and action spectra, biological significance of carotenoid pigments, 3.2 Red drop and Emerson effect, Components of photosystems (light harvesting complex), Photochemical reaction centres, Cyclic and noncyclic electron transport, Water splitting mechanism, 3.3 Calvin cycle – Biochemical reactions & stoichiometry, 3.4 HSK Pathway– three variants of the pathway, 3.5. Photosynthetic efficiency of C3 and C4 plants and crop productivity, 3.6. Photorespiration – mechanism and significance, 3.7 Crassulacean acid metabolism – mechanism and ecological significance.</p> <p>4. Respiration : 4.1 EMP pathway, regulation and its anabolic role , 4.2 Conversion of Pyruvic acid to Acetyl CoA,</p>	BKP

<p>4.3 TCA-cycle and its amphibolic role ,4.4. Oxidative pentose phosphate pathway and its significance, 4.5 β-oxidation of fatty acids and significance, 4.6 Mitochondrial electron transport system, uncouplers, 4.7 Oxidation of cytosolic NADH+H⁺ 4.8 Stoichiometry of glucose oxidation (aerobic).</p> <p>5. Nitrogen Metabolism : 5.1 Assimilation of nitrate by plants, 5.2 Biochemistry of dinitrogen fixation in Rhizobium, 5.3. General principle of amino acid biosynthesis (including GS and GOGAT enzyme system).</p> <p>6. Plant Growth Regulators : 6.1. Physiological roles of Auxin, Gibberellin, Cytokinin, Abscisic acid, Ethylene, 6.2 Chemical nature –IAA, GA3, Kinetin, 6.3. Biosynthesis and bioassay of IAA, 6.4 Mode of action of IAA, 6.5 Brassinosteroids and Polyamines as PGRs (brief idea).</p> <p>7. Photomorphogenesis : 7.1 Concept of photomorphogenesis, Photoperiodism and plant types, 7.3 Perception of photoperiodic stimulus, 7.4 Critical day length, concept of light monitoring, 7.5 Phytochrome – chemical nature, interconversion, function in flowering, 7.6 Role of GA in flowering, 7.7 Vernalisation – role of low temperature in flowering, 7.8 Concept of biological clock and biorhythm .</p> <p>8. Seed dormancy : 8.1 Types; Causes and Methods of breaking seed dormancy, 8.2 Biochemistry of seed germination.</p> <p>9. Physiology of Senescence and Ageing.</p> <p>10. Stress Physiology: Plant responses to: 10.1 Water stress, Temperature stress, 10.3 Salt stress</p>	
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PAPER – VI
MODULE-XI

TOPICS	ASSIGNED TEACHERS
<p>CELL BIOLOGY</p> <p>20 Marks</p> <p>1. Origin and Evolution of Cells : 1.1. Concept of RNA world, Ribozymes, First cell, 1.2. Origin of eukaryotic cell, 1.3. Organellar DNA (cp-and mt DNA).</p> <p>2. Nucleus and Chromosome : 2.1. Nuclear envelope, Nuclear lamina and Nuclear pore complex, 2.2. Nucleolus-ultrastructure and ribosome biogenesis, 2.3. Chromatin ultrastructure and DNA packaging in eukaryotic chromosome, 2.4. Karyotype concept and its parameters.</p>	PG

3. Cell cycle and its regulation :	3.1. Centromere,	
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<p>kinetochore, spindle apparatus & telomere–structural organization and functions, 3.2. Dynamics of chromosome movement in anaphase, 3.3. Mechanism of cell cycle control in Yeast (checkpoints and role of MPF), Apoptosis (Brief idea).</p>	
<p>PLANT BREEDING & BIOMETRY 15 Marks</p> <ol style="list-style-type: none"> Plant Breeding: 1.1 Maintenance of germplasm, 1.2 Mass selection and Pure line selection, 1.3 Back cross method, 1.4. Heterosis and hybrid seed production, 1.5. Male sterility and its use in plant breeding, 1.6 Molecular Breeding (use of DNA markers in plant breeding). Biometry: 2.1 Random sampling, Frequency distribution, 2.2. Central tendency– Arithmetic Mean, Mode and Median, 2.3. Measurement of dispersion – Standard Deviation, Standard error of Mean, 2.4. Test of significance: ‘t’- test; chi-square test for goodness of fit, 2.5 Probability (Addition and Multiplication rules), 2.6 Measurement of gene frequency (Hardy-Weinberg equilibrium). 	<p>PG SG</p>
<p>PLANT BIOTECHNOLOGY 15 Marks</p> <ol style="list-style-type: none"> Plant tissue culture –Introduction: 1.1. Cellular totipotency, 1.2. Tissue culture media, 1.3. Aseptic manipulation. Callus culture : 2.1. Callus initiation, growth and maintenance, 2.2. Applications. Micropropagation: 3.1. Organogenesis (direct and indirect), Somatic embryogenesis, Artificial seed, 3.3. Significance. Haploid Culture : 4.1. Anther and Pollen culture methods, 4.2. Significance . Protoplast Culture : 5.1. Protoplast isolation and culture, Protoplast fusion (somatic hybridization), 5.3. Significance. Plant Genetic Engineering : 6.1. Brief concept of different gene transfer methods, special emphasis on Agrobacterium mediated gene transfer, Role of Reporter gene, 6.2. Achievements in crop biotechnology (suitable examples of transgenic plants). 	<p>SG</p>

<p>endonuclease, ligase), 10.2 Vector (plasmid pBR 322) 10.3 Marker gene, 10.4. Steps of cloning technique, 10.5 PCR and its application 10.6 Genomic DNA and cDNA library.</p> <p>11. Bioinformatics : Brief concept on 11.1 Genomics, 11.2 Proteomics.</p>	
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PAPER – VII
MODULE-XIII

TOPICS	ASSIGNED TEACHERS
<p>PLANT BIOCHEMISTRY</p> <p>Qualitative :</p> <ol style="list-style-type: none"> 1. Detection of organic acids: citric , tartaric, oxalic and malic from laboratory samples. 2. Detection of carbohydrate and protein from plant samples. 3. Detection of the nature of carbohydrate – glucose, fructose , sucrose and starch from laboratory samples. 4. Detection of Ca, Mg, Fe, S from plant ash sample. <p>Quantitative :</p> <ol style="list-style-type: none"> 1. Estimation of amino-nitrogen by formol titration method (glycine) . 2. Estimation of glucose by Benedicts quantitative reagent. 3. Estimation of titratable acidity from lemon. 4. Estimation of catalase activity in plant samples 5. Estimation of urease activity in plant samples. 6. Colorimetric estimation of protein by Folin phenol reagent 	BKP
<p>PHARMACOGNOSY</p> <ol style="list-style-type: none"> 1. Chemical tests for (a) Tannin (<i>Camellia sinensis</i> / <i>Terminalia chebula</i>), (b)Alkaloid (<i>Catharanthus roseus</i>) . 2. Powder microscopy – <i>Zingiber</i> and <i>Holarrhena</i> . 3. Histochemical tests of (a) Curcumin (<i>Curcuma longa</i>) , (b) Starch in non-lignified vessel (<i>Zingiber</i>), (c) Alkaloid (stem of <i>Catharanthus</i> and bark of <i>Holarrhena</i>). 	BKP
<p>LABORATORY RECORDS</p> <ol style="list-style-type: none"> 1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes. 2. Slides (permanent) prepared during practical classes. 	Respective Teachers

PAPER – VII
MODULE-XIV

TOPICS	ASSIGNED TEACHERS
<p>PLANT PHYSIOLOGY</p> <ol style="list-style-type: none"> 1. Determination of loss of water per stoma per hour. 2. Relationship between transpiration and evaporation. 3. Rate of photosynthesis under varying HCO₃ concentration in an aquatic plant using bicarbonate and to find out the optimum and toxic concentration . 4. Separation of plastidial pigments 5. Measurement of oxygen uptake by respiring tissue (per g/hr.) 6. Determination of the RQ of germinating seeds. 7. Measurement of osmotic pressure of storage tissue by weighing method. 8. . Measurement of osmotic pressure of Rhoeo leaf by plasmolytic method 9. Effect of temperature on absorption of water by storage tissue and determination of Q10. 10. Comparison of imbibitions of water by starchy, proteinaceous and fatty seeds 	BKP
<p>ANATOMY</p> <ol style="list-style-type: none"> 1. Microscopic studies on: Types of stomata, sclereids, raphides (<i>Colocasia</i>), cystolith (<i>Ficus</i> leaf) starch grains, aleurone grains, laticiferous ducts, oil glands. 2. Study of anomalous secondary structure in stem of <i>Bignonia</i>, <i>Boerhaavia</i>, <i>Tecoma</i>, <i>Dracaena</i> and root of <i>Tinospora</i> 3. Study of adaptive anatomical features : Hydrophytes (<i>Nymphaea</i> – petiole) and Xerophytes (<i>Nerium</i> – leaf). 	SG
<p>LABORATORY RECORDS</p> <ol style="list-style-type: none"> 1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes. 2. Slides (permanent) prepared during practical classes. 	Respective Teachers

PAPER – VIII
MODULE-XV

TOPICS	ASSIGNED TEACHERS
<p>CELL BIOLOGY AND GENETICS</p> <ol style="list-style-type: none"> 1. Introduction to chromosome preparation: Pre-treatment, Fixation, Staining, Squash and Smear preparation, Preparation of permanent slides. 2. Determination of mitotic index and frequency of different mitotic stages in pre-fixed root tips of <i>Allium cepa</i>. 3. Study of mitotic chromosome : Metaphase chromosome preparation , free hand drawing under high power objective, drawing with drawing prism under oil immersion lens, determination of 2n number, comment on chromosome morphology of the following specimens from root tips: <i>Allium cepa</i> , <i>Aloe vera</i> , <i>Lens esculenta</i> 4. Study of meiotic chromosome: Smear preparation of meiotic cells, identification of different stages and free hand drawing of the following specimens from flower buds: <i>Allium cepa</i> and <i>Setcreasea sp</i> 5. Identification from permanent slides : Meiosis – (i) normal stages (ii) abnormal stages – laggard, anaphase bridge, ring chromosome (Rhoeo discolor); Mitosis –(i) normal stages, (ii) abnormal stages- early separation, late separation, multipolarity , sticky bridge, fragmentation, (ii) pollen mitosis. 	<p>SG</p>
<p>LABORATORY RECORDS</p> <ol style="list-style-type: none"> 1. Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes. 2. Slides (permanent) prepared during practical classes. 	<p>Respective Teachers</p>

PAPER – VIII
MODULE-XVI

TOPICS	ASSIGNED TEACHERS
<p>BIOMETRY</p> <ol style="list-style-type: none"> Determination of goodness of fit in normal and modified mono-and dihybrid ratios (3:1, 1:1, 9:7, 13:3, 15:1, 9:3:3:1, 1:1:1:1) by Chi-square analysis and comment on the nature of inheritance Univariate analysis of statistical data : Statistical tables , mean , mode , median , standard deviation and standard error (using seedling population / leaflet size). 	SG
<p>MICROBIOLOGY</p> <ol style="list-style-type: none"> Preparation of bacterial media – (a) Nutrient agar and nutrient broth, (b) Preparation of slants and pouring Petriplates. Sub-culturing of bacterial culture. Gram staining from bacterial culture Microscopic examination of bacteria from natural habitat (curd) by simple staining 	SG
<p>PLANT PATHOLOGY</p> <ol style="list-style-type: none"> Preparation of fungal media (PDA). Sterilization process. Isolation of pathogen from diseased leaf. Inoculation of fruit and subculturing. Identification : Pathological specimens of Brown spot of rice, Bacterial blight of rice ,Loose smut of wheat, Stem rot of jute, Late blight of potato; Slides of uredial, telial, pycnial & aecial stages of <i>Puccinia graminis</i>. 	SG
<p>LABORATORY RECORDS</p> <ol style="list-style-type: none"> Laboratory Note Book of each section must be signed by the respective teacher with date during practical classes. Slides (permanent) prepared during practical classes. 	Respective Teachers

BOTANY GENERAL

SEMESTER – I BOTANY GENERAL
(CORE COURSE 1)
CORE COURSE-1
PLANT DIVERSITY I (BOT-G-CC-1-1-TH)

THEORETICAL PAPER

TOPICS	ASSIGNED TEACHERS
PLANT DIVERSITY I	
1. Introduction to different plant groups	SG
2. Phycology 2.1. Diagnostic characters and examples of Cyanophyceae, Rhodophyceae, Chlorophyceae, Charophyceae and Phaeophyceae, 2.2 Classification: Criteria and system of Fritsch, 2.3. Life histories of Chlamydomonas, Chara and Ectocarpus, 2.4. Role of algae in the environment, agriculture, biotechnology and industry.	NH
3. Mycology 3.1 Diagnostic characters and examples of Oomycotina, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, Deuteromycotina (Ainsworth, 1973). 3.2 Life histories of Rhizopus and Ascobolus, 3.3. Economic importance of fungi, 3.4 Fungal symbioses: Mycorrhiza, Lichen and their importance.	SG
4. Phytopathology 4.1 Symptoms - necrotic, hypoplastic and hyperplastic, 4.2 Koch's postulates, 4.3 Biotrophs and Necrotrophs, 4.4 Disease triangle, 4.5 Pathotoxins and phytoalexins (brief concept), 4.6 Symptoms, causal organism, disease cycle and control measures of plant diseases (Late blight of potato, Brown spot of Rice, Stem rot of jute).	SG
5. Bryophytes 5.1 Unifying features of archaegoniates and transition to land habit, 5.2 Amphibian nature of bryophytes, 5.3 Diagnostic characters and examples of Hepaticopsida, Anthocerotopsida and Bryopsida (Proskauer 1957), 5.4 Life histories of Marchantia and Funaria, 5.5 Ecological and economic importance.	BKP
6. Anatomy 6.1 Stomata - Types (Metcalfe & Chalk), 6.2 Anatomy of root, stem and leaf of monocots and dicots, 6.3 Stelar types and evolution, 6.4 Secondary growth – normal in dicot stem and anomaly in stem of Tecoma & Dracaena.	DT

CORE COURSE-1

**PLANT DIVERSITY I (BOT-G-CC-1-1-P)
PRACTICAL PAPER**

TOPICS	ASSIGNED TEACHERS
<p>1. Work out: Microscopic preparation, drawing and labeling of <i>Chlamydomonas</i>, <i>Chara</i>, <i>Ectocarpus</i>, <i>Rhizopus</i> and <i>Ascobolus</i></p> <p>2. Anatomical studies (following double staining method) of: 2a. Stem- Cucurbita, sunflower and maize. 2b. Root- Colocassia, gram and orchid. 2c. Leaf- Nerium</p> <p>3. Identification with reasons: 3a. Cryptogamic specimens (macroscopic/microscopic as prescribed in the theoretical syllabus. 3b. Pathological specimens (herbarium sheets) of Late blight of potato, Brown spot of rice and stem rot of jute</p> <p>4. Laboratory records: Laboratory note books (regularly signed) and slides (prepared in class) are to be submitted at the time of Practical Examination. Regular attendance in the class must be credited.</p> <p>5. Atleast one local excursion to be conducted to give an idea of plant diversity, habitat of algae and fungi</p>	<p>Three Groups taken By three Teachers Separately</p> <p>PG – Gr. 1 DT – Gr. 4 NH – Gr. 3</p> <p style="text-align: center;">SG</p>

**SEMESTER – II BOTANY GENERAL
(CORE COURSE 2)
CORE COURSE-2
PLANT DIVERSITY II (BOT-G-CC-2-2-TH)
THEORETICAL PAPER**

TOPICS	ASSIGNED TEACHERS
<p>1. Pteridophytes 1.1 Diagnostic characters and examples of Psilophyta, Lycophyta, Sphenophyta & Filicophyta (Gifford & Foster 1989). 1.2 Life histories of Selaginella and Pteris, 1.3 Economic importance.</p>	SG
<p>2. Gymnosperms 2.1 Progymnosperms (brief idea), 2.2 Diagnostic characters and examples of Cycadophyta, Coniferophyta and Gnetophyta (Gifford & Foster 1989), 2.3 Life histories of Cycas and Pinus, 2.4 Williamsonia (reconstructed), 2.5 Economic importance of Gymnosperms.</p>	NH
<p>3. Paleobotany & Palynology 3.1 Fossil, fossilization process and factors of fossilization, 3.2 Importance of fossil study. 3.3 Geological time scale, 3.4 Palynology - Definition, spore & pollen (brief idea), Applications.</p>	PG

4. Angiosperm Morphology 4.1 Inflorescence types with examples, 4.2 Flower, 4.3 Fruits and seeds- type and examples.	DT
5. Taxonomy of Angiosperms 5.1 Artificial, Natural and Phylogenetic systems of classification with one example each, 5.2 Diagnostic features of following families- Malvaceae, Leguminosae (Fabaceae), Cucurbitaceae, Rubiaceae, Compositae (Asteraceae), Solanaceae, Acanthaceae, Labiatae (Lamiaceae), Orchidaceae, Gramineae (Poaceae).	DT

CORE COURSE-2
PLANT DIVERSITY II (BOT-G-CC-2-2-P)
PRACTICAL PAPER

TOPICS	ASSIGNED TEACHERS
1. Dissection, drawing and labelling, description of angiospermic plants and floral parts, floral formula and floral diagram, identification (family) from the following families: Leguminosae (Fabaceae), Malvaceae, Solanaceae, Labiatea (Lamiaceae), Acanthaceae.	Three Groups taken By three Teachers Separately
2. Identification with reasons: Macroscopic specimens of Selaginella and Pteris, male and female strobilus of Cycas and Pinus, Anatomical slides (stellar types, transfusion tissue, sieve tube, sunken stomata, lenticels), inflorescence types	PG – Gr. 1
3. Spot identification of the following Angiospermic plants (scientific names and families): Sida rhombifolia (Malvaceae), Abutilon indicum (Malvaceae), Cassia sophera (Fabaceae), Tephrosia halimtonii (Fabaceae), Crotolaria palida (Fabaceae), Coccinia grandis (Cucurbitaceae), Solanum indicum (Solanaceae), Nicotiana plumbagenifolia (Solanaceae), Leucas aspera (Lamiaceae), Leonurus sibiricus (Lamiaceae), Parthenium hysterophorus (Asteraceae), Tridax procumbense (Asteraceae), Eclipta prostrate (Asteraceae), Eragrostis tenella (Poaceae), Chrysopogon aciculantus (Poaceae), Eleusine indica (Poaceae), Vanda taesellata (Orchidaceae).	DT – Gr. 4 NH – Gr. 3
4. Laboratory records: Laboratory note books (regularly signed) and slides (prepared in class) are to be submitted at the time of Practical Examination. Regular attendance in the class must be credited.	SG
5. Field excursion: Local Excursions (at least two including one to Acharya Jagadish Chandra Bose Botanic Garden, Shibpur, Howrah) 6. Field Records: Field note book and 15 herbarium	

sheets of common Angiospermic weeds are to be prepared and submitted at the time of Practical Examination. Regular attendance in the class must be credited.

PART – II BOTANY GENERAL
PAPER – II + PAPER -III
(MODULE-III + MODULE IV)+ (MODULE-V + MODULE VI)

PAPER – II (Theoretical Paper)
MODULE III + MODULE IV

TOPICS	ASSIGNED TEACHERS
<p>Module III: 50 Marks</p> <p>1. Anatomy: 1.1 Stomata - Types (Metcalfe & Chalk), 1.2 Mechanical Tissues - Principle and distribution, 1.3 Stelar types and evolution, 1.4 Shoot apex (Tunica-Corpus) and Root apex (Korper-Kappe), 1.5 Secondary growth – normal in dicot stem and anomaly in stem of Tecoma & Dracaena</p> <p>2. Cell Biology and Genetics: 2.1 Ultrastructure of nuclear envelope, nucleolus and their functions, 2.2 Molecular organisation of metaphase chromosome (Nucleosome concept), 2.3 Chromosomal aberrations deletion, duplication, inversion & translocation, 2.4 Aneuploidy & Polyploidy-types, importance and role in evolution, 2.5 Central Dogma, 2.6 DNA replication -mechanism in prokaryote, 2.7 Transcription, Processing of mRNA and Translation, 2.8 Genetic Code properties, 2.9 Epistasis, 2.10 Linkage group and Genetic map (three-point test cross), 2.11 Mutation - Point mutation (tautomerisation; transition, transversion and frame shift), Mutagen physical and chemical, 2.12 Brief concept of Split gene, Transposons</p>	<p>DT</p> <p>PG + DT</p>
<p>Module IV Marks: 50</p> <p>3. Biochemistry and Plant Physiology: 3.1 Proteins - Primary, secondary and tertiary structure, 3.2 Nucleic acid- DNA structure, RNA types, 3.3 Enzyme- Classifications with examples (IUBMB), Mechanism of action. 3.4 Transport in plants - ascent of sap and Xylem cavitation , Phloem transport and source-sink relation, 3.5 Transpiration- Mechanism of stomatal movement, significance 3.6 Photosynthesis- Pigments, Action spectra and Enhancement effect, Electron transport system and Photophosphorylation, C3 and C4 photosynthesis, CAM- Reaction and Significance 3.7 Respiration- Glycolysis & Krebs cycle— Reactions and</p>	<p>BKP</p>

<p>Significance, ETS and oxidative phosphorylation 3.8 Nitrogen metabolism –Biological dinitrogen fixation, Amino acid synthesis (reductive amination and transamination) 3.9 Plant Growth regulators – Physiological roles of Auxin, Gibberellin, Cytokinin, Ethylene, ABA 3.10 Photoperiodism (Plant types, Role of phytochrome and GA in flowering) and Vernalization 3.11 Senescence (brief idea).</p> <p>4. Economic Botany: Study of the following economically important plants (scientific names, families, parts used and importance) : 4.1 Cereals-rice, wheat, 4.2 Pulses- mung, gram, 4.3 Spices - ginger, cumin, 4.4 Beverages - tea, coffee, 4.5 Medicinal Plants - cinchona, neem, ipecac, vasaka, 4.6 Oil yielding plants- mustard, groundnut, coconut, 4.7 Vegetables- potato, radish, bottlegourd, cabbage, 4.8 Fibre yielding plants- cotton, jute, 4.9 Timber yielding plants teak, sal 4.10 Fruits- mango, apple, 4.11 Sugar yielding plant- sugarcane</p> <p>5. Ecology: 5.1 Ecotypes and microclimate, 5.2 Plant succession - stages of succession (hydrosere) 5.3 Ecological adaptation of hydrophytes, halophytes and xerophytes, 5.4 Biodiversity - Definition, levels of biodiversity (genetic, species and ecosystem), methods of in-situ & ex-situ conservation, 5.5 Phytoremediation (brief idea).</p>	<p>NH</p> <p>SG</p>
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PAPER – III (Practical Paper)
MODULE V

<p>TOPICS</p>	<p>ASSIGNED TEACHERS</p>
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<p>Module V 50 Marks</p> <ol style="list-style-type: none"> Cryptogams: Work out, microscopic preparation, drawing and labeling, description and identification of the following cryptogams: <i>Chara</i>, <i>Ectocarpus</i>, <i>Rhizopus</i>, <i>Ascobolus</i>. Angiosperms: Dissection, drawing and labeling, description of angiospermic plants and floral parts, floral formula and floral diagram, identification (family) from the following families: Leguminosae (Fabaceae), Malvaceae, Solanaceae, Labiatae (Lamiaceae), Acanthaceae. Identification with reasons: Cryptogamic specimens (macroscopic/microscopic) as prescribed in the theoretical syllabus. Gymnosperms: Macroscopic - male and female strobilus of <i>Cycas</i>, and <i>Pinus</i> Anatomical slides (stelar types, transfusion tissue, sieve tube, sunken stomata, lenticel). Morphology: Inflorescence types. Spot identification (Scientific names and families) of the following Angiospermic plants: <i>Sida rhombifolia</i> (Malvaceae), <i>Abutilon indicum</i> (Malvaceae), <i>Thespesia populnea</i> (Malvaceae), <i>Cassia sophera</i> (Fabaceae), <i>Tephrosia hamiltonii</i> (Fabaceae), <i>Crotalaria pallida</i> (Fabaceae), <i>Leucaena leucocephala</i> (Fabaceae), <i>Coccinia grandis</i> (Cucurbitaceae), <i>Solanum sisymbriifolium</i> (Solanaceae), <i>Nicotiana glauca</i> (Solanaceae), <i>Physalis minima</i> (Solanaceae), <i>Leucas aspera</i> (Lamiaceae), <i>Leonurus sibiricus</i> (Lamiaceae), <i>Anisomeles indica</i> (Lamiaceae), <i>Parthenium hysterophorus</i> (Asteraceae), <i>Tridax procumbens</i> (Asteraceae), <i>Mikania scandens</i> (Asteraceae), <i>Eclipta prostrata</i> (Asteraceae), <i>Eragrostis tenella</i> (Poaceae), <i>Chrysopogon aciculatus</i> (Poaceae), <i>Eleusine indica</i> (Poaceae), <i>Vanda tasellata</i> (Orchidaceae). Laboratory Records: Laboratory note books (regularly signed) and slides (prepared in class) are to be submitted at the time of Practical Examination 	<p>Three separate groups taken by separate teachers</p> <p>PG</p> <p>DT</p> <p>NH</p>
<ol style="list-style-type: none"> Field Excursion: Local Excursions (at least two including one to Acharya Jagadish Chandra Bose Indian Botanic Garden, Shibpur, Howrah). Field Records: Field note-book and 15 herbarium sheets of common angiospermic weeds are to be prepared and submitted 	<p>Respective Teachers</p>

at the time of Practical Examination.	
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PAPER – III (Practical Paper)
MODULE VI

TOPICS	ASSIGNED TEACHERS
<p>Module VI 50 Marks</p> <ol style="list-style-type: none"> 1. Plant Physiology: i) Experiment on Plasmolysis. ii) Measurement of leaf area (graphical method) and determination of transpiration rate per unit area by weighing method. iii) Imbibition of water by dry seeds - proteinaceous and fatty seeds. iv) Evolution of O₂ during photosynthesis (using graduated tube). v) Evolution of CO₂ during aerobic respiration and measurement of volume. 2. Anatomy: Anatomical studies (following double-staining method) of: i) Stem: Cucurbita, Maize. ii) Root: Gram, Orchid. iii) Leaf: Nerium, Tuberose. 3. Cell Biology: i) Staining (Aceto-orcein) and squash preparation of onion root tip: study of mitotic stages. ii) Determination of mitotic index (from onion root tip) 4. Identificaiton with reasons: i) Cytological slides of different mitotic and meiotic stages. 5. Laboratory Records: Laboratory note books (regularly signed) and slides (prepared in class) are to be submitted at the time of Practical Examination. 	<p>Three separate groups taken by separate teachers</p> <p>PG</p> <p>DT</p> <p>NH</p>

PART – III BOTANY GENERAL
PAPER – IVA + PAPER –IVB
(MODULE-VII) + (MODULE-VIII)

TOPICS	ASSIGNED TEACHERS
PAPER-IVA Module VII 70 Marks	NH
1. Biofertilizer: 1.1 Sources 1.2 Production, 1.3 Application	NH
2. Mushroom: 2.1 Food value, 2.2 Cultivation technique of Pleurotus.	PG
3. Plant disease control: 3.1 Quarantine, 3.2 Biological control, 3.3 Chemical Control.	SG
4. Plant Breeding: 4.1 Mass and Pure line selection, 4.2 Heterosis and hybrid seed production.	DT
5. Biometry: 5.1 Measures of Central Tendency (Mean, Mode and Median), 5.2 Goodness of fit (Chi square test).	DT
6. Plant tissue culture: 6.1 Callus culture and plant regeneration, 6.2 Micropropagation, 6.3 Somatic embryogenesis and Artificial seed, 6.4 Protoplast culture and applications.	SG
7. Recombinant DNA Technology: 7.1 Recombinant DNA, restriction enzymes, plasmids as vector, 7.2 Gene cloning (basic steps), 7.3 Transgenic plants.	DT+PG
8. Pharmacognosy: 8.1 Scope and importance, 8.2 Secondary metabolites- alkaloids, terpenoids, phenolics and their functions, 8.3 Organoleptic evaluation of crude drugs	NH
PAPER-IVA Module VIII 30 Marks	Three separate groups taken by separate teachers
1. Acquaintance with laboratory instruments - Autoclave, Incubator, Clinical centrifuge, Analytical balance, pH Meter, Colorimeter, Water bath, Distillation plant	PG
2. Sterilization technique by autoclaving.	PG
3. Preparation of PDA medium (slants, pouring of plates).	PG
4. Bacteria staining by simple staining method (methylene blue/crystal violet) from curd.	DT
5. Acquaintance with common medicinal plants and their useful parts : <i>Terminalia arjuna</i> , <i>Centella asiatica</i> , <i>Saraca asoca</i> , <i>Adhatoda vasica</i> , <i>Andrographis paniculata</i> , <i>Asteracantha longifolia</i> , <i>Eclipta alba</i> , <i>Aloe barbadensis</i> , <i>Rauwolfia</i>	DT

<p><i>serpentina, Vitex negundo, Herpestis monieria, Holarrhena antidysenterica, Boerhaavia repens.</i></p> <p>6. Determination of Goodness of fit of normal monohybrid ratios (3: I and I: 1) by Chi-square analysis.</p> <p>7. Visit to a Medicinal Plant Garden.</p>	NH
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DEPARTMENT OF CHEMISTRY

Course: B.Sc. (Hons.) - Chemistry [CEMA]

Year: 1; Semester - I

(Odd Semester: July - December)

Theory

CEMA CC-1-1-TH

Inorganic Chemistry - I

TOPIC	PROFESSOR ASSIGNED
<p>Extra nuclear Structure of atom</p> <p>Quantum numbers and their significance, Schrödinger's wave equation, significance of ψ and ψ^2. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Pauli's Exclusion Principle, Hund's rules and multiplicity, Exchange energy, Aufbau principle and its limitations, Ground state Term symbols of atoms and ions for atomic number upto 30.</p>	AKD
<p>Acid-Base reactions</p> <p>Acid-Base concept: Arrhenius concept, theory of solvent system (in H₂O, NH₃, SO₂ and HF), Bronsted-Lowry's concept, relative strength of acids, Pauling's rules. LuxFlood concept, Lewis concept, group characteristics of Lewis acids, solvent levelling and differentiating effects. Thermodynamic acidity parameters, Drago-Wayland equation. Superacids, Gas phase acidity and proton affinity; HSAB principle. Acid-base equilibria in aqueous solution (Proton transfer equilibria in water), pH, buffer. Acid-base neutralisation curves; indicator, choice of indicators..</p>	PG
<p>Redox Reactions</p> <p>Ion-electron method of balancing equation of redox reaction. Elementary</p>	AKD

idea on standard redox potentials with sign conventions, Nernst equation (without derivation). Influence of complex formation, precipitation and change of pH on redox potentials; formal potential. Feasibility of a redox titration, redox potential at the equivalence point, redox indicators. Redox potential diagram (Latimer and Frost diagrams) of common elements and their applications.	
Redox Reactions Disproportionation and comproportionation reactions (typical examples). Electroanalytical methods: Basic principle of pH metric, potentiometric and conductometric titrations. Techniques used for the determination of equivalence points. Techniques used for the determination of pK _a values Solubility and solubility effect – common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulfides, phosphates, carbonates, sulfates and halides.	PG

ORGANIC CHEMISTRY-1A

TOPIC	PROFESSOR ASSIGNED
Basics of Organic Chemistry Bonding and Physical Properties Valence Bond Theory: concept of hybridisation, shapes of molecules, resonance (including hyperconjugation); calculation of formal charges and double bond equivalent (DBE); orbital pictures of bonding (sp ³ , sp ² , sp: C-C, C-N & C-O systems and s-cis and s-trans geometry for suitable cases). Electronic displacements: inductive effect, field effect, mesomeric effect, resonance energy; bond polarization and bond polarizability; electromeric effect; steric effect, steric inhibition of resonance. Physical properties: influence of hybridization on bond properties: bond dissociation energy (BDE) and bond energy; bond distances, bond angles; concept of bond angle strain; melting point/boiling point and solubility of common organic compounds in terms of covalent & non-covalent intermolecular forces; polarity of molecules and dipole moments; relative stabilities of isomeric hydrocarbons in terms of heat of hydrogenation and heat of combustion data.	AP
Basics of Organic Chemistry Bonding and Physical Properties MO theory: qualitative idea about molecular orbitals, bonding and antibonding interactions, idea about σ , σ^* , π , π^* , n – MOs; concept of HOMO, LUMO and SOMO; sketch and energy levels of π MOs of i)	KSG

acyclic p orbital system (C=C, conjugated diene, triene, allyl and pentadienyl systems) ii) cyclic p orbital system (neutral systems: [4], [6] annulenes; charged systems: 3-,4-,5-membered ring systems); Hückel's rules for aromaticity up to [8] annulene (including mononuclear heterocyclic compounds up to 6- membered ring); concept of antiaromaticity and homoaromaticity; non-aromatic molecules; Frost diagram (qualitative drawing).	
General Treatment of Reaction Mechanism I Mechanistic classification: ionic, radical and pericyclic (definition and example); reaction type: addition, elimination and substitution reactions (definition and example); nature of bond cleavage and bond formation: homolytic and heterolytic bond fission, homogenic and heterogenic bond formation; curly arrow rules in representation of mechanistic steps; reagent type: electrophiles and nucleophiles (elementary idea).	KSG

CEMA-CC-1-1-P

TOPIC	PROFESSOR ASSIGNED
INORGANIC CHEMISTRY: I(1) LAB Oxidation-Reduction Titrations	AKD & PG
ORGANIC CHEMISTRY: O (1A) LAB Separation based upon solubility, by using common laboratory reagents like water (cold,hot), dil. HCl, dil. NaOH, dil. NaHCO ₃ , etc., of components of a binary solid mixture; purification of any one of the separated components by crystallization and determination of its melting point	AP

CEMA-CC-1-2-TH : (Credits: Theory-04, Practicals-02)

PHYSICAL CHEMISTRY-1

TOPIC	PROFESSOR ASSIGNED
Kinetic Theory and Gaseous state	MS

<p><u>Kinetic Theory of gases:</u> Concept of pressure and temperature; Collision of gas molecules; Collision diameter; Collision number and mean free path; Frequency of binary collisions (similar and different molecules); Wall collision and rate of effusion</p> <p><u>Maxwell's distribution of speed and energy:</u> Nature of distribution of velocities, Maxwell's distribution of speeds in one, two and three dimensions; Kinetic energy distribution in one, two and three dimensions, calculations of average, root mean square and most probable values in each case; Calculation of number of molecules having energy $\geq \epsilon$, Principle of equipartition of energy and its application to calculate the classical limit of molar heat capacity of gases</p> <p><u>Real gas and virial equation:</u> Deviation of gases from ideal behavior; compressibility factor; Boyle temperature; Andrew's and Amagat's plots; van der Waals equation and its features; its derivation and application in explaining real gas behaviour, other equations of state (Berthelot, Dietrici); Existence of critical state, Critical constants in terms of van der Waals constants; Law of corresponding states; virial equation of state; van der Waals equation expressed in virial form and significance of second virial coefficient; Intermolecular forces (Debye, Keesom and London interactions; Lennard-Jones potential - elementary idea)</p>	
<p>Transport processes</p> <p><u>Diffusion:</u> Fick's law, Flux, force, phenomenological coefficients & their interrelationship (general form), different examples of transport properties Viscosity: General features of fluid flow (streamline flow and turbulent flow); Newton's equation, viscosity coefficient; Poiseuille's equation (with derivation); principle of determination of viscosity coefficient of liquids by falling sphere method and using Ostwald's viscometer. Temperature variation of viscosity of liquids and comparison with that of gases. Relation between viscosity coefficient of a gas and mean free path.</p>	MS
<p>Chemical kinetics</p> <p>Rate law, order and molecularity: Introduction of rate law, Extent of reaction; rate constants, order; Forms of rates of First, second and nth order reactions; Pseudo first order reactions (example using acid catalyzed hydrolysis of methyl acetate); Determination of order of a reaction by half-life and differential method; Rate determining step and steady-state approximation – explanation with suitable examples;) Opposing reactions, consecutive reactions and parallel reactions (with</p>	MS

<p>explanation of kinetic and thermodynamic control of products; all steps first order) Role of Temperature : Temperature dependence of rate constant; Arrhenius equation, energy of activation; Homogeneous catalysis: Homogeneous catalysis with reference to acid-base catalysis; Enzyme catalysis; Michaelis-Menten equation, Lineweaver-Burk plot, turn-over number</p>	
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ORGANIC CHEMISTRY-IB

TOPIC	PROFESSOR ASSIGNED
<p>Stereochemistry I</p> <p>Bonding geometries of carbon compounds and representation of molecules: tetrahedral nature of carbon and concept of asymmetry; Fischer, sawhorse, flying wedge and Newman projection formulae and their inter translations. Concept of chirality and symmetry: symmetry elements, molecular chirality and centre of chirality; asymmetric and dissymmetric molecules; enantiomers and diastereomers; concept of stereogenicity, chirotopicity and pseudoasymmetry; chiral centres and number of stereoisomerism: systems involving 1/2/3-chiral centre(s) (AA, AB, ABA and ABC types). Relative and absolute configuration: D/L and R/S descriptors; erythro/threo and meso nomenclature of compounds; syn/anti nomenclatures for aldols; E/Z descriptors for C=C, conjugated diene, triene, C=N and N=N systems; combination of R/S- and E/ Zisomerisms. Optical activity of chiral compounds: optical rotation, specific rotation and molar rotation; racemic compounds, racemisation (through cationic, anionic, radical intermediates and through reversible formation of stable achiral intermediates); resolution of acids, bases and alcohols via diastereomeric salt formation; optical purity and enantiomeric excess; invertomerism of chiral trialkylamines.</p>	DKD
<p>General Treatment of Reaction Mechanism II</p> <p>Reactive intermediates: carbocations (carbenium and carbonium ions), non-classical carbocations, carbanions, carbon radicals, carbenes: generation and stability, structure using orbital picture and electrophilic/nucleophilic behavior of reactive intermediates (elementary idea).</p>	KSG

CEMA-CC-1-2-P

TOPIC	PROFESSOR ASSIGNED
PHYSICAL CHEMISTRY: P (1) LAB	JM
ORGANIC CHEMISTRY: O (1B) LAB	AP

Year: 1; Semester - II**(Even Semester: January - June)****Theory****CEMA-CC-2-3-TH****Organic Chemistry - 2**

TOPIC	PROFESSOR ASSIGNED
Stereochemistry II Chirality arising out of stereocenter: stereoisomerism of substituted cumulenes with even and odd number of double bonds; chiral axis in allenes, spiro compounds, alkylidenecycloalkanes and biphenyls; related configurational descriptors (R _a /S _a); atropisomerism; racemisation of chiral biphenyls. Concept of prostereoisomerism: prostereogenic centre; concept of (pro) n -chirality: topicity of ligands and faces (elementary idea); pro-R/pro-S, pro-E/pro-Z and R _e /S _i descriptors; pro-r and pro-s descriptors of ligands on propseudoasymmetric centre. Conformation: conformational nomenclature: eclipsed, staggered, gauche, syn and anti; dihedral angle, torsion angle; Klyne-Prelog terminology; P/M descriptors; energy barrier of rotation, concept of torsional and steric strains; relative stability of conformers on the basis of steric effect, dipole-dipole interaction and H-bonding; butane gauche interaction; conformational analysis of ethane, propane, n-butane, 2-methylbutane and 2,3-dimethylbutane; haloalkane, 1,2-dihaloalkanes and 1,2-diols (up to four carbons); 1,2-halohydrin; conformation of conjugated systems (s-cis and-trans).	DKD
General Treatment of Reaction Mechanism III Reaction thermodynamics: free energy and equilibrium, enthalpy and	KSG

<p>entropy factor, calculation of enthalpy change via BDE, intermolecular & intramolecular reactions. Concept of organic acids and bases: effect of structure, substituent and solvent on acidity and basicity; proton sponge; comparison between nucleophilicity and basicity; application of thermodynamic principles in acid-base equilibria. Tautomerism: prototropy (keto-enol, nitro - aci-nitro, nitroso-oximino, diazo-amino and enamine-imine systems); valence tautomerism and ring-chain tautomerism; composition of the equilibrium in different systems (simple carbonyl; 1,2- and 1,3- dicarbonyl systems, phenols and related systems), factors affecting keto-enol tautomerism; application of thermodynamic principles in tautomeric equilibria. Reaction kinetics: rate constant and free energy of activation; free energy profiles for one-step, two-step and three-step reactions; catalyzed reactions: electrophilic and nucleophilic catalysis; kinetic control and thermodynamic control of reactions; isotope effect: primary and β-secondary kinetic isotopic effect (k_H/k_D); principle of microscopic reversibility; Hammond's postulate.</p>	
<p>Substitution and Elimination Reactions</p> <p><u>Free-radical substitution reaction</u>: halogenation of alkanes, mechanism (with evidence) and stereochemical features; reactivity-selectivity principle in the light of Hammond's postulate.</p>	KSG
<p>Substitution and Elimination Reactions</p> <p><u>Nucleophilic substitution reactions</u>: substitution at sp^3 centre [systems: alkyl halides, allyl halides, benzyl halides, alcohols, ethers, epoxides, α-halocarbonyls]: mechanisms (with evidence), relative rates & stereochemical features: SN_1, SN_2, SN_2', SN_1' (allylic rearrangement) and SN_i; effects of solvent, substrate structure, leaving group and nucleophiles (including ambident nucleophiles, cyanide & nitrite); substitutions involving NGP (with hetero atoms and aryl groups); role of crown ethers and phase transfer catalysts.</p> <p><u>Elimination reactions</u>: E_1, E_2, E_1cB and E_i (pyrolytic syn eliminations); formation of alkenes and alkynes; mechanisms (with evidence), reactivity, regioselectivity (Saytzeff/Hofmann) and stereoselectivity; comparison between substitution and elimination.</p>	AP

CEMA-CC-2-3-P

TOPIC	PROFESSOR ASSIGNED
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Organic Preparations	KSG & AP
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CEMA-CC-2-4-TH : (Credits: Theory-04, Practicals-02)

Inorganic Chemistry - 2

TOPIC	PROFESSOR ASSIGNED
<p>Chemical Bonding-I</p> <p>(i) Ionic bond: General characteristics, types of ions, size effects, radius ratio rule and its application and limitations. Packing of ions in crystals. Born-Landé equation with derivation and importance of Kapustinskii expression for lattice energy. Madelung constant, Born-Haber cycle and its application, Solvation energy. Defects in solids (elementary idea). Solubility energetics of dissolution process (ii) Covalent bond: Polarizing power and polarizability, ionic potential, Fajan's rules. Lewis structures, formal charge. Valence Bond Theory. The hydrogen molecule (Heitler-London approach), directional character of covalent bonds, hybridizations, equivalent and non-equivalent hybrid orbitals, Bent's rule, Dipole moments, VSEPR theory, shapes of molecules and ions containing lone pairs and bond pairs (examples from main groups chemistry) and multiple bonding (σ and π bond approach).</p>	AKD
<p>Chemical Bonding-II</p> <p>(i) Molecular orbital concept of bonding (The approximations of the theory, Linear combination of atomic orbitals (LCAO)) (elementary pictorial approach): sigma and pi bonds and delta interaction, multiple bonding. Orbital designations: gerade, ungerade, HOMO, LUMO. Orbital mixing, MO diagrams of H_2, Li_2, Be_2, B_2, C_2, N_2, O_2, F_2, and their ions wherever possible; Heteronuclear molecular orbitals: CO, NO, NO^+, CN^-, HF, BeH_2, CO_2 and H_2O. Bond properties: bond orders, bond lengths. (ii) Metallic Bond: Qualitative idea of valence bond and band theories. Semiconductors and insulators, defects in solids. (iii) Weak Chemical Forces: Hydrogen bonding (theories of hydrogen bonding, valence bond treatment), receptor-guest interactions, Halogen bonds. Effects of chemical force, melting and boiling points.</p>	PG
<p>Radioactivity</p>	AKD

Nuclear stability and nuclear binding energy. Nuclear forces: meson exchange theory. Nuclear models (elementary idea): Concept of nuclear quantum number, magic numbers. Nuclear Reactions: Artificial radioactivity, transmutation of elements, fission, fusion and spallation. Nuclear energy and power generation. Separation and uses of isotopes. Radio chemical methods: principles of determination of age of rocks and minerals, radio carbon dating, hazards of radiation and safety measures.

CEMA-CC-2-4-P

TOPIC	PROFESSOR ASSIGNED
Iodo-/ Iodimetric Titrations; Estimation of metal content in some selective samples	AKD & PG

Year: 2: Part - II

Paper: IV A (50 Marks)

CHT 21a (Inorganic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Chemical Periodicity II</p> <p>General trends of variation of electronic configuration, elemental forms, metallic nature, magnetic properties (if any), catenation and catalytic properties (if any), oxidation states, inert pair effect (if any), aqueous and redox chemistry in common oxidation states, properties and reactions of important compounds such hydrides, halides, oxides, oxyacids</p>	PG

<p>(if any), complex chemistry (if any) in respect of the following elements:</p> <p>(i) s-block elements: Li-Na-K, Be-Mg-Ca-Sr-Ba.</p> <p>(ii) p-block elements: B-Al-Ga-In-Tl, C-Si-Ge-Sn-Pb, N-P-As-Sb-Bi, O-S-Se-Te, F-Cl-Br-I, He-Ne-Ar-Kr-Xe</p>	
<p><u>UNIT: II</u></p> <p>Other Types of Bonding</p> <p>Molecular orbital concept of bonding (elementary pictorial approach):sigma and pi-bonds, multiple bonding, MO diagrams of H₂, F₂, O₂, C₂, B₂, CO, NO, CN-, HF, and H₂O; bond orders, bond lengths, Walsh Diagram. Coordinate bonding: Lewis acid-base adducts (examples), double salts and complex salts, Werner theory of coordination compounds. Ambidentate and polydentate ligands, chelate complexes. IUPAC nomenclature of coordination compounds (up to two metal centers). Coordination numbers, constitutional isomerism. Stereoisomerism in square planar and octahedral complexes. Hydrogen bonding and its effects on the physical properties of compounds of the main group elements.</p> <p>Metallic bonding: qualitative idea of band theory, conducting, semi conducting and insulating properties with examples from main group elements.</p>	AKD

CHT 21b (Inorganic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Chemistry of s- and p-block Elements</p> <p>(i) Structure, bonding and reactivity of B₂H₆; (SN)_x with x = 2, 4; phosphazines; interhalogens. (ii) Structure of borates, silicates, polyphosphates, borazole, boron nitride, silicones, thionic acids. (iii) Reactivity of polyhalides, pseudo halides, fluorocarbons, freons and NO_x with environmental effects. (iv) Chemistry of hydrazine, hydroxylamine, N₃-, thio- and per-sulphates.</p> <p>Noble gases from air; oxides, fluorides and oxofluorides of xenon;</p>	AKD

chemical and photochemical reactions of ozone.	
<p><u>UNIT: II</u></p> <p>Precipitation and Redox Reactions</p> <p>Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulfides, phosphates, carbonates, sulfates and halides. Ion-electron method of balancing equation of redox reaction. Elementary idea on standard redox potentials with sign conventions, Nernst equation (without derivation). Influence of complex formation, precipitation and change of pH on redox potentials; formal potential. Feasibility of a redox titration, redox potential at the equivalence point, redox indicators. Redox potential diagram (Latimer and Frost diagrams) of common elements and their applications. Disproportionation and comproportionation reactions (typical examples).</p>	PG

Paper: III A (50 Marks)

CHT 22a (Organic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Addition reactions</p> <p>Electrophilic addition to C=C: Mechanism, reactivity, regioselectivity and stereoselectivity. Reactions: halogenations, hydrohalogenation, hydration, hydrogenation, epoxidation, hydroxylation, ozonolysis, electrophilic addition to diene (conjugated dienes and allenes). Radical addition: HBr addition. Dissolving metal reduction of alkynes and benzenoid aromatics (Birch). Pericyclic addition: Diels-Alder reaction. Addition of singlet and triplet carbenes.</p> <p>Nucleophilic addition to C=O: Mechanism, reactivity, equilibrium and kinetic control. Reactions with alcohols, amines, thiols, HCN, bisulfate, Wittig reaction. Carbonyl Reduction: hydride addition, Wolff-Kishner reduction, dissolving metal (Bouveault-Blanc reduction, Clemmensen Reduction), Cannizzaro reaction, Tischenko reaction, aldol condensation, benzoin condensation. Hydrolysis of nitriles and</p>	KSG

isonitriles. Nucleophilic addition to α,β -unsaturated carbonyl system (general principles)	
<p><u>UNIT: II</u></p> <p>Elimination and aromatic substitution</p> <p>Elimination - Mechanisms: E1, E2 and E1cB; reactivity, orientation (Saytzeff/ Hofmann) and stereoselectivity; substitution vs elimination, Electrophilic aromatic substitution: Mechanisms, orientation and reactivity. Reactions: nitration, nitrosation, sulfonation, halogenation, Friedel-Crafts reactions, onecarbon electrophiles (reactions: chloromethylation, Gatterman-Koch, Gatterman, Hoesch, Vilsmeier-Haack reaction, Reimer-Tiemann, Kolbe-Schmidt). Nucleophilic aromatic substitution: Addition-elimination mechanism, S_N1 mechanism, benzyne mechanism.</p>	AP

CHT 22b (Organic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Nitrogen compounds and Organometallics</p> <p>Nitrogen compounds: amines (aliphatic & aromatic) [preparation, separation and identification of primary, secondary and tertiary amines], E. Clarke reaction, enamines, Mannich reaction, diazomethane, diazoacetic ester, aromatic nitro compounds, aromatic diazonium salts, nitrile and isonitrile. Organometallics: preparation of Grignard reagent and organo lithium. Reactions: addition of Grignard and organo lithium to carbonyl compounds, substitution on -COX, conjugate addition by Gilman cuprates, Reformatsky reaction.</p>	DKD
<p><u>UNIT: II</u></p> <p>Reactions: Rearrangements</p> <p>1,2-shift: Rearrangement to electron-deficient carbon (Wagner-Meerwein rearrangement, pinacol rearrangement, dienone-phenol; Wolff rearrangement in ArndtEistert synthesis, benzil-benzilic acid rearrangement). Electron-deficient nitrogen (Beckmann rearrangement, Schmidt rearrangement, Hofmann</p>	DKD

<p>rearrangement, Lossen rearrangement, Curtius rearrangement). Electron-deficient oxygen (Baeyer-Villiger oxidation, hydroperoxide rearrangement (cumene hydroperoxide-phenol rearrangement), Dakin reaction. Aromatic rearrangements [migration from oxygen to ring carbon (Fries rearrangement, Claisen rearrangement); migration from nitrogen to ring carbon (Hofmann-Martius rearrangement, Fischer-Hepp rearrangement, N-azo to C-azo rearrangement, Bamberger rearrangement, Orton rearrangement, benzidine rearrangement.</p>	
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Paper: III B (50 Marks)

CHT 23a (Physical)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Thermodynamics and Equilibrium</p> <p>Open system, chemical potential and activity, partial molar quantities, chemical potential in terms of Gibb's free energy and other thermodynamic state functions and its variation with temperature and pressure. Gibbs-Duhem equation; fugacity of gases and fugacity coefficient. Thermodynamic conditions for equilibrium, degree of advancement. van't Hoff's reaction isotherm (deduction from chemical potential). Explanation of the free energy versus degree of advancement plot . Equilibrium constant and standard Gibbs free energy change. Definitions of K_p, K_c and K_x ; van't Hoff's reaction isobar and isochore from different standard states. Shifting of equilibrium due to change in external parameters e.g. temperature and pressure. Le Chatelier's principle and degree of advancement. Activity and activity coefficients of electrolyte / ion in solution. Debye-Huckel limiting law (statement and applications only). Solubility equilibrium and influence of common ions and indifferent ions thereon. pH, buffer solution, buffer capacity, salt hydrolysis (detailed treatment).</p>	JM
<p><u>UNIT: II</u></p> <p>Liquid State and Viscosity of Fluids</p> <p>Nature of the liquid state, (short range order and long range disorder). Vapor pressure. Surface tension, surface energy, excess pressure, capillary rise and measurement of surface tension. Work of cohesion</p>	MS

and adhesion, spreading of liquid over other surface. Vapour pressure over curved surface. Temperature dependence of surface tension. General features of fluid flow (streamline flow and turbulent flow). Reynold number, nature of viscous drag for streamline motion, Newton' equation, viscosity coefficient. Poiseuille's equation (with derivation), temperature dependence of viscosity, principle of determination of viscosity coefficient of liquids by falling sphere method. Viscosity of gases vs liquids and kinetic theory of gas viscosity.	
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CHT 23b (Physical)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Quantum Chemistry I</p> <p>Wave-particle duality, light as particles: photoelectric and Compton effects; electrons as waves and the de Broglie hypothesis. Elementary concepts of operators, eigenfunctions and eigenvalues. Linear operators. Commutation of operators, fundamental commutator and uncertainty relation (without proof). Expectation value. Hermitian operator. Schrodinger time-independent equation: nature of the equation, acceptability conditions imposed on the wave functions and probability interpretations of wave function. Particle in a box: setting up of Schrodinger equation for one-dimensional box and its solution. Comparison with free particle eigenfunctions and eigenvalues. Properties of PB wave functions (normalisation, orthogonality, probability distribution). Expectation values of x, x^2, p_x and p_x^2 and their significance in relation to the uncertainty principle. Extension of the problem to two and three dimensions and the concept of degenerate energy levels.</p>	JM
<p><u>UNIT: II</u></p> <p>Electrochemistry</p> <p>Conductance and measurement of conductance, cell constant, specific conductance and molar conductance. Variation of specific and equivalent conductance with dilution for strong and weak electrolytes. Kohlrausch's law of independent migration of ions, ion conductance and ionic mobility. Equivalent and molar conductance at infinite dilution and their determination for strong and weak electrolytes. Ostwald's dilution law. Debye-Huckel model (physical idea only).</p>	MS

<p>Application of conductance measurement (determination of solubility product and ionic product of water). Conductometric titrations. Determination of transport number by moving boundary method. Types of electrochemical cells and examples, cell reactions, emf and change in free energy, ΔH and ΔS of cell reactions from emf measurements. Thermodynamic derivation of Nernst equation. Standard cells. Half-cells / electrodes, different types of electrodes (with examples). Standard electrode potential (IUPAC convention) and principles of its determination. Types of concentration cells. Liquid junction potential and its minimisation. Glass electrode and determination of pH of a solution. Potentiometric titrations: acid-base and redox.</p>	
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Paper: IV B (50 Marks)

Practical

TOPIC	PROFESSOR ASSIGNED
<p>CHP 24a: Inorganic Analytical Estimations</p>	AKD & PG
<p>CHP 24b: Physical Instrumental Estimations</p>	JM

Year: 3; Part - III

Paper: V (100 Marks)

CHT 31a (Inorganic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u> Chemistry of coordination compounds Isomerism, reactivity and stability: Determination of configuration of cis- and trans- isomers by chemical methods. Labile and inert complexes, substitution reaction on square planer complexes, trans</p>	PG

<p>effect (example and applications). Stability constants of coordination compounds and their importance in inorganic analysis. Structure and bonding: VB description and its limitations. Elementary Crystal Field Theory: splitting of dn configurations in octahedral, square planar and tetrahedral fields, crystal field stabilization energy in weak and strong fields; pairing energy. JahnTeller distortion. Metal-ligand bonding (MO concept, elementary idea), sigma- and pi-bonding in octahedral complexes (qualitative pictorial approach) and their effects on the oxidation states of transitional metals (examples). Magnetism and Colour: Orbital and spin magnetic moments, spin only moments of dn ions and their correlation with effective magnetic moments, including orbital contribution; quenching of magnetic moment: super exchange and antiferromagnetic interactions (elementary idea with examples only); d-d transitions; L-S coupling; qualitative Orgel diagrams for 3d1-3d9 ions and their spectroscopic ground states; selection rules for electronic spectral transitions; spectrochemical series of ligands; charge transfer spectra (elementary idea).</p>	
<p><u>UNIT: II</u></p> <p>Chemistry of d- and f- block elements</p> <p>General comparison of 3d, 4d and 5d elements in term of electronic configuration, elemental forms, metallic nature, atomization energy, oxidation states, redox properties, coordination chemistry, spectral and magnetic properties. f-block elements: electronic configuration, ionization energies, oxidation states, variation in atomic and ionic (3+) radii, magnetic and spectral properties of lanthanides, comparison between lanthanide and actinides, separation of lanthanides (by ion-exchange method). Chemistry of some representative compounds: $K_2Cr_2O_7$, $KMnO_4$, $K_4[Fe(CN)_6]$, $K_2[Ni(CN)_4]$, H_2PtCl_6, $Na_2[Fe(CN)_5NO]$.</p>	AKD

CHT 31b (Inorganic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Organometallic Compounds</p> <p>18-electron rule and its applications to carbonyls (including carbonyl</p>	PG

<p>hydrides and carbonylates), nitrosyls, cyanides, and nature of bonding involved therein. Simple examples of metal-metal bonded compounds and metal clusters. Metal-olefin complexes: zeises salt (preparation, structure and bonding), Ferrocene (preparation, structure and reactions). Hapticity(η) of organometallic ligands, examples of mono tri and penta-hapto cyclopentadienyl complexes. Simple examples of fluxional molecules. Coordinative unsaturation: oxidative addition and insertion reactions. Homogeneous catalysis by organometallic compounds: hydrogenation, hydroformylation and polymerization of alkenes (Ziegler-Natta catalysis).</p>	
<p><u>UNIT: II</u></p> <p>Bioinorganic Chemistry</p> <p>Elements of life: essential major, trace and ultratrace elements. Basic chemical reactions in the biological systems and the role of metal ions (specially Na^+, K^+, Mg^{2+}, Ca^{2+}, $\text{Fe}^{3+/2+}$, $\text{Cu}^{2+/+}$, and Zn^{2+}).Metal ion transport across biological membrane Na^+-ion pump, ionophores. Biological functions of hemoglobin and myoglobin, cytochromes and ferredoxins, carbonate bicarbonate buffering system and carbonicanhydrase. Biological nitrogen fixation, Photosynthesis: Photosystem-I and Photosystem-II. Toxic metal ions and their effects, chelation therapy (examples only), Pt and Au complexes as drugs (examples only), metal dependent diseases.</p>	AKD

CHT 31c (Inorganic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Electrochemical and spectral analysis, and analytical separation</p> <p>Electrochemical methods: Conductometry, Potentiometry, pH-metry. Electrogravimetry, Coulometry. Spectrophotometry: Lambert-Beer law, Limits to Beer's law, Principle of spectrophotometric estimation of iron, manganese and phosphorous. Principles and instrumentations of atomic absorption and atomic emission spectrometry; estimation of sodium and potassium in water samples. Ion exchange resins and their exchange capacities, principle and simple applications of ion exchange separation. Chromatographic separations: General description and classification of chromatographic methods, thin layer, paper and column chromatographic techniques and their simple applications, Rf-values</p>	PG

and their significance, elution in column chromatography, migration rates of solutes, band broadening and column efficiency, column resolution	
<p><u>UNIT: II</u></p> <p>Statistical methods in chemical analysis and environmental analysis</p> <p>Errors in chemical analysis: Accuracy and precision of measurements, determinate indeterminate, systematic and random errors in chemical analysis with examples, absolute and relative errors; source, effect and detection of systematic errors; distribution of random errors, normal error curve, standard deviations, standard deviation of calculated results- sum or difference, product or quotient, significant figures, rounding and expressing results of chemical computations. Principles for determination of BOD, COD, DO, TDS, in water samples. Detection and estimation of As, Hg, Cd, Pb, NH₄⁺, and F⁻, NO₃⁻, NO₂⁻ in water sample. Detection, collection and principles of estimation of CO, NO_x, SO₂, H₂S and SPM in air samples</p>	AKD

CHT 31d (Inorganic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Gravimetric and titrimetric methods of analysis</p> <p>Requirements of gravimetry: properties of precipitates and precipitating reagents, particle size and filterability of precipitates, colloidal and crystalline precipitates coprecipitation and post-precipitation drying and ignition of precipitates, principles of gravimetric estimation of chloride, phosphate, zinc, iron, aluminum and magnesium singly. Primary and secondary standard substances in acid-base, redox, complexometric (EDTA) and argentometric titrations. Principle and application of redox titrimetric estimation based on the use of the following reagents: KMnO₄, K₂Cr₂O₇, I₂, Na₂S₂O₃.5H₂O, KH(IO₃)₂ and KBrO₃. Principle of argentometric estimation of chloride using adsorption indicators. Principle of complexometric EDTA titration, metal ion indicators</p>	AKD

(examples), masking and demasking reactions, estimation of Cu-Zn, Fe-Al and Ca-Mg mixture by EDTA titration methods. Dissolution, scheme of analysis and principles of estimation of the constituents of the following materials: dolomite, pyrolusite, chalcopyrites, Portland cement, basic slag, brass, steel and type metal.	
<p><u>UNIT: II</u></p> <p>Thermodynamics of dissolution</p> <p>Acidities of cations, factors influencing acidities (effects of charge and size); basicities of anions, factors influencing basicities (size and charge effects). Hydration energies of ions, Born-equation, enthalpy change associated with dissolution, solubility rules, thermodynamic interpretations of the rules; application of the rules for precipitation reactions, uses of the rules in quantitative and qualitative analysis, complexation reactions and their roles in dissolution processes.</p>	PG

Paper: VI A (75 Marks)

CHT 32a (Organic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Carbanion chemistry and cyclic stereochemistry</p> <p>Carbanions: formation of enols and enolates (metal), alkylation of enolates, reactions of enolates with carbonyls (aldehydes, ketones and esters), conjugate addition of enolates. Cyclic Stereochemistry: Baeyer strain theory. Conformational analysis: cyclohexane, mono and disubstituted cyclohexane, symmetry properties and optical activity. Conformation & reactivity in cyclohexane system: elimination (E₂),</p>	KSG

rearrangement, nucleophilic substitution (S_N1 , S_N2 , NGP), oxidation of cyclohexanol, esterification, saponification, lactonisation.	
<p><u>UNIT: II</u></p> <p>Spectroscopy UV, IR, NMR (elementary)</p> <p>UV Spectra: Electronic transition ($\sigma\text{-}\sigma^*$, $n\text{-}\sigma^*$, $\pi\text{-}\pi^*$ and $n\text{-}\pi^*$), relative positions of λ_{max} considering conjugative effect, steric effect, solvent effect, red shift (bathochromic shift), blue shift (hypsochromic shift), hyperchromic effect, hypochromic effect (typical examples). IR Spectra: Modes of molecular vibrations, application of Hooke's law, characteristic stretching frequencies of O-H, N-H, C-H, C-D, C=C, C=N, C=O functions; factors effecting stretching frequencies (H-bonding, mass effect, electronic factors, bond multiplicity, ring size). PMR Spectra: Nuclear spin, NMR active nuclei, principle of proton magnetic resonance, equivalent and non-equivalent protons, chemical shift δ), shielding / deshielding of protons, up-field and down-field shifts. NMR peak area (integration), diamagnetic anisotropy, relative peak positions of different kinds of protons (alkyl halides, olefins, alkynes, aldehyde H), substituted benzenes (toluene, anisole, nitrobenzene, halobenzene, dinitrobenzenes, chloronitrobenzene), first order coupling (splitting of the signals: ordinary ethanol, bromoethane, dibromoethanes), coupling constants.</p>	KSG

CHT 32b (Organic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Synthetic strategies and Asymmetric synthesis</p> <p>Retrosynthetic analysis: disconnections, synthons, donor and acceptor synthons, functional group interconversion, C-C disconnections and synthesis [one group and twogroup (1,2 to 1,6-dioxygenated), reconnection (1,6-di carbonyl), natural reactivity and umpolung,</p>	AP

<p>protection-deprotection strategy [alcohol, amine, carbonyl, acid] Strategy of ring synthesis: thermodynamic factor, synthesis through enolate anion chemistry and carbonyl condensation reactions (including acetoacetic ester & malonic ester synthesis), synthesis through rearrangement (including pinacol, Favorski), synthesis of large rings, high dilution technique and acyloin reaction, Stobbe condensation. Asymmetric synthesis: stereoselective and stereospecific reactions, diastereoselectivity and enantioselectivity (only definition), diastereoselectivity: addition of nucleophiles to C=O, adjacent to a stereogenic centre (Felkin-Anh model).</p>	
<p><u>UNIT: II</u></p> <p>Carbohydrate chemistry</p> <p>Monosaccharides: Aldoses upto 6 carbons, structure of D-glucose & D-fructose (configuration & conformation), anomeric effect, mutarotation. reactions: osazone formation, bromine – water oxidation, stepping-up (Kiliani method) and stepping-down (Ruff's & Wohl's method) of aldoses. Disaccharides: glycosidic linkages, structure of sucrose</p>	AP

CHT 32c (Organic)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Carbocycles and Heterocycles</p> <p>Polynuclear hydrocarbons: syntheses and reactions of naphthalene, anthracene and phenanthrene. Heterocyclic compounds: reactivity, orientation and important reactions of furan, pyrrole, pyridine, indole, synthesis (including retrosynthetic approach) pyrrole: Knorr pyrrole synthesis and Hantzsch synthesis. Hantzsch pyridine synthesis. Indole: Fischer, Madelung and Reissert synthesis, Skaurp quinoline and</p>	DKD

Bischler-Napieralski Synthesis of isoquinoline	
<p><u>UNIT: II</u></p> <p>Amino acids, peptides and nucleic acids</p> <p>Amino acids: Synthesis: (Strecker, Gabriel, acetamido malonic ester, azlactone); isoelectric point, ninhydrin reaction. Peptides: peptide linkage, syntheses of peptides using N-protection & C-protection, solid phase synthesis; peptide sequence: C-terminal and N-terminal unit determination (Edmann, Sanger & dansyl chloride). Nucleic acids: pyrimidine & purine bases (only structure & nomenclature), nucleosides and nucleotides, DNA: Watson-Crick model, complimentary base-pairing in DNA.</p>	DKD

Paper: VII A (75 Marks)

CHT 33a (Physical)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Properties of solids, interfaces and dielectrics</p> <p>Crystal, crystal planes, law of rational indices, Calculation of fraction occupied for simple cubic, bcc, and fcc. Miller indices. Bragg's law and its applications for the determination of crystal structure for cubic system single crystal. Crystal structures of NaCl and KCl. Special features of interfaces compared to bulk. Surface dynamics: Physical and chemical adsorption. Freundlich and Langmuir adsorption isotherms;</p>	JM

<p>multilayer adsorption and BET isotherm (no derivation required). Gibbs adsorption isotherm and surface excess. Heterogeneous catalysis (single reactant). Colloids: lyophobic and lyophilic sols. Origin of charge and stability of lyophobic colloids. Coagulation and Schultz-Hardy rule. Zeta potential and Stern double layer (qualitative idea). Tyndall effect. Electrokinetic phenomenon (qualitative idea only). Electrical properties of molecules: Polarizability of atoms and molecules, dielectric constant and polarisation, molar polarisation for polar and non-polar molecules. Clausius-Mosotti equation and Debye equation (both with derivation) and their application. Determination of dipole moments.</p>	
<p><u>UNIT: II</u></p> <p>Quantum Chemistry – II</p> <p>Simple Harmonic Oscillator: setting up of the Schrodinger stationary equation, energy expression (without derivation), expression of wave function for $n = 0$ and $n = 1$ (without derivation) and their characteristic features. Stationary Schrodinger equation for the H-atom in polar coordinates, separation of radial and angular (θ, φ) parts. Solution of φ-part and emergence of quantum number 'm'; energy expression (without derivation), degeneracy. Hydrogenic wave functions up to $n = 2$ (expression only); real wave function. Concept of orbitals and shapes of s and p orbitals.</p>	<p>JM</p>

CHT 33b (Physical)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Phase equilibrium and colligative properties</p> <p>Definitions of phase, component and degrees of freedom. Phase rule and its derivations. Definition of phase diagram. Phase equilibria for</p>	<p>MS</p>

<p>one component system – water, CO₂. First order phase transition and Clapeyron equation; Clausius-Clapeyron equation - derivation and use. Liquid vapour equilibrium for two component systems. Ideal solution at fixed temperature and pressure. Principle of fractional distillation. Duhem-Margules equation. Henry's law. Konowaloff's rule. Positive and negative deviations from ideal behaviour. Azeotropic solution. Liquid-liquid phase diagram using phenol-water system. Solidliquid phase diagram. Eutectic mixture. Nernst distribution law. Solvent extraction. ΔG, ΔS ΔH and ΔV of mixing for binary solutions. Vapour pressure of solution. Ideal solutions, ideally diluted solutions and colligative properties. Raoult's law. Thermodynamic derivation of colligative properties of solution (using chemical potentials) and their inter-relationships. Abnormal colligative properties.</p>	
<p><u>UNIT: II</u></p> <p>Statistical thermodynamics and the third law</p> <p>Macrostates and microstates, thermodynamic probability, entropy and probability, Boltzmann distribution formula (with derivation). Applications to barometric distribution. Partition function and Einstein's theory of heat capacity of solids. Limitations of Einstein's theory and Debye's modification (qualitative). Nernst heat theorem. Approach to zero kelvin, adiabatic demagnetisation. Planck's formulation of third law and absolute entropies.</p>	MS

CHT 33c (Physical)

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Kinetics and photochemistry</p> <p>Collision theory (detailed treatment); outline of Transition State theory.</p>	JM

<p>Primary kinetic salt effect. Lindemann theory of unimolecular reaction. Potential energy curves (diatomic molecules), Frank-Condon principle and vibrational structure of electronic spectra. Bond dissociation and principle of determination of dissociation energy (ground state). Decay of excited states by radiative and non-radiative paths. Fluorescence and phosphorescence, Jablonsky diagram. Laws of photochemistry: Grotthus-Draper law, Stark-Einstein law of photochemical equivalence and Lambert-Beer's law; quantum yield and its measurement for a photochemical process, actinometry. Photostationary state. Photosensitized reactions. Kinetics of HI decomposition, H₂-Br₂ reaction, dimerisation of anthracene.</p>	
<p><u>UNIT: II</u></p> <p>Spectroscopy</p> <p>Rotational spectroscopy of diatomic molecules: rigid rotor model, selection rules, spectrum, characteristic features of spectral lines (spacing and intensity). Determination of bond length, effect of isotopic substitution. Vibrational spectroscopy of diatomic molecules: SHO model, selection rules, spectra; anharmonicity and its consequences on energy levels, overtones, hot bands. Raman Effect. Characteristic features and conditions of Raman activity with suitable illustrations. Rotational and vibrational Raman spectra. Rule of mutual exclusion with examples.</p>	MS

Paper: VI B (25 Marks) + VII B (25 Marks) + VIII A (50 Marks) + VIII B (50 Marks)

Practicals

TOPIC	PROFESSOR ASSIGNED
CHP-34a: Organic	KSG

Spectroscopic Analysis of Organic Compounds	
CHP-34b: Organic (i) Qualitative analysis of single solid organic compounds (ii) Organic preparations	DKD + KSG + AP
CHP-35a+ 35b: Physical (i) Short Physical experiments (ii) Long Physical experiments	MS

Course: B.Sc. (Gen.) - Chemistry [CEMG]

Year: 1; Semester - I

(Odd Semester: July - December)

Theory

CC1/ GE 1: (Credits: Theory-04, Practicals-02)

TOPIC	PROFESSOR ASSIGNED
Kinetic Theory of Gases and Real gases Concept of pressure and temperature; Collision of gas molecules; Collision number and mean free path. Nature of distribution of velocities, Maxwell's distribution of speed and kinetic energy; Average velocity, root mean square velocity and most probable velocity; Principle of equipartition of energy Deviation of real gases from ideal behavior; compressibility factor; Boyle temperature; Andrew's and Amagat's plots; van der Waals equation and its features; Existence of critical state, Critical constants in terms of van der Waals constants; Law of corresponding states.	JM
Liquids Definition of Surface tension, its dimension and principle of its determination using stalagmometer; Viscosity of a liquid and principle of determination of coefficient of viscosity using Ostwald viscometer;	JM

Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only)	
<p>Chemical Kinetics</p> <p>Introduction of rate law, Order and molecularity; Extent of reaction; rate constants; Rates of First, second and nth order reactions and their Differential and integrated forms (with derivation); Pseudo first order reactions; Determination of order of a reaction by half-life and differential method. Temperature dependence of rate constant; Arrhenius equation, energy of activation</p>	JM
<p>Atomic Structure</p> <p>Bohr's theory for hydrogen atom (simple mathematical treatment), atomic spectra of hydrogen and Bohr's model, Sommerfeld's model, quantum numbers and their significance, Pauli's exclusion principle, Hund's rule, electronic configuration of many-electron atoms, Aufbau principle and its limitations.</p>	AKD
<p>Chemical Periodicity</p> <p>Classification of elements on the basis of electronic configuration: general characteristics of s-, p-, d- and f-block elements. Positions of hydrogen and noble gases. Atomic and ionic radii, ionization potential, electron affinity, and electronegativity; periodic and group-wise variation of above properties in respect of s- and p- block elements.</p>	PG
<p>Acids and bases</p> <p>Brønsted–Lowry concept, conjugate acids and bases, relative strengths of acids and bases, effects of substituent and solvent, differentiating and leveling solvents. Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept. Hard and soft acids and bases (HSAB concept), applications of HSAB process.</p>	PG
<p>Fundamentals of Organic Chemistry</p> <p>Electronic displacements: inductive effect, resonance and</p>	KSG

hyperconjugation; nucleophiles and electrophiles; reactive intermediates: carbocations, carbanions and free radicals.	
Stereochemistry Different types of isomerism; geometrical and optical isomerism; concept of chirality and optical activity (upto two carbon atoms); asymmetric carbon atom; interconversion of Fischer and Newman representations; enantiomerism and diastereomerism, meso compounds; threo and erythro, D and L, cis and trans nomenclature; CIP Rules: R/S (only one chiral carbon atoms) and E/Z nomenclature.	KSG
Nucleophilic Substitution and Elimination Reactions Nucleophilic substitutions: S _N 1 and S _N 2 reactions; eliminations: E1 and E2 reactions (elementary mechanistic aspects); Saytzeff and Hofmann eliminations.	KSG

CC1/GE 1 Practical:

TOPIC	PROFESSOR ASSIGNED
1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with KMnO ₄ . 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO ₄ . 4. Estimation of Fe (II) ions by titrating it with K ₂ Cr ₂ O ₇ using internal indicator. 5. Estimation of Cu (II) ions iodometrically using Na ₂ S ₂ O ₃ . 6. Estimation of Fe(II) and Fe(III) in a given mixture using K ₂ Cr ₂ O ₇ solution	AKD, JM, MS, KSG

Year: 1: Semester - II

(Even Semester: January - June)

Theory

CC2/ GE 2: (Credits: Theory-04, Practicals-02)

TOPIC	PROFESSOR ASSIGNED
<p>Chemical Thermodynamics:</p> <p>Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics; Concept of heat, work, internal energy and statement of first law; enthalpy, H; relation between heat capacities, calculations of q, w, ΔU and ΔH for reversible, irreversible and free expansion of gases. Standard states; Heats of reaction; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; Laws of thermochemistry, Kirchoff's equations. Statement of the second law of thermodynamics; Concept of heat reservoirs and heat engines; Carnot cycle; Physical concept of Entropy; Entropy change of systems and surroundings for various processes and transformations; Auxiliary state functions (G and A) and Criteria for spontaneity and equilibrium.</p>	JM
<p>Chemical Equilibrium:</p> <p>Thermodynamic conditions for equilibrium, degree of advancement; Variation of free energy with degree of advancement; Equilibrium constant and standard Gibbs free energy change; Definitions of K_p, K_c and K_x and relation among them; van't Hoff's reaction isotherm, isobar and isochore from different standard states; Shifting of equilibrium due to change in external parameters e.g. temperature and pressure; variation of equilibrium constant with addition to inert gas; Le Chatelier's principle</p>	JM
<p>Solutions</p> <p>Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions; Vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions; Distillation of solutions; Lever rule; Azeotropes Nernst distribution law and its applications, solvent extraction</p>	MS
<p>Phase Equilibria</p> <p>Phases, components and degrees of freedom of a system, criteria of phase equilibrium; Gibbs Phase Rule; Derivation of Clausius – Clapeyron equation and its importance in phase equilibria; Phase diagrams of one-component systems (water and CO_2)</p>	MS
<p>Solids</p> <p>Forms of solids, crystal systems, unit cells, Bravais lattice types, Symmetry elements; Laws of Crystallography - Law of constancy of</p>	MS

interfacial angles, Law of rational indices; Miller indices of different planes and interplanar distance, Bragg's law	
<p>Aliphatic Hydrocarbons</p> <p>Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structures. Alkanes: (up to 5 Carbons). Preparation: catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis. Alkenes: (up to 5 Carbons). Preparation: elimination reactions: dehydration of alcohols and dehydrohalogenation of alkyl halides; cis alkenes (partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: addition of bromine, addition of HX [Markownikoff's (with mechanism) and anti-Markownikoff's addition], hydration, ozonolysis. Alkynes: (up to 5 Carbons). Preparation: acetylene from CaC₂; by dehalogenation of tetra halides and dehydrohalogenation of vicinal dihalides. Reactions: formation of metal acetylides, hydration reaction.</p>	DKD
<p>Error Analysis and Computer Applications</p> <p>Error analysis: accuracy and precision of quantitative analysis, determinate, indeterminate, systematic and random errors; methods of least squares and standard deviations. Computer applications: general introduction to computers, different components of a computer; hardware and software; input and output devices; binary numbers and arithmetic; Introduction to computer languages.</p>	JM
<p>Redox reactions</p> <p>Ion-electron method of balancing equation of redox reaction. Elementary idea on standard redox potentials with sign conventions, Nernst equation (without derivation). Influence of complex formation, precipitation and change of pH on redox potentials; formal potential. Feasibility of a redox titration, redox potential at the equivalence point, redox indicators</p>	PG

CC2/GE 2 Practical:

TOPIC	PROFESSOR ASSIGNED
Experiment 1: Study of kinetics of acid-catalyzed hydrolysis of methyl acetate Experiment 2: Study of kinetics of decomposition of H ₂ O ₂ (Clock Reaction) Experiment 3: Study of viscosity of unknown liquid (glycerol,	JM, MS, KSG

sugar) with respect to water. Experiment 4: Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator) Experiment 5: Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method Experiment 6: Determination of surface tension of a liquid using Stalagmometer

Year: 2: Part - II

Theory

Paper: II (100 Marks)

CGT 21a

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Basic physical chemistry I</p> <p>Gaseous state: Gas laws, kinetic theory of gas, collision and gas pressure, derivation of gas laws from kinetic theory, average kinetic energy of translation, Boltzmann constant and absolute scale of temperature, Maxwell's distribution law of molecular speeds (without derivation), most probable, average and root mean square speed of gas molecules, principle of equipartition of energy (without derivation). Mean free path and collision frequencies. Heat capacity of gases (molecular basis); viscosity of gases. Real gases, compressibility factor, deviation from ideality, van der Waals equation of state, critical phenomena, continuity of states, critical constants. Liquid state: physical properties of liquids and their measurements: surface tension and viscosity. .</p>	MS
<p><u>UNIT: II</u></p> <p>Basic physical chemistry II</p> <p>Chemical kinetics and catalysis: order and molecularity of reactions, rate laws and rate equations for first order and second order reactions (differential and integrated forms); zero order reactions. Determination of order of reactions. Temperature dependence of reaction rate, energy of activation. Catalytic reactions: homogeneous and heterogeneous catalytic reactions, autocatalytic reactions, catalyst poisons, catalyst promoters (typical examples).</p>	MS

CGT 21b

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Principles of qualitative inorganic analysis</p> <p>Formation of sublimes; principle of flame test, borax-bead test, cobalt nitrate test, fusion test, chromyl chloride test; analytical reactions for the detection of nitrate, nitrite, halides, phosphate, arsenate, arsenite, sulphide, thiosulphate, sulphate, thiocyanate, borate, boric acid, carbonate. Analytical reactions for the detection of Cr^{3+}, Fe^{3+}, Ni^{2+}, Cu^{2+}, As^{3+}, Mn^{2+}, Importance of common-ion effect in the separation of Group II cations, and Group III cations.</p>	PG
<p><u>UNIT: II</u></p> <p>Basic inorganic chemistry III</p> <p>Comparative study of s-block elements: Group trends in electronic configuration, modification of pure elements, common oxidation states, inert pair effect, chemical properties and reactions in respect of the following group elements: i) Li-Na-K ii) Be-Mg-Ca-Sr-Ba. Extraction and purification of elements from natural sources: Li, Cr, Ni, Ag, Au. Electroplating, galvanizing and anodizing.</p>	AKD

CGT 22a

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Basic physical chemistry III</p> <p>Thermodynamics: Definition of thermodynamic terms: Intensive and extensive variables, isolated, closed and open systems. Cyclic, reversible and irreversible processes. Thermodynamic functions and their differentials. Zeroth law of thermodynamics, concept of heat (q) and work (w). First law of thermodynamics, internal energy (U) and enthalpy (H); relation between C_p and C_v, calculation of w, q, ΔU and ΔH for expansion of ideal gas under isothermal and adiabatic conditions for reversible and irreversible processes including free expansion. Joule-Thomson Coefficient and inversion temperature. Application of First law of thermodynamics: standard state, standard enthalpy changes of physical and chemical transformations: fusion, sublimation,</p>	JM

<p>vaporization, solution, dilution, neutralization, ionization,. Hess's law of constant heat summation. Bond-dissociation energy, Born haber cycle for calculation of lattice energy. Kirchhoff's equation, relation between ΔH and ΔU of a reaction. Spontaneous processes, heat engine, Carnot cycle and its efficiency, Second law of thermodynamics, Entropy (S) as a state function, molecular interpretation of entropy, entropy changes in simple transformations. Free energy: Gibbs function (G) and Helmholtz function (A), Gibbs-Helmholtz equation, criteria for thermodynamic equilibrium and spontaneity of a process.</p>	
<p><u>UNIT: II</u></p> <p>Basic physical chemistry IV</p> <p>Chemical equilibrium: chemical equilibria of homogeneous and heterogeneous systems, derivation of expression of equilibrium constants; temperature, pressure and concentration dependence of equilibrium constants (K_p, K_c, K_x); Le Chatelier's principle of dynamic equilibrium. Colloids: colloids and crystalloids, classification of colloids, preparation and purification of colloids: ferric hydroxide sol and gold sol. Properties of colloids: Brownian motion, peptization, dialysis, Tyndal effect and its applications. Protecting colloids, gold number, isoelectric points, coagulation of colloids by electrolytes, Schulze-Hardy rule.</p>	JM

CGT 22b

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Basic physical chemistry V</p> <p>Acids-bases and solvents: Modern aspects of acids and bases: Arrhenius theory , theory of solvent system, Bronsted and Lowry's concept, Lewis concept with typical examples, applications and limitations. Strengths of acids and bases (elementary idea). Ionization of weak acids and bases in aqueous solutions, application of Ostwald's dilution law, ionization constants, ionic product of water, pH-scale, buffer solutions and their pH values, buffer actions; hydrolysis of salts. Solutions of electrolytes: Electrolytic conductance, specific conductance, equivalent conductance and molar conductance of electrolytic solutions. Influence of temperature and dilution on weak electrolytes.</p>	MS

<p><u>UNIT: II</u></p> <p>Basic physical chemistry VI</p> <p>Electrode potential: Electrode potentials, Nernst Equation, reference electrodes: normal hydrogen electrode and calomel electrodes, Emf of electrochemical cells and its measurement, electrode potential series and its applications. Solutions of non-electrolytes: Colligative properties of solution, Raoult's Law, relative lowering of vapor pressure, osmosis and osmotic pressure; elevation of boiling point and depression of freezing point of solvents.</p>	AP
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Paper: III A (50 Marks) + III B (50 Marks)

Practicals

TOPIC	PROFESSOR ASSIGNED
<p>CGP-23: Organic</p> <p>Qualitative Analysis of Single Organic Compound(s)</p>	JM + MS + DKD + KSG
<p>CHP-24: Inorganic</p> <p>Qualitative Analysis of Inorganic Mixtures</p>	JM + MS + PG + KSG

Year: 3; Part - III

Theory

Paper: IV A (75 Marks)

CGT 31a

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Chemical analysis</p> <p>Gravimetric Analysis: Solubility product and common ion effect. Requirements of gravimetry. Gravimetric estimation of chloride, sulphate, lead, barium, nickel, copper and zinc. Volumetric Analysis: Primary and secondary standard substances, principles of acid-base, oxidation-reduction, and complexometric titrations; acid-base, redox and metal-ion indicators. Principles of estimation of mixtures of NaHCO₃ and Na₂CO₃ (by acidimetry); iron, copper, manganese, chromium (by</p>	MS

redox titration); zinc, aluminum, calcium, magnesium (by complexometric EDTA titration). Chromatographic methods of analysis: column chromatography and thin layer chromatography.	
<p><u>UNIT: II</u></p> <p>Error analysis and computer applications</p> <p>Accuracy and precision of quantitative analysis, determinate-, indeterminate-, systematic- and random-errors. Methods of least squares and standard deviations. General introduction to computers, different components of a computer, hardware and software, input and output devices, binary numbers and arithmetic. Introduction to computer languages, programming and operating systems.</p>	MS

CGT 31b

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Industrial chemistry I</p> <p>Fuels: Classification of fuel, heating values. Origin of coal, carbonization of coal, coal gas, producer gas, water gas, coal based chemicals. Origin and composition of petroleum, petroleum refining, cracking, knocking, octane number, anti-knock compounds, Kerosene, liquefied petroleum gas (LPG), liquefied natural gas (LNG), petrochemicals (C1 to C3 compounds and their uses). Fertilizers: Manufacture of ammonia and ammonium salts, urea, superphosphate, biofertilizers. Glass and Ceramics: Definition and manufacture of glasses, optical glass and coloured glass. Clay and feldspar, glazing and vitrification, glazed porcelain, enamel. Portland cement: composition and setting of cement, white cement.</p>	PG
<p><u>UNIT: II</u></p> <p>Industrial chemistry II</p> <p>Polymers: Basic concept, structure and types of plastics, polythene, polystyrene, phenol-formaldehydes, PVC; manufacture, physical properties and uses of natural rubber, synthetic rubber, silicone rubber; synthetic fibres: Nylon-66, polyester, terylene, rayon; foaming agents, plasticizers and stabilizers. Paints, Varnishes and Synthetic Dyes: Primary constituents of a paint, binders and solvents for paints. Oil based</p>	PG

<p>paints, latex paints, baked-on paints (alkyd resins). Constituents of varnishes. Formulation of paints and varnishes. Synthesis of Methyl orange, Congo red, Malachite green, Crystal violet. Drugs and pharmaceuticals: Concept and necessity of drugs and pharmaceuticals. Preparation, and uses of Aspirin, Paracetamol, Sulphadiazine, Quinine, Chloroquine, Phenobarbital, Metronidazole. Fermentation Chemicals : Production, and purification of ethyl alcohol, citric acid, lactic acid, Vitamin B₁₂, Penicillin</p>	
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CGT 31c

TOPIC	PROFESSOR ASSIGNED
<p><u>UNIT: I</u></p> <p>Environmental chemistry</p> <p>The Atmosphere: Composition and structure of the atmosphere: troposphere, stratosphere, mesosphere and thermosphere. Ozone layer and its role. Major air pollutants : CO, SO₂, NO and particulate matters –their origins and harmful effects, problems of ozone layer depletion, green house effect, acid rain and photochemical smog. Air pollution episodes. Air quality standard. Air pollution control measures: cyclone collector, electrostatic precipitator, catalytic converter. The Hydrosphere : Environmental role of water, natural water sources, water treatment for industrial, domestic and laboratory uses. Water pollutants : action of soaps and detergents, phosphates, industrial effluents, agricultural run off, domestic wastes; thermal pollution radioactive pollution and their effects on animal and plant life, water pollution episodes. Water pollution control measures : waste water treatment: chemical treatment and microbial treatment; water quality standards : DO, BOD, COD, TDS and hardness parameters. Desalination of sea water : reverse osmosis, electro dialysis. The Lithosphere: Water and air in soil, waste matters and pollutants in soil, waste classification, treatment and disposal. Soil pollution and control measures.</p>	AP
<p><u>UNIT: II</u></p> <p>Industrial chemistry III</p> <p>Fats-Oils-Detergents : Fats and oils, natural fat, edible and inedible oil of vegetable origin. Common fatty acids, glycerides. Hydrogenation of unsaturated oil, production of vanaspati and margarine. Production of toilet and washing soaps, Enzymebased detergents, detergent powder, liquid soaps. Pesticides: Common pesticides : Production, applications</p>	AP

and residual toxicity of gammaxane, aldrin, parathion, malathion, DDT, paraquat, decamethrin. Food Additives: Food flavour, food colour, food preservatives, artificial sweeteners, acidulants, alkalies, edible emulsifiers and edible foaming agents, sequesterants – uses and abuses of these substances in food beverages.	
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Paper: IV A (25 Marks)

Practicals

TOPIC	PROFESSOR ASSIGNED
<p>CGP-32: Physical</p> <p>Experiments: 1. Titration of Na₂CO₃ + NaHCO₃ mixture vs HCl using phenolphthalein and methyl orange indicators. 2. Titration of HCl + CH₃COOH mixture vs NaOH using two different indicators to find the composition. 3. To find the total hardness of water by EDTA titration. 4. To find the PH of an unknown solution by comparing color of a series of HCl solutions + 1 drop of methyl orange, and a similar series of NaOH solutions + 1 drop of phenolphthalein. 5. To determine the rate constant for the acid catalysed hydrolysis of an ester. 6. Determination of the strength of the H₂O₂ sample. 7. To determine the solubility of a sparingly soluble salt, e.g. KHTa (one bottle)</p>	AP

Computer Science General

SEMESTER I

Full Marks – 100

Courses	Topics	Teacher Assigned
CMS-G-CC-1-1-TH Sem-1-Core Course-1 Theory	Computer Fundamentals and Digital Logic Design	MB
CMS-G-CC-1-P Sem-1-Core Course-1 Practical	Word Processing, Spreadsheet, Presentation and Web design by HTML	MB

SEMESTER II

Full Marks – 100

Courses	Topics	Teacher Assigned
CMS-G-CC-2-2-TH Sem-2-Core Course-2 Theory	Algorithms and Data Structure	MB
CMS-G-CC-2-2-P Sem-2-Core Course-2 Practical	Programming with C	MB

Part II - 2ND YEAR

Paper- II (Theoretical Full Marks – 100)

TOPICS	Teacher Assigned
Group – A Algorithms and Data Structure	MB
Group – B Software Engineering	MB
Group – C Database Management System	MB

Paper- III (Practical , Full Marks – 100)

TOPICS	Teacher Assigned
Group – A Word Processing , Document Preparation & Presentation and Spreadsheet	MB
Group – B Programming in C	MB
Group – C Database Design and Applications	MB

Part III – 3RD YEAR

Paper- IV (Full Marks – 100)(Theoretical - 50 , Practical – 50)

TOPICS	Teacher Assigned
Group – A (Theoretical – 50) Communication and Computer Network	MB

TOPICS	Teacher Assigned
Group – B(B1 and B2) (Practical – 50)	
Group – B1 Unix/ Linux and Shell Programming	MB
Group – B2 Programming In Visual Basic	MB

ECONOMICS HONOURS

1ST Semester (Honours)

Paper	Teacher	Paper	Teacher
<u>Introductory Micro economics (CC-I)</u> Total Marks: 100 [Theory(Th) 65 + Tutorial(Tu) 15 + Internal Assessment 10+Attendance: 10]		<u>Mathematical Methods in Economics-I(CC-II)</u> Total Marks: 100 [Theory(Th) 65 + Tutorial(Tu) 15 + Internal Assessment 10+Attendance: 10]	
Exploring the subject matter of Economics, Demand and Supply: How Markets Work, Market and Adjustments, Market Sensitivity and Elasticity, Government Intervention, Utilitarian Approach.	(RM +SG)	Functions of one real variable, Functions of one real variable, Integration of functions, Matrix Algebra, Game Theory.	MB + MM+ BM)

2nd Semester (Honours)

Name of Paper	Teacher	Name of Paper	Teacher
<u>Introductory Macro economics (CC – III)</u> _Total Marks: 100 [Theory(Th) 65 + Tutorial(Tu) 15 + Internal Assessment 10+Attendance: 10]		<u>Mathematical Methods for Economics (CC – IV)</u> Total Marks: 100 [Theory(Th) 65 + Tutorial(Tu) 15 + Internal Assessment 10+Attendance: 10]	

National Income Accounting , Income Determination in the Short Run (Part-I) :The Simple Keynesian Model in a Closed Economy, The Classical system , Macroeconomic Foundations -I	(RM +SG)	Multi-variable optimization , Difference Equations , Differential Equations ,	(MB + MM+ BM)
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2ND Year Economics (Honours)

Paper 3-Group A F.M- 50	Teacher	Paper 4 –Group A F.M- 50	Teacher
Economic Theory 2- Choice under uncertainty and economics of information, Monopoly and monopolistic competition, Oligopoly, Factor pricing, Welfare Economics.	MM	Development Economics- Concepts and measures of development, Concepts and measures of development, Process of development, factors in economic development, population and development, development strategies, development in a labour surplus economy, development, inequality and poverty , environment and development	RM
Paper 3-Group B F.M-50		Paper 4 –Group B F.M- 50	
Macro Economic theory The economy in the long run, the economy in the short run, Foreign trade and exchange rate, Theories of consumption and investment, Demand for money, Economic Growth.	MB	Indian Economy since Independence-Indian economy at the time of independence, Planning –evolution of India’s Development goals and strategy, Land and Agriculture, Industrial development-evolution, trade and policy, Employment, wages and inflation.	SG

3RD Year Economics (Honours)

Name of Paper	Name of the teachers
<p><u>Paper VA: International Economics: FM: 50</u></p> <p>Basic Models of Trade, Resources, Comparative advantage and Income distribution.</p> <p>The standard Trade model, Trade policy, Accounting, Income Determination and Exchange Rates.</p>	SG
<p><u>Paper VB: Public Finance: FM: 50</u></p> <p>Introduction to public economics , Forms and Functions of Government, Federal Finance , Public Goods and Public Sector , Government Budget and Policy , Revenue Resources , Tax Structure , Distribution and Stabilization.</p>	MM
<p><u>Paper VIA : Comparative Development Experience: FM : 50</u></p> <p>International comparisons of development , Genesis of capitalism , Industrialization Experiences in Early Part of 20th Century , Post second World War Development Scenario , Development and underdevelopment as historical processes , Evolution of New international economic order , Development policies and role of the state , Some Recent Development Experiences.</p>	RM
<p><u>Paper VIB : Contemporary Economic Issues : India and West Bengal : FM : 50</u></p> <p>Group A : Contemporary Economic Issues – India: Marks :Contemporary Economic Issues – India: Marks :30</p> <p>Economic Reform in India Since 1991, Agriculture, Poverty and Social Security, Post reform performance of Indian Economy, Indian Economy: Since Current and Future Issues.</p> <p>Group B: Contemporary Economic Issues –West Bengal : Marks: 20</p> <p>West Bengal Economy, Growth and Development of West Bengal.</p>	SG

<u>Paper VIIA: Statistics & Basic Econometrics : FM: 50</u>	(MB)
Joint probability distribution, Sampling Theory, Sampling Distribution, Classical Statistical Inferences, Elementary Econometrics, Time series Data.	
<u>Paper VIIB :Applied Economics : Group B: Mathematical Economics : FM: 50</u>	MB
Theory of Consumer , Theory of Firm , Game theory, Inter-Temporal Choice theory, Comparative Statics, Application of Difference and Differential equations.	
<u>Paper VIIIA: Indian Economic History : FM:50</u>	RM
Economic condition in India on the eve of British Rule, Aspects of economic Policies under the British Rule, Impact of British Rule, Early Economic Planning Initiatives.	
<u>Paper VIIIB : Term Paper: FM :50</u>	MB,,RM,SG

ECONOMICS GENERAL

1ST Semester Economics (General)

Name of Paper	
<u>Introductory Micro Economics- (GE 1)</u>	
Total Marks: 100 [Theory(Th) 65 + Tutorial(Tu) 15 + Internal Assessment 10+Attendance: 10]	Teacher
Economics and Micro Economics, Demand and Supply , The Households , The Firm and Perfect Market Structure , Imperfect Market Structure , Input Markets	RM+SG+MM

2nd Semester Economics (General)

Name of Paper	
<u>Introductory Macro Economics- (GE 2) :</u>	
Total Marks: 100 [Theory(Th) 65 + Tutorial(Tu) 15 + Internal Assessment 10+Attendance: 10]	Teacher

Economics and Micro Economics, Demand and Supply , The Households , The Firm and Perfect Market Structure , Imperfect Market Structure , Input Markets	RM+SG+MM
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2ND Year Economics (General)

Paper 2	Group A	Teacher	Paper2	Group B	Teacher
F.M-50			F.M-50		
Micro Economics II- Theory of Markets, Theory of Distribution		RM	Macro Economics II- Theory of income and employment, Prices and inflation, External sector		MB
Paper 3	Group A		Paper3	Group B	
F.M-50			F.M-50		
Indian Economy 1- An Overview, N.I Trends, Demography, Dualism, Indian Planning		(SG +MM)	Indian Economy II- Indian Agriculture, Indian industry, Finance in India, Indian Public Finance, India's Foreign Trade,		SG

3rd Year Economics (General)

Paper	Name of the teacher
Paper IVA: Development Economics :FM : 50 Distinction between Economic Growth & Economic Development, Development Planning, Population & Economic Development, Foreign Investment, Gender Related Issues.	SG
Paper IVB: International Economics & statistics : FM : 50 Group A : International Economics : FM :25 Group B : Statistics : FM: 25	(RM+MM)

MATHEMATICS HONOURS

CBCS

Semester –I (Hons)

Core Course-I	
Unit	Teacher Assigned
Unit-1: Calculus	DC
Unit-2: Geometry	SR
Unit-3: Vector Analysis	SKB
Graphical Demonstration (Teaching Aids)	All
Unit	Core Course-II
1	TC
2	DM
3	SKB

Semester II (Hons)

Core Course-III	
Unit	Teacher Assigned
1	DC
2	SR
3	TC
Graphical Demonstration (Teaching Aids)	All
Unit	Core Course-IV
1	DM
2	SKB
3	TC

MATHEMATICS (Part II)

Honours/ General/ Paper	Module	Group	TOPICS	Teacher Assigned
Honours Paper-III	V	A	Modern Algebra-II	TC
		B	Linear Programming & Game Theory	SR
	VI	A	Analysis II	DC
		B	Differential Equation-I	DM
Honours Paper-IV	VII	A	Real-Valued Functions of Several Real Variables	DC
		B	Application of Calculus	TC
	VIII	A	Analytical Geometry of 3D	TC & DM
		B	Analytical Statics I	SKB
		C	Analytical Dynamics of A Particle I	SKB

MATHEMATICS (Part III)

Honours/ General/	Module	Group	TOPICS	Teacher Assigned
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Paper				
Honours Paper-V	IX	A	Analysis III	TC
	X	A	Linear Algebra II and Modern Algebra II	DM
		B	Tensor Calculus	DC
		C	Differential Equation II / Graph Theory	DM
Honours Paper-VI	XI	A	Vector calculus II	DM
		B	Analytical Statics II	SKB
		C	Analytical Dynamics of A Particle II	SKB
	XII	A	Hydrostatics	SKB
		B	Rigid Dynamics	SKB
	Honours Paper-VII	XIII	A	Analysis IV
B			Metric Space	DM
C			Complex Analysis	DM
XIV		A	Probability	SR
		B	Statistics	SR
Honours Paper-VIII	XV	A	Numerical Analysis	DC
		B	Computer Programming	DC
	XVI	A	Practical (50 marks)	SKB, DC, TC,

				SR, DM
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MATHEMATICS GENERAL

Semester –I (General)	
Unit	Course-GE1/CC1
1: Algebra-1	DC
2: Differential Calculus-1	TC & SKB
3: Differential Equation-1	DM
4: Co-ordinate Geometry	SR & SKB

Semester –II(General)	
Unit	Course-GE 2/CC2
Unit 1: Differential Calculus-II	DC & DM
Unit 2: Differential Equation-II	DM
Unit 3: Vector Algebra	SKB
Unit 4: Discrete Mathematics	TC & SR

PART - II

PAPER	MODULE	GROUP	TOPIC	TEACHER
Paper-II	III	A	Modern Algebra	TC
		B	Analytical Geometry of 3D	DM
	IV	A	Differential Calculus	TC
		B	Integral Calculus	DC

		C	Differential Equations	DM
General Paper-III	V	A	Numerical Methods	DC
		B	Linear Programming	SR
	VI	A / B	Analytical Dynamics / Probability & Statistics	SKB

PART - III

PAPER	GROUP	TOPIC	TEACHER
VII		Computer Science & Programming	DC & SR
VIII	A / B	A Course of Calculus / Discrete Mathematics	TC & DM

PHYSICS HONOURS

CC-1 (50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper PHS-A-CC-1-1-TH:</u> Mathematical Physics -1: Matrices	SGM
<u>Paper PHS-A-CC-1-1-TH:</u> Mathematical Physics -1: Calculus 1. First and second order differential equation. 2. Calculus of functions of more than one variables.	PD

<u>Paper PHS-A-CC-1-1-TH:</u> Mathematical Physics : Vector Algebra & Vector Calculus 1. Recapitulation of Vector Algebra 2. Vector differentiation . 3. Vector integration.	SB
<u>Paper PHS-A-CC-1-1-TH:</u> Mathematical Physics : 1. Calculus recapitulation 2. Orthogonal Curvilinear Coordinates.	YA

CC-2
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper PHS-A-CC-1-2-TH:</u> Mechanics : 1 Gravitation and Central Force Motion . 2. Non-inertial systems. 3. Rotational Dynamics.	SDG
<u>Paper PHS-A-CC-1-2-TH:</u> Mechanics : 1. Fundamental of Dynamics. 2. Work & energy. 3. Elasticity 4. Fluid Motion.	JM

SEMESTER-II
CC-3
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper PHS-A-CC-2-3-TH:</u> <u>Electricity & Magnetism:</u> Electrostatics Field 1. Coulomb law. 2. Gauss's theorem 3. Electric potential. 4. Laplace's & Poisson's equation. 5. Electrical Circuits.	SDG

6. Network Theorem.	
<u>Paper PHS-A-CC-2-3-TH:</u> Electricity & Magnetism : Electrostatic Field 1. Conductors 2. Electrostatic energy. 3. Dielectric properties of matter. 4. Magnetic properties of matter.	PD
<u>Paper PHS-A-CC-2-3-TH:</u> Electricity & Magnetism : 1. The magnetostatic field. 2. Electromagnetic Induction	JM

CC-4
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper PHS-A-CC-2-4-TH:</u> Waves & Optics : 1. Wave optics 2. Interference 3. Diffraction & Holography	SGM
<u>Paper PHS-A-CC-2-4-TH:</u> Waves & Optics : 1. Oscillation 2. Superposition of Harmonic Oscillations 3. Wave motion.	SB
<u>Paper PHS-A-CC-2-4-TH:</u> Waves & Optics : Holography	JM
<u>Paper PHS-A-CC-2-4-TH:</u> Waves & Optics : 1. Velocity of waves 2. Superposition of Harmonic Waves. 3. Interferometers	YA

Practicals

YEAR	PAPER	NAME OF THE TEACHER
SEM-I	CC1, CC2	SGM, PD, SB, JM
SEM-II	CC3, CC4	SDG,SGM,PD,

Part-II PAPER-III (100 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper III:</u> (Unit-II) WAVES & OPTICS II: 1. Interference of light waves 2. Diffraction of light waves 3. Polarisation	SGM
<u>Paper III:</u> (Unit-I) ELECTRICITY AND MAGNETISM: 2. Field and magnetic materials (Unit-II) ELECTROSTATICS: 1. Units and dimensions 2. Gauss' law 3. Multipole expansion 4. Dielectrics 5. Electrical Images	PD
<u>Paper III:</u> (Unit-I) ELECTRICITY AND MAGNETISM: 1. Magnetic effect of steady current 3. Electromagnetic induction	JM
<u>Paper III:</u> (Unit-I) ELECTRONICS II: 1. Amplifier 2. Oscillators 3. Operational amplifier 4. Combinational logic 5. Sequential logic 6. Communication principles	YA

Part- II
PAPER-IVA
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper IVA:</u> (Unit-I) THERMAL PHYSICS II: 1. Basic Concepts 2. First Law of Thermodynamics 3. Second Law of Thermodynamics 4. Thermodynamic Functions 5. Change of State	SB
<u>Paper IVA:</u> (Unit-I) QUANTUM MECHANICS I: 1. Old quantum theory 2. Basic quantum mechanics 3. Basic postulates of quantum mechanics	YA

Practicals

PAPER	NAME OF THE TEACHER
IVB	SDG, SGM, PD

Part-III
PAPER-V
(100 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper V:</u> (Unit-I) CLASSICAL MECHANICS II: 1. Central force problem 2. Mechanics of Ideal Fluids 3. Lagrangian and Hamiltonian formulation of Classical Mechanics <u>Paper V:</u> (Unit-II) QUANTUM MECHANICS II: 1. Time dependent and time independent Schrodinger equation 2. Simple applications of Quantum Mechanics 3. Schrodinger equation in spherical polar coordinates	SDG

<u>Paper V:</u> (Unit-I) SPECIAL THEORY OF RELATIVITY: 1. Introduction 2. Special Theory of Relativity 3. Vectors and Tensors 4. Invariant intervals	SB
<u>Paper V:</u> (Unit-II) ATOMIC PHYSICS: 1. Atomic Spectrum 2. Vector atom model 3. Many electron model 4. Molecular spectroscopy 5. Laser Physics	YA

Part-III
PAPER-VI
(100 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper VI:</u> (Unit-I) NUCLEAR & PARTICLE PHYSICS I: 1. Bulk properties of nuclei 2. Nuclear structure 3. Unstable nuclei (Unit-I) NUCLEAR & PARTICLE PHYSICS II: 1. Nuclear reactions 2. Nuclear fission and fusion 3. Elementary particles 4. Particle Accelerator and Detector 5. Nuclear Astrophysics	SGM
<u>Paper VI:</u> (Unit-II) SOLID STATE PHYSICS I: 1. Crystal Structure 2. Structure of solids	PD
<u>Paper VI:</u> (Unit-II) SOLID STATE PHYSICS II: 1. Dielectric properties of materials 2. Magnetic properties of materials 3. Lattice vibrations 4. Superconductivity	SB

Part-III
PAPER-VII A
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper VIIA:</u> (Unit-I) STATISTICAL MECHANICS: 1. Microstates and macrostates 2. Classical statistical mechanics 3. Motivations for quantum statistics 4. Quantum statistical mechanics	PD
<u>Paper VIIA:</u> (Unit-I) ELECTROMAGNETIC THEORY: 1. Generalization of Ampere's Law 2. EM Waves in an isotropic dielectric 3. EM waves in conducting medium 4. Dispersion 5. Scattering	JM

Practicals

PAPER	NAME OF THE TEACHER
VII B	SDG, SGM,PD,SB
VIII A	SDG, SGM,PD,SB
VIII B	SDG, SGM,PD,SB

PHYSICS GENERAL

SEM -I
CC1/GE1
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper PHS-G-CC-1-1-TH</u> Mechanics : 1. Mathematical Methods.	SB

2. Laws of motion. 3. Work & Energy.	
<u>Paper PHS-A-CC-1-1-TH</u> Mechanics : 1. Elasticity. 2. Surface Tension. 3. Viscosity.	JM
<u>Paper PHS-A-CC-1-1-TH</u> Mechanics : 1. Gravitation 2. Oscillation. 3. Rotational motion	YA

SEM-II
CC2/GE2
(50 marks)

TOPIC	ASSIGNED TEACHER
<u>Paper PHS-A-CC-2-2-TH:</u> Electricity & Magnetism : 1. Electromagnetic Induction 2. Linear Network. 3. Maxwell's equation & electromagnetic wave propagation.	SB
<u>Paper PHS-A-CC-2-2-TH</u> Electricity & Magnetism : 1. Magnetism	JM
<u>Paper PHS-A-CC-2-2-TH</u> Electricity & Magnetism : Electrostatics	YA

Practicals

YEAR	PAPER	NAME OF THE TEACHER
SEM-I	CC1 / GE1	SGM, SB, JM, YA
SEM-II	CC2 / GE2	

Part-II
PAPER-IIB
(50 marks)

TOPIC	ASSIGNED TEACHER
<p><u>Paper IIB:</u> ELECTRICITY AND MAGNETISM:</p> <ol style="list-style-type: none"> 1. Electrostatics 2. Capacitor 3. Steady current 4. Thermoelectricity 	PD
<p><u>Paper IIB:</u> ELECTRICITY AND MAGNETISM:</p> <ol style="list-style-type: none"> 1. Magnetic effect of steady current 2. Lorentz force. 3. Magnetic materials. 4. Electromagnetic induction 	JM

Part-II
PAPER- IIIA
(50 marks)

TOPIC	ASSIGNED TEACHER
<p><u>Paper IIIA:</u> (Unit - I) Physical Optics</p> <ol style="list-style-type: none"> 1. Light as an electromagnetic wave 2. Interference of light. 3. Diffraction. 4. Polarisatio 	PD
<p><u>Paper IIIA:</u> (Unit-III) Modern Physics:</p> <ol style="list-style-type: none"> 1. Special theory of relativity. 2. Quantum theory of radiation. 3. Basic Quantum Mechanics 4. Solid State Physics 5. Nuclear Physics. 	JM
<p><u>Paper IIIA:</u> (Unit-II) Electronics :</p> <ol style="list-style-type: none"> 1. Diodes and Transistors. 2. Digital circuits . 	YA

3. Logic gates	
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Practicals

PAPER	NAME OF THE TEACHER
IIA, IIIB	SDG, SGM, SB, JM, YA

**Part-III
PAPER-IVA
(50 marks)**

TOPIC	ASSIGNED TEACHER
<p><u>Paper IVA:</u> (Unit-I) Pumps, gauges and engine: 1. Production and measurement of high vacuum. 2. Engines (Unit -II) Energy Sources 1. Conventional energy sources. 2. Non conventional</p>	SB
<p><u>Paper 1VA:</u> (Unit-III) Electronics: 1. Feedback 2. Digital Electronics 3. Instruments. <u>Paper 1VA:</u> (Unit-IV) Communications: 4. Propagation of electromagnetic waves. 5. Trasmision of electromagnetic waves. 6. Transmission through media.</p>	YA

Practicals

PAPER	NAME OF THE TEACHER
IVB	SB, PD

PHYSIOLOGY HONOURS

SEMESTER - I

	TOPIC	TEACHER ASSIGNED
CC1TH	Cellular Basis of Physiology	AD
	Genetics	SK
	Cell cycle , Enzyme	AM
CCIP	Study of various stages of meiosis from grass hopper testis	SK
	Cell viability study by Trypan blue staining	SK
	Osmotic fragility test of goat blood RBC	LM
	Staining of adipose tissue using Sudan III or IV	LM
CC2TH	Biophysical Principles	AB
	Instruments	SK
	Carbohydrates and Lipids	LM
	Amino acid ,Peptides and Proteins	SP
	Purine and Pyrimidine	AB
	Nucleic Acid	SK
CC2P	Qualitative test for identification of Physiologically important substance	AM
	Preparation of Buffer and PH measurement	SP

SEMESTER - 2

	TOPIC	TEACHER ASSIGNED
CC3TH	Cell signalling	SP
	Nerve	LM
	Muscle	AM

CC3P	Staining of Isolated nerve fiber by silver nitrate method. Staining of skeletal and cardiac muscle by methylene blue, Staining of collagen tissue	AM
CC4TH	Nervous system(Brain,Spinal cord,Reflex action) Nervous system Vestibular Apparatus ,Cerebral circulation ,stroke Muscle Spindle and Golgi tendon organ CT Scan,MRI ,PET	AD SK AM AD LM
	Molecular Neuroiology	AB
CC4P(Prac)	CT Scan, MRI- I dentification of diff. Structure	LM
	Kymographic recording of muscle twitch	SP

2nd Year

	TOPIC	Teacher Assigned
PAPER III	Nervous System I	AD
Unit- 5		
	Nervous System II	SK
	Nervous System III	AM
	Nervous System IV	SK
	Molecular Neurobiology	SP
UNIT6	Instrument	SP
	Renal Physiology	AM

	Sensory Receptors, Olfaction, Gustation	AD
	Audition Vision	AM
PAPER-IVA Unit-7	Carbohydrate, Lipid metabolism Purine , Pyrimidine Metabolism	LM
	Amino acid Metabolism	AB
	Methodologies	SP
	Molecular Biology	LM
PAPER -IVB Unit8(Prac)	Histology	AM
	Biochemistry Quantitative	LM
	Experimental Physiology	SP

3rd Year

	TOPIC	TEACHER ASSIGNED
PAPER V Unit-9	General Endocrinology I	AM
	General Endocrinology II	SP
	General Endocrinology III	SP
	General Endocrinology IV	LM
	Chronobiology	LM
Unit 10	Reproductive Physiology I	SP
	Reproductive Physiology II	CM
	Nutrition and Dietetics	AD
	Social Physiology	AD

PAPER VI	Work Physiology and Ergonomics	AM
Unit-11	Sports Physiology	
	Skin and Body Temperature	AM
	Human and Environment I &II	CM
Unit12	Microbiology I	CM
	Microbiology II	AB
	Immunology and Biostat	LM
	Pharmacology	AB

3rd YEAR PRACTICAL

	TOPIC	TEACHER ASSIGNED
PAPER VII	Biochemical Estimation and Chromatography	LM
Unit-13		
	Experimental Physiology(Perfusion)	SP
	Microbiology	AM
PAPER VIII	Histology	CM
Unit- 14		
	Experimental Physiology(Dale's)	AM
	Work Physiology and Ergonomics	
	Biostatistics	LM
	Social Physiology-	
	Diet Survey	SP
	Field survey report	AM

ZOOLOGY HONOURS
ZOOA PART I: SEMESTER I (18-19)

	Name of Faculty	Unit	Topics allotted
1	MB Theory	Basics of Animal Classification	Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy;
		Protista and Metazoa	Protozoa General characteristics and Classification up to phylum (according to Levine <i>et. al.</i> , 1980)
	Practical		Study of whole mount of <i>Euglena</i> , <i>Amoeba</i> and <i>Paramecium</i>
2	SR Theory	Basics of Animal Classification	Concept of classification – three kingdom concept of Carl Woese, 1977 and five kingdom concept of Whittaker, 1969
		Protista and Metazoa	Metazoa Evolution of symmetry and segmentation of Metazoa
		DNA Replication	Mechanism of DNA Replication in Prokaryotes, Prove that replication is Semi-conservative, bidirectional and discontinuous, RNA priming, Replication of telomeres
		Gene Regulation	Regulation of Transcription in prokaryotes: <i>lac</i> operon and <i>trp</i> operon; Epigenetic Regulation: DNA Methylation, Histone Methylation & Acetylation
		Molecular Techniques	PCR, Western and Southern blot, Northern Blot
	Practical		Staining/mounting of any protozoa/helminth from gut of <i>Periplaneta</i> sp.
			Isolation and quantification of genomic DNA from goat liver
			Agarose gel electrophoresis for DNA. Histological staining of DNA and RNA in prepared slides
3	BM	Protista and Metazoa	Life cycle and pathogenicity of <i>Plasmodium vivax</i> and <i>Entamoeba histolytica</i>
		Platyhelminthes	Life cycle and pathogenicity and control measures of <i>Fasciola hepatica</i> and <i>Taenia solium</i>

		Nematoda	General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6th Ed.) Life cycle, and pathogenicity and control measures of <i>Ascaris lumbricoides</i> and <i>Wuchereriabancrofti</i>
4	AC Theory	Protista and Metazoa	Locomotion in <i>Euglena</i> , <i>Paramecium</i> and <i>Amoeba</i>
		Cnidaria	General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6th Ed.), Metagenesis in <i>Obelia</i>
		Nematoda	Parasitic adaptations in helminthes
		Nucleic Acids	Salient features of DNA, Chargaff's Rule, Hypo and Hyperchromic shift. Watson and Crick Model of DNA. RNA types & Function.
	Practical		Identification with reason & Systematic position of <i>Amoeba</i> , <i>Euglena</i> , <i>Entamoeba</i> , <i>Paramecium</i> , <i>Plasmodium</i> , <i>Balantidium</i> , <i>Vorticella</i> (from the prepared slides)
			Demonstration of polytene and lampbrush chromosome from photograph
5	JD Theory	Basics of Animal Classification	Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types
		Cnidaria	Polymorphism in Cnidaria; Corals and coral reef diversity, Role of symbiotic algae in reef formation. Conservation of coral and coral reefs.
		Transcription	Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription
		Post Transcriptional Modifications and Processing of Eukaryotic RNA	Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing and RNA editing
		Gene Regulation	Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors,

			miRNA mediated gene silencing.
	Practical		Identification with reason & Systematic position of <i>Sycon</i> , <i>Poterion</i> (Neptune's Cup), <i>Obelia</i> , <i>Physalia</i> , <i>Aurelia</i> , <i>Gorgonia</i> , <i>Metridium</i> , <i>Pennatula</i> , <i>Madrepora</i> , <i>Fasciola hepatica</i> , <i>Taenia solium</i> and <i>Ascaris lumbricoides</i>
			Isolation and quantification of genomic DNA from goat liver. Agarose gel electrophoresis for DNA. Histological staining of DNA and RNA in prepared slides
6	SK Theory	Protista and Metazoa	Conjugation in <i>Paramecium</i> .
		Porifera	General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6th Ed.)
		DNA Repair Mechanisms	Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair
7	KRB	Porifera	Canalsystem and spicules in sponges
		Ctenophora	General characteristics
		Platyhelminthes	General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6th Ed.)
		Translation	Genetic code, Degeneracy of the genetic code and Wobble Hypothesis. Mechanism of protein synthesis in prokaryotes.

PART - I

Part I: Sem II Honours(18-19)

CC2-3-TH

Professors	Topics allotted
MB	1. Metamorphosis in Lepidopteran Insects 2. Feeding and respiration in Pila sp.
SR	1. Evolution of coelom 2. Arthropoda Classification, Social life in Termite
BM	1. Respiration in Prawn and Cockroach 2. Echinodermata classification, Water-vascular system in Asterias
JD	1. Annelid classification, Metamerism in Annelida, Excretion in Annelida through nephridia 2. Echinoderm larva and affinities with chordates
SK	1. Mollusca classification, Nervous system in Pila sp. 2. Torsion in Gastropoda. 3. Onychophora: General characteristics and Evolutionary significance.
KRB	1. Insect Eye 2. Hemichordata: General characteristics, Relationship with non chordates and chordates

CC2-3-P

Professors	Topics allotted
All	<p>1. Study of following specimens: a. Annelids- Aphrodite, Nereis, Chaetopterus, Earthworm, Hirudinaria, b. Arthropods- Limulus, Palaemon, Balanus, Eupagurus, Scolopendra, Peripatus, Silk-worm– Life history stages, Termite – members of a colony and Honey bee– members of the colony, c. Molluscs- Dentalium, Patella, Chiton, Pila, Achatina, Pinctada, Sepia, Octopus, Nautilus, d. Echinoderms Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon</p> <p>2. Anatomy study: Nervous system, Reproductive system (Male & female), Mouth parts & Salivary apparatus in Periplaneta sp.</p>

Part I: Sem II Honours

CC2-4-TH

Professors	Topics allotted
SR	<p>1. Cytoplasmic organelles I Protein sorting and mechanisms of vesicular transport.</p> <p>2. Cell Cycle Cell cycle and its regulation, Cancer (Concept of oncogenes and tumor suppressor genes with special reference to p53, Retinoblastoma and Ras. Process of Proto-oncogene activation</p>
BM	<p>1. Cytoplasmic organelles II Peroxisomes: Structure and Functions.</p> <p>2. Nucleus Nuclear envelope, Nuclear pore complex, Nucleolus.</p> <p>2.</p>

AC	<p>1. Plasma Membrane Ultra-structure and composition of Plasma membrane: Fluid mosaic model</p> <p>2. Cytoplasmic organelles I Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes.</p> <p>3. Cytoplasmic organelles II Mitochondria: Structure, Semi-autonomous nature; Centrosome (Kinetochores and centromeric DNA): Structure and Functions</p>
JD	<p>1. Plasma Membrane Transport across membrane - Active and Passive transport, Facilitated transport, Cell junctions: Tight junctions, Gap junctions, Desmosomes</p> <p>2. Cell Signalling Cell signalling transduction pathways; Types of signalling molecules and receptors (Classification and Example only): RTK & JAK/STAT. Apoptosis</p>
SK	<p>1. Cytoplasmic organelles II Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemiosmotic hypothesis; Peroxisomes: Structure and Functions</p>
KRB	<p>1. Nucleus Chromatin: Euchromatin and Heterochromatin and nucleosome packaging</p> <p>2. Cytoskeleton Type, structure and functions of cytoskeleton; Accessory proteins of microfilament & microtubule</p>

CC-2-4-P

Professors	Topics allotted
SR	<p>1. Study of various stages of meiosis from grasshopper testis</p> <p>2. Preparation of permanent slide to demonstrate: b. Cell viability study by Trypan Blue staining</p>
AC	<p>1. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.</p>

JD	<p>1. Preparation of temporary stained squash of onion/arum root tip to study various stages of mitosis</p> <p>2. Preparation of permanent slide to demonstrate:</p> <p>a. DNA by FeulGEN REACTION</p>
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Part – II HONS SYLLABUS DISTRIBUTION 18-19
Paper 3 Unit 1

S.No.	Prof	Topics
1	MB	<p>Type concept – names of primary and secondary types, their definitions and applications</p> <p>. Biological Species concept, Subspecies, Polytypic species, Sibling species and Ring species</p>
2	SR	<ol style="list-style-type: none"> 1. Basic principle and use of DNA bar coding in species identification 2. Adaptive radiation with special reference to Darwin’s finches 8.Natural selection, Synthetic theory. Concept of selection: stabilizing, directional and disruptive with example 3. Hardy-Weinberg equilibrium; calculating allele & genotype frequency, mathematical calculation of frequency changes in mutation, migration 4. Genetic drift, founder effect and population bottleneck
3	BM	<p>Bathymetric and discontinuous distribution</p> <p>Echolocation in bat</p> <p>Barriers and dispersals - types and their impact on animal distribution</p>

4	AC	Zoogeographical realms – names & animal distribution according to Wallace scheme, Avian and Mammalian faunal distribution in different realms Xeric (camel and lizard); Arboreal (sloth bear) adaptation
5	JD	1. Taxonomy – Levels of taxonomy (alpha, beta and gamma taxonomy, micro and macro taxonomy), scope of taxonomy 2. Systematics – Place of Systematics in Biology, contribution of Systematics in Biology 3. Classification (Phenetic and Cladistics) 4. Concept of dendrogram and cladogram 6. Isolation and its role in speciation (pre mating and post mating) 7. Modes of speciation – Sympatric, Allopatric and Parapatric 8. Bird migration
6	SK	RNA world & Origin of life (Chemical origin only) Origin of birds Evolution in horse
7	KRB	1. Instinctive and learning behavior, fixed action pattern 2. Communication in honey bees (dance language and pheromone) 3. Altruism, kinship and selfishness 4. Parental investment (fish only); cost and benefit analysis of parental investment; parent-offspring conflict

Paper 3 Unit II

S.No.	Prof	Topics
1	MB	1. Concept of Ecosystem – structure and function; generalized model of energy flow in ecosystem 2. Wetland as ecosystem service provider 3. Population attributes – dispersal, dispersion, survivorship curves, age distribution 4. Population growth models – natality, mortality exponential and logistic, density dependent and density independent factors 5. Life history analysis, r and k strategies Community and ecosystem – assemblage, guild and community concept, niche concept, edge effect 6. Ecological succession, types of ecological succession with examples, concept of Climax, Connell and Slatyer’ model of succession. Tilman’s resource-ratio hypothesis
4	AC	1. Types of biodiversity, biodiversity and human welfare, mega diversity zones and biodiversity hot spots with special reference to India 2. Concept of wildlife, wildlife heritage of India, reasons for wildlife depletion in Indian context 3. Concept of threatened fauna – IUCN categories.

		<p>4. Protected area concept – Sanctuary, National Park, Biosphere reserve, Core Zone, Buffer Zone, Corridor concept. Conservation reserves</p> <p>5. Man–animal conflict (man-tiger and man-elephant) – causes and concern</p>
5	JD	<p>1. Population interactions – emergence of competition as a central theory experiments of Tansley, Gause and Park, competition exclusion principle, interspecific and intraspecific competitions, Lotka Volterra model</p> <p>2. Animal’s space and resource use. Resource partitioning. Coupled oscillations of predator and prey population – modeling</p>
6	SK	<p>1. Brief idea on El nino, La nina and their consequences</p> <p>2. JFM & Arabari model for conservation – key stone, flagship and umbrella species</p> <p>3. Special management program with special reference to Tiger project</p> <p>4. Environmental audit and impact assessment</p> <p>5. Role of NGO’s in wildlife conservation in India</p>

Paper 4 Unit I

S.No.	Prof	Topics
1	MB	<p>1. Physiology of osmo-regulation in vertebrates</p> <p>2. Temperature regulation in cold desert</p>
2	SR	<p>Nucleic acid metabolism – Purine salvage pathway</p> <p>Structure and function of neuro-transmitter: glutamate, γ-aminobutyric acid (GABA), dopamine (DA), norepinephrine (noradrenaline; NE, NA), epinephrine (adrenaline)</p>
3	BM	<p>1. Physiology of hibernation and aestivation with reference to amphibians, reptilians and gastropods</p> <p>2. Carbohydrate metabolism – Glycogenesis, Glycogenolysis, Neoglucogenesis</p> <p>3. Beta-oxidation of fatty acids –</p> <p>a. Palmitic acid {saturated (C 16:0)}</p> <p>b. Linoleic acid {unsaturated (C 18:2)}</p>
4	AC	<p>Metabolism of amino acids; transamination and oxidative and non-oxidative deamination</p> <p>4. Integration: Krebs cycle, Oxidative phosphorylation and Electron transport chain</p> <p>. Physiology of excretion – physiology of urine formation, urea cycle, nitrogenous wastes- ammonia, urea, uric acid, creatinine.</p>

5	SK	Enzymes - Classes; kinetics and factors affecting enzyme action, enzyme inhibition
7	KRB	1. Structure & function of haemoglobin, transport of O ₂ and CO ₂ in mammals, Bohr and Haldane effect, Chloride shift. 4. Origin and propagation of nerve impulse through nerves, synaptic and neuro-muscular junctions, functional significance of Giant nerve fibers in mollusks 5. Physiology of skeletal muscle contraction 7. Physiology of vision in human, compound eyes and image formation in insects

Paper 4 Unit II

S.No.	Prof	Topics
1.	<p>SK MB+AC SK AC AC</p> <p>MB+AC</p> <p>ALL</p>	<p>Ecological methods: (10)</p> <p>1. Use of pH meter for estimation of pH in water and soil samples 2. Study of micro arthropods of water and soil samples - 3. Determination of dissolved O₂ - free CO₂ of water - 4. Zoo-plankton count by standard methods</p> <p>Systematic & Evolutionary Biology: (10+10)</p> <p>General discussion, distinguishing characters and classification of respective Phylum should be taken into consideration. In Laboratory Note Book scheme of classification of all Phylum should be written before identification</p> <p>Key making with the specimens both from non-chordate (e.g., insects) and chordates (e.g., fishes)</p> <p>Identification with reasons of the following Museum specimens should be done - ALL</p> <p>Non-chordates: <i>Elphidium</i>, <i>Scypha</i> (<i>Syn</i>, <i>Sycon</i>), Neptune's cup, <i>Aurelia</i>, <i>Pennatulula</i>, Sea anemone, <i>Fasciola</i>, <i>Chaetopterus</i>, <i>Beroe</i>, <i>Madrepora</i>, <i>Nereis</i>, <i>Aphrodite</i>, <i>Squilla</i>, <i>Hippa</i>, <i>Eupagurus</i>, King crab, <i>Peripatus</i>, <i>Belostoma</i>, <i>Achatina</i>, <i>Chiton</i>, <i>Patella</i>, <i>Aplysia</i>, <i>Mytilus</i>, <i>Sepia</i>, <i>Loligo</i>, <i>Nautilus</i>, <i>Asterias</i>, Sea-urchin, Sea-lily, <i>Balanoglossus</i> Chordates: <i>Branchiostoma</i>, <i>Ascidia</i>, <i>Petromyzon</i>, <i>Myxine</i>, <i>Torpedo</i>, <i>Sphyrna</i>, <i>Hippocampus</i>, <i>Myxus</i>, <i>Necturus</i>,</p>

	<p>SR</p> <p>MB+JD(Invitee)</p> <p>SR</p> <p>SK</p>	<p><i>Ichthyophis, Tylototriton, Cryptobranchus, Hyla, Chameleon, Gekko, Vipera, Calotes, Mabuya, Varanus, Naja, Hydrophis, Mega Chiroptera</i> Animal Physiology and Biochemistry (10)</p> <p>1. Quantitative estimation of protein by modified Lowry's colorimetric method</p> <p>2. Qualitative tests for Carbohydrate (Starch, Sucrose, Maltose Fructose, Glucose), Protein (Albumin, Gelatin, Peptone), fat, uric acid (in Alkaline solution) and urea (Tests to be performed – Red Litmus Test, Hypobromite test, Biuret test, Millon's test, Iodine test, Benedict's test, Barfoed test, Seliwanof's test)</p> <p>3. Counting of cockroach haemocytes using haemocytometer</p> <p>4. Preparation of Normal, molar and standard solutions, phosphate buffers, serial dilutions</p> <p>Submission of Laboratory note Book (5) Viva Voce (5)</p>
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Part – III ZOOLOGY HONS SYLLABUS DISTRIBUTION(18-19)

	Name of Faculty	Paper	Topics allotted
1	MB Theory	6 Unit-I	Insect hormones – neuro-endocrine regulation of diapauses and metamorphosis
	Practical	7	Histological techniques and staining methods: (a) Tissue fixation, embedding, microtomy, staining and mounting of histological tissues (liver, pancreas, thyroid, kidney, ovary and testis) of white rat
		8	Report on Environmental audit Local Biodiversity Record (in group/individual of a particular area) – at least two records of faunal diversity along with ecological notes and photographic documentations in two seasons should be done. For example: butterfly community or bird community of a particular area. Field work assessment
2	SR Theory	5 Unit-I	Restriction enzyme: Types and use in gene cloning Cloning vectors: Characteristic features, Plasmid vector (pBR322, pUC19), Cosmid, phage vector, Concept of expression and Shuttle vector Construction of genomic DNA and cDNA libraries

			<p>DNA fingerprinting: Principle of RFLP, mini-satellites, microsatellites, RAPD and its uses</p> <p>Blot Technique: Southern Blot and Northern Blot</p> <p>Epigenetic regulation of gene expression: DNA methylation (CpG) and histone acetylation.</p> <p>Molecular basis and detection technique for human genetic disorders: Sickle cell Anemia, Thalassemia, Hemophilia</p>
		6 Unit-I	<p>Transgenic animals</p> <p>(i) Production of transgenic animals: cloning (methodology and application)</p> <p>(ii) Contribution of transgenic animals to human welfare (Poultry and Dairy)</p> <p>Animal cell culture</p> <p>(i) Cell culture types</p> <p>(ii) Cell culture technology (suspended and adherent culture)</p> <p>(iii) Cell culture media (RPMI-1640, M-199 and its components)</p>
	Practical	7	<p>Molecular Biology:</p> <p>(a) Paper Chromatography for amino acid separation,</p> <p>(b) Slide TLC for oil separation,</p> <p>(c) Quantitative estimation of DNA in solution by Diphenyl method (at 595 nm).</p>
		8	<p>Instrumentation</p> <p>Principle/function and laboratory use of micropipette, colorimeter, centrifuge, digital balance, autoclave</p> <p>Field work assessment</p> <p>Hypothesis testing (Chi-square, t-test)</p> <p>Work shop for advanced biological methods</p>
3	BM Theory	5 Unit-II	<p>Origin and evolution of parasitism with special reference to nematodes</p> <p>Host-parasite interaction, parasitic adaptations in internal parasites with special reference to protozoa and helminths</p> <p>Life cycle of important parasites; Mechanism of host-finding; establishment in host; growth; reproduction and modes of transmission of a) <i>Plasmodium vivax</i>, b) <i>Entamoeba histolytica</i>, c) <i>Leishmania donovani</i>, d) <i>Wuchereria bancrofti</i>, e) <i>Fasciola hepatica</i>, and f) <i>Ascaris lumbricoides</i></p> <p>MHC: Structure and Function.</p>
		6 Unit-I	Homeostasis of Ca ⁺⁺ regulation and Blood glucose regulation
	Practical	7	<p>Parasitology & Microbiology:</p> <p>(a) Study of gut contents of cockroach (fixation, staining & identification)</p> <p>(b) Identification, systematic position, characters & clinical</p>

			importance of the following parasites – <i>Entamoeba</i> , <i>Giardia</i> , <i>Trypanosoma</i> , <i>Plasmodium spp.</i> , <i>Leishmania</i> , <i>Wuchereriabancrofti</i> , <i>Ascaris</i> (male & female)
4	AC Theory	5 Unit-I	Cell cycle & cancer genetics: Concept of normal and transformed cell, role of proto-oncogene, tumour suppressor genes. Molecular mechanism of proto-oncogene activation
		5 Unit-II	Characterization and classification of bacteria (on the basis of staining methods) 7. Techniques of microorganism culture (sterilization reproduction and growth, maintenance and preservation of pure cultures), Control of micro-organisms 8. Microbes in relation to common diseases of man and control (Cholera and Shigella)
			Complement proteins – pathways and activation (classical, alternative and lectin mediated pathway, MAC formation Humoral and cell mediated immunity in man, mollusks and insects Monoclonal antibody production strategy and use of monoclonal antibody
		6 Unit-I	Chemical messengers – hormones, neurotransmitters, info-chemicals, semio-chemicals – their types, mode of action and behavior modulation Biological light production in animals a. Chemistry of bioluminescence in insect and its significance b. Electric organs in electric rays
		6 Unit-II	Gene therapy: Principle: Ex-vivo & In-vivo gene therapy. Strategies, Viral and non-viral vectors, antisense therapy
	Practical	7	Determination of human blood group Histological techniques and staining methods: (b) Identification of mammalian histological tissue sections: liver, pancreas, thyroid, kidney, adrenal, ovary, testis, stomach and lung (c) Identification of stages of estrous cycle in white rat
		8	Instrumentation: pH meter
5	SK Theory	5 Unit-I	Recombination: Homologous recombination, Holliday Model of recombination, definition and example of site specific and transpositional recombination; Gene conversion DNA repair mechanism: Base and nucleotide excision repair in bacteria, Mismatch repair, SOS repair

			Transposable Genetic Element: Concept of transposon and retrotransposon, Characteristic features of IS element in bacteria, SINE and LINE element in mammals and their role in chromosomal aberration
		5 Unit-II	Concept of Vector with special reference to resurgence of malaria (bio-ecology, vector potentiality, present susceptibility status to commonly used insecticide of important rural malaria vectors of India - <i>Anopheles culicifacies</i>)
		6 Unit-I	Neuro-endocrine integration General concept of hormone action and receptors Mechanism of hormone action (cAMP, IP3, DAG, TRK), neuro-hypophysis, adenohypophysis, hypothalamic regulatory peptides, endocrine tissues of the gastrointestinal endoderm Environmental signaling in sex reversals in fish and mollusks – role of endocrine disruption and signals
		6 Unit-II	Biotechnology and Applied Zoology (i) Modern techniques of fish hybridization and induced breeding in carps. (ii) Application of biotechnology in – (a) Sericulture, (b) Lac culture, (c) Api culture, (d) Pearl culture practice, (e) Prawn culture (iii) Integrated pest management and biological control of pests: principles and significance.
6	JD Theory	5 Unit-I	DNA sequencing: Principle of Dideoxy sequencing PCR: Basic Principle. Use of Allele specific RT-PCT Regulation of gene expression: Operon concept (inducible and repressible viz. Lac and Tryptophan operon)
		5 Unit-II	Inter-specific associations T-cell – structure, receptor and maturation (signal hypothesis excluded); B-cell – activation and differentiation (signal hypothesis excluded); Macrophage – types, generation and function
		6 Unit-I	Biosynthesis, secretion, mode of action, functional significance and regulation of T3, T4, Adrenalin, Nor-adrenalin, Insulin and Glucagon Biological rhythm – concept, types and its control by pineal and SCN
	Practical	7	Molecular Biology: (a) Paper Chromatography for amino acid separation, (b) Slide TLC for oil separation, (c) Quantitative estimation of DNA in solution by Diphenyl method (at 595 nm). Adaptations: Study of animals from museum specimens to analyze adaptive features for cursorial, aquatic, desert, volant and deep sea adaptations; features for parasitic mode of life.
		8	Report on Environmental audit

			Local Biodiversity Record (in group/individual of a particular area) – at least two records of faunal diversity along with ecological notes and photographic documentations in two seasons should be done. For example: butterfly community or bird community of a particular area. Field work assessment Experimental project work and Data Analysis – Mean, Mode, Median, Probability, Correlation test Work shop for advanced biological methods
7	KRB Theory	5 Unit-I	Proteome Analysis: Principle and use of SDS PAGE, affinity chromatography and Gel Filtration chromatography, immuno-electrophoresis, Western blot (excluding methodology) Apoptosis: concept, molecular signaling (extrinsic and intrinsic) and significance Cell cycle & cancer genetics: Concept of cell cycle check points and molecular regulation
		5 Unit-II	Cells and organs associated with immune system; Innate and adaptive immunity Antigens – characteristics, antigenic determinants, antigen processing and presentation Antibody – structure, types, binding sites and binding mechanisms Cytokines, adjuvants – complete and incomplete
		6 Unit-I	Endocrine regulation of estrous and menstrual cycle
		6 Unit-II	Principle of LD50 and LC50 and their application in applied Zoology
	Practical	7	Gram staining of bacteria Histology of primary and secondary lymphoid organs – thymus and spleen only

PART I: SEMESTER 1. (18-19)
CORE COURSE 1. Animal Diversity
ZOOG-CC1-1-TH

S.No.	Prof	Topics
2	SR	<ol style="list-style-type: none"> 1. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.); Eye in Cockroach, Metamorphosis in Lepidoptera 2. General Characters ; Pharynx and feeding mechanism in <i>Amphioxus</i> 3. General features and Classification up to orders (Young, 1981); Poisonous and non-poisonous snakes, Biting mechanism 4. Metagenesis in <i>Obelia</i>

		5. Osmoregulation in Fishes
4	AC	1.
5	JD	<ol style="list-style-type: none"> 1. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.); Lifehistory of <i>Ascaris lumbricoides</i> and its adaptation 2. General characters and classification up to classes (Rupert and Barnes, 1994, 6th Ed.); Metamerism in Annelida 3. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.);Respiration in <i>Pila</i> 4. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.); Cnidaria
6	SK	<ol style="list-style-type: none"> 1. General characters and classification up to classes (Levine et. al., 1980); LocomotoryOrganelles and locomotion in <i>Amoeba</i> and <i>Paramecium</i> 2. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.); CanalSystem in <i>Sycon</i> 3. General features of Agnatha and classification of cyclostomes up to classes (Young, 1981) 4. Classification up to orders (Young, 1981); Hair, Horn & Antler, Nail & claw 5. General features and Classification up to orders (Young, 1981);FISHES
7	KRB	<ol style="list-style-type: none"> 1. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.); Lifehistory of <i>Taenia solium</i> 2. General features and Classification up to orders (Young, 1981); Parental care 3. General features and Classification up to orders (Young, 1981); Flight adaptations in birds 4. General characters and classification up to classes (Ruppert and Barnes, 1994, 6th Ed.); Watervascularsystem in Asteroidea 5.

Animal Diversity, ZOOG – CC1-1-P

Prof	Topics
SR, BM, JD, KRB	<ol style="list-style-type: none"> 1. Identification with reasons of the following specimens: <i>Amoeba, Euglena, Paramecium, Sycon, Obelia, Aurelia, Metridium, Taenia solium, Ascarislumbricoides</i> (Male and female), <i>Aphrodite, Nereis, Hirudinaria, Palaemon, Cancer, Limulus, Apis, Chiton, Dentalium, Unio, Sepia, Octopus, Echinus, Cucumaria</i> and <i>Antedon, Balanoglossus, Branchiostoma, Petromyzon, Torpedo, Labeo rohita, Exocoetus, Salamandra, Hyla, Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Bat, Funambulus</i> 2. Key for Identification of poisonous and non-poisonous snakes 3. Study of anatomy of digestive system, salivary gland, mouth parts of <i>Periplaneta</i>, Study

	<p>of reproductive system of female cockroach</p> <p>An “animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose</p>
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Part I: Sem II General distribution (18-19)

CC2-2-TH

Professors	Topics allotted
SR	<p>1. Circulatory System</p> <p>Evolution of heart and aortic arches</p> <p>2. Late Embryonic Development</p> <p>Placenta types and function; Metamorphic events in frog life cycle and its hormonal regulation</p>
JD	<p>1. Digestive System</p> <p>Stomach and Dentition</p> <p>2. Urino-genital System</p> <p>Succession of kidney, Evolution of urino-genital ducts</p>
BM	<p>1. Integumentary System</p> <p>Derivatives of integument with respect to glands in Birds & Mammals</p> <p>2. Respiratory System</p> <p>Brief account of Gills, lungs, air sacs and swim bladder</p>
KRB	<p>1. Early Embryonic Development:</p> <p>Gametogenesis: Spermatogenesis and oogenesis with respect to mammals.</p> <p>Fertilization: Sea-Urchin; Early development of frog; structure of mature egg and its membranes,</p> <p>patterns of cleavage, fate map, up to formation of gastrula; types of morphogenetic movements;</p> <p>Fate of germ layers</p>

CC2-2-P

Professors	Topics allotted
All	<ol style="list-style-type: none"> 1. Osteology: Limb bones, girdle and vertebra of Pigeon & Guinea pig, Mammalian skulls: One herbivorous; Guinea pig and one carnivorous; Dog. 2. Larval stages: Veliger, Nauplius, Trochophore, Mysis. 3. Study of the different types of placenta- histological sections through photomicrographs. 4. 4. Developmental stages of chick embryo: 24 Hrs., 48 Hrs, 72 Hrs., 96 Hrs.

Part – II general SYLLABUS DRIBUTION (18-19)

Paper- II

S.No.	Prof	Topics
1	MB	<ol style="list-style-type: none"> 1. Population – definition and growth 2. Community – definition and types 3. Basic concept of Biodiversity, Biodiversity hotspots. 4. Honey bee – Hive, castes and their roles 1. Conservation of wild life – purpose & methods, concept of Biosphere Reserve, importance & strategies of wildlife conservation; National park & Wildlife Sanctuary 2. Classification of Phylum Chordata with distinctive features and suitable examples – up to living subclass (Amphibia) (Scheme of classification as per J.Z. Young 1980, Life of vertebrates)
3	BM	<ol style="list-style-type: none"> 1. Classification of Phylum Chordata with distinctive features and suitable examples –up to subclass (Aves) (Scheme of classification as per J.Z. Young 1980, Life of vertebrates) 2. Circulatory structure and circulation: Single circuit heart (fish); double circuit heart (Amphibia and Mammals) 3. Nervous system – Brain in <i>Oreochromis</i> 4. Origin and distribution of cranial nerves in fish
4	AC	<ol style="list-style-type: none"> 1. Functional anatomy – digestive system in <i>Oreochromis</i>; Circulatory system in <i>Columba</i> 2. Classification of Phylum Chordata with distinctive features

		<p>and suitable examples – up to living subclass (Reptilia); up to subclass (Fishes) (Scheme of classification as per J.Z. Young 1980, Life of vertebrates)</p> <ol style="list-style-type: none"> 3. Basic idea of ecotoxicology and xenobiotics 4. Climate change – Global warming, acid rain, ozone depletion (cause and effect)
5	JD	<ol style="list-style-type: none"> 1. General characters of hormones: Naming and function of hormones secreted from Pituitary 2. Histology of pancreas (theory) 3. Enzyme – classification & characteristics; mechanism of enzyme action; effects of pH and temperature on enzymatic action 4. Nerve impulse propagation & synaptic transmission 5. Osmoconformers and Osmoregulators – definition and example; Osmoregulation in fishes 6. Classification of Phylum Chordata with distinctive features and suitable examples – up to living subclass (Mammalia); (Scheme of classification as per J.Z. Young 1980, Life of vertebrates)

Paper – III

Prof	Topics
ALL	<ol style="list-style-type: none"> 1. Demonstration (15+15=30) <ol style="list-style-type: none"> i) Cockroach: digestive, nervous and female reproductive system ii) <i>Oreochromis</i>: digestive and urino-genital system 2. Mounting and preparation (7½+7½=15) <ol style="list-style-type: none"> (i) Mouth parts of cockroach (ii) Cycloid and Ctenoid scale of fin fish (iii) Haemolymph of cockroach (Leishman/Giemsa stain) (iv) Gut contents of cockroach for protozoa (Fixation, staining and identification) (v) Whole mount of aquatic and soil micro-arthropods (vi) Epithelial cells from buccal smears with staining 3. Identification with reasons: 1 from bones, 1 from histological slides, 2 from non-chordates and 2 from chordate specimens; systematic position up to taxon as mentioned in the theory. (30) <ol style="list-style-type: none"> (i) Bones: Skull, vertebrae, limb and girdle bones of <i>Columba</i> (ii) Histological slides: Sections of mammalian liver, pancreas, testis, ovary, and thyroid. (iii) Non-chordate specimens: <i>Paramoecium</i>, Scypha, <i>Sea-anaemone</i>, <i>Ascaris</i> (male & female), <i>Hirudinaria</i>, Scorpion, <i>Bombyx mori</i> (adult male & female), <i>Lamellidens</i>, <i>Pila</i>, <i>Loligo</i>, Starfish, <i>Balanoglossus</i>. (iv) Chordate specimens: <i>Amphioxus</i>, <i>Petromyzon</i>, <i>Scolidon</i>, <i>Lates</i>, <i>Rhacophorus</i>, Axolotl larva, <i>Tylotriton</i>, <i>Gekko</i>; <i>Hemidactylus</i>, Turtle, <i>Naja</i>, Chiroptera 4. Report on field study tours: 10 marks Zoological importance: Zoological garden or Museum

Part – III general syllabus distribution (18-19)

Paper- IV

S.No.	Prof	Topics
1	MB	<ol style="list-style-type: none"> 1. Definition of systematics & taxonomy 2. Aquaculture: Principles, definition and scope. Exotic fishes- their merits and demerits. Basic principles of different aquaculture system (Polyculture and integrated farming); culture of prawn 3. Pest and Management: a) Definition and types of pests with examples. Life history, behaviour, ecology, damage and control of the following pests: i) Paddy <i>Scirpophaga</i> (Syn. <i>Tryporyza</i>) <i>incertulas</i>, ii) Stores grain-<i>Sitophilus oryzae</i>, iii) Mammalian pest (<i>Bandicota bengalensis</i>). 4. Poultry: fowl - Types of breeds, rearing and disease management.
3	BM	<ol style="list-style-type: none"> 1. Parasitism (definition and types) and other inter-specific interactions (symbiosis, commensalism and mutualism). 2. Life history, Pathogenecity and clinical features of (i) <i>Entamoeba histolytica</i>, (ii) <i>Plasmodium vivax</i>, iii) <i>Ascaris</i> 3. Anatomical and Physiological adaptations: Aquatic (fish), Desert (Camel) and Volant (Pigeon) animals.
4	AC	<ol style="list-style-type: none"> 1. Sericulture: Life history and rearing of <i>Bombyx mori</i>, harvesting & processing of cocoon, reeling and extraction of silk, diseases of worms of <i>Bombyx mori</i> and control measures 2. Species as a unit of evolution (definition and types: biological, sibling and polytypic species)
7	KRB	<ol style="list-style-type: none"> 3. Outline structure and classification of immunoglobulin,

		<p>antigen-antibody reaction</p> <ol style="list-style-type: none"> 1. Chemical basis of origin of life 2. Zoogeographical realms (Wallace scheme) with characteristic mammalian fauna 3. Apiculture: Development of Apiary in India. Types of honey bees, modern methods of apiary management, products and its uses. Problems and prospects.
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Paper - IV Gr. D

Prof	Topics
ALL	<p>Group – D. Laboratory course (Course No.ZG-11) (Full marks –30)</p> <p>1. Experimental works a. Estimation of dissolved O₂ content of water or Estimation of free CO₂ content of water 8 b. Pedigree analysis: sex linked recessive, autosomal recessive and dominant 4 c. Determinant of ABO blood group & Rh factor in man or Measurement of water pH and handling of pH meter 4 2. Field training – Submission of report on any one place from the following: 8 a. Freshwater fish farm b. Poultry farm c. Apiary d. Sericulture center e. Place of wild life interest (Sanctuary, National Park) f. Species diversity studies in local area.</p>

Department of Commerce
Semester-I
Business Laws
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Unit I : Contract Act Unit II : Sale of goods act Unit III : Partnership law	PSC
Unit IV : Negotiable instrument act Unit V: Consumer protection act	PB

Semester-I
Principles of management
Full marks- 100

TOPICS	ASSIGNED TEACHERS

Unit II : Planning Unit III : Organising	PSC
Unit IV : Directing & Staffing	PB
Unit I : Introduction Unit V : Motivation	AM

**Semester-I
Financial Accounting-I
Full marks- 100**

TOPICS	ASSIGNED TEACHERS
Unit II : Concepts of business income Unit III : Accounting standard & accounting theory Unit IV : Final A/cs	SB
Unit V : Single entry Unit V : Non profit organisations	PSC
Unit VI : Sale on approval Unit VI : Insurance claim	PB
Unit I : Introduction Unit VI : Consignment Unit VI : Sectional & self - balancing ledger	AM

**Semester-I
Microeconomics – I & Statistics (50+50)
Full marks- 100**

TOPICS	ASSIGNED TEACHERS
Full Syllabus for Microeconomics-I	SS
Full Syllabus for Statistics	PS

**Semester-III
Information Technology
Full marks- 100**

TOPICS	ASSIGNED TEACHERS

M I : Introduction M I : Data organisation & DBMS M I : IT act & cyber crime M II : Practical classes	PB
M I : Internet and its application M I : Security & encryption M II : Practical classes	AM

Semester-III
Business Mathematics & Statistics
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Full syllabus	PS

Semester-III
Financial Accounting-II
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Unit III : Branch accounting Unit VII : Business acquisition	SB
Unit I : Partnership I Unit II : Partnership II	PSC
Unit V : Departmental Unit VI : Investment A/c	PB
Unit IV : Hire purchase	AM

Semester-III
Indian Financial System
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Unit I : Financial systems and its components Unit III : Financial institutions	SB
Unit II : Financial markets	PSC
Unit V : Investor's protection	PB
Unit IV : Financial services	AM

Semester-II
E – Commerce & Business Communication
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Module I – Unit 1 : Introduction Module II – Unit 4 : Drafting	SB
Module I – Unit 3 : Digital payment Module II – Unit 1 : Introduction	PSC
Module I – Unit 2 :E-CRM & SCM Module II – Unit 2 : Types of Communication	AM
Module I – Unit 4 : ERP Module II – Unit 3 : Tools of communication	IM

Semester-II

Company Law
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Unit-5 : Corporate meeting	SB
Unit 1 : Introduction Unit 4 : Share capital & Debenture	PSC
Unit 2 : Formation of Company Unit 3 : Company administration	AM

Semester-II

Marketing Management & Human Resource management
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Module I – Unit 1 : Introduction & Module I – Unit 4 : Pricing Module II – HRM- Unit 1 : Nature & Scope Module II – Unit 3 : Recruitment & Selection	SB
Module I – Unit 3 : Product Module II – Unit 5 : Job Evaluation & Performance appraisal	PB
Module I – Unit 2 : Consumer behavior & Market segmentation Module I – Unit 5 : Promotion & Recent development in marketing Module II – HRM- Unit 2: Human Resource Planning	AM

Semester-II

Cost & Management Accounting – I
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Unit VI: Contract costing Unit VI: Operating costing	SB
Unit 1: Introduction including Cost sheet Unit 6 : Process costing	PSC
Unit 3 : Labour & Unit 4 : Overhead	PB
Unit 2 : Material & Unit 5 : Cost ledger control account & Reconciliation of cost & Financial accounts	AM

Semester-IV
Microeconomics I & Indian Economy
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Full Syllabus	SS

Semester-IV**Entrepreneurship Development & Business Ethics
Full marks- 100**

TOPICS	ASSIGNED TEACHERS
Module: I – Unit I : Introduction Module: I – Unit III : Project planning Module: II – Unit I : Business Ethics	PSC
Module: I – Unit IV : Resource mobilization Module: II – Unit III : Ethics in management	PB
Module: I --Unit II :Public private system of Stimulation Module: II -- Unit II : Principles of business ethics	IM
Module: II --Unit IV :Corporate culture Module:II --Unit V: Ethics & Corporate governance	AM

**Semester-IV
Taxation – I
Full marks- 100**

TOPICS	ASSIGNED TEACHERS
Unit II: Income under the head Salaries Unit IV: Set off Carry forward & loss Unit IV: Deductions from total income	SB
Unit II:Income from House property Unit IV: Clubbing of Income Unit III: Capital gains(Gen only)	PSC
Unit III: Capital gains(Hons only) Unit III: Income from other sources, Unit I: Income that do not form the part of Total Income & Agricultural income (Hons only)	PB
Unit I:Basic concepts Unit I:Residential status Unit III: Profits & gains from business and profession	AM

Semester-IV**Cost & Management Accounting – II**
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Unit IV: CVP analysis- Marginal costing Unit V: Short term decision making	SB
Unit II: Budget & budgetary control Unit III: Standard costing	PSC
Unit I: Activity Based Costing Unit V: Short term Decision making (Gen only)	PB
Unit III: Standard costing Unit II: Budget & budgetary control (Gen only)	AM
Unit I: Joint product & By Product	IM

Year- 3rd
Economics- II
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Full syllabus	SS

Year- 3 rd**Advanced Business Mathematics**
Full marks- 100

TOPICS	ASSIGNED TEACHERS
Full Syllabus	PS

Year- 3 rd**Financial Accounting- III**
Full marks- 100

TOPICS	ASSIGNED TEACHERS
M-I (Holding company) M-II (Accounting theory) M-II (Accounting ratios)	SB

M-I (Investment A/c) M-II (Fund flow) M-II (Cash flow)	PSC
M-I (Valuation of shares & goodwill) M-II (Business acquisition)	PB
M-I (Merger & Acquisition) M-II (Introduction to financial statements)	AM

Year- 3 rd
Indian Financial System (Honours only)
Full marks- 100

TOPICS	ASSIGNED TEACHERS
M-I (Development banks M-I (Other financial institution) M-II (Capita market) M-II (Financial services)	PSC
M-I (Interest rates structure) M-II (Investor's protection)	PB
M-I (Introduction) M-I (Money & banking system) M-II (Overview) M-II (Money market)	AM

Year- 3 rd

Financial Management
Full marks- 100

TOPICS	ASSIGNED TEACHERS
M-I (Working Capital management – 1) M-II (Working Capital management – 2) M-II (Financial control)	PSC
M-I (Leverage & Capital structure) M-II (Dividend Decision)	PB
M-I (Introduction) M-I (Basic concepts) M-I(Cost of capital) M-II (Capital expenditure decision – 1) M-II (Capital expenditure decision – 2)	AM

ENVS

Compulsory - 3rd Year

Stream	Professors
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B.A. (General)	
B.A. (Honours)	
B.Sc. (Honours)	
B.Sc. (General)	
B.Com. (Hons. + Gen.)	

AECC-2: ENVS

Compulsory - SEMESTER - II

Stream	Professors
B.A. (General)	PG + AD + KR + AC
B.A. (Honours)	BM + MB
B.Sc. (Honours)	DD + MS
B.Sc. (General)	PG(BOT) + SG + AD + LM
B.Com. (Hons. + Gen.)	KSG + AP