



Department of Electronics
Distribution of Syllabus, 2022 (Odd semester)

Semester-V

Sl. No	Paper Code	Topic	Faculty	Marks
Honours				
1	CC-11	Electronic Instrumentation	Theory: Dr. Sourav Kumar Bhowmick Practical: Dr. Sourav Kumar Bhowmick	100
2	CC-12	Microprocessor and Microcontroller	Theory: Arnab Samadder Practical: Arnab Samadder	100
3	DSE-1-A-2	Control System	Theory: Rabia Sultana Practical: Rabia Sultana	100
4	DSE-2-B-2	Power Electronics	Theory: Dr. Kunal Sinha Practical: Dr. Kunal Sinha	100

Semester-III

Sl. No	Paper Code	Topic	Faculty	Marks
Honours				
1	CC-5	Semiconductor Devices	Theory: Dr. Kunal Sinha Practical: Dr. Kunal Sinha	100
2	CC-6	Electronic Circuits	Theory: Dr. Rabia Sultana Practical: Dr. Rabia Sultana	100
3	CC-7	Electromagnetics	Theory: Madhurima Chatterjee Practical: Madhurima Chatterjee	100
4	SEC-1-A-1	Design and Fabrication of Printed Circuit Board	Theory: Dr. Sourav Kumar Bhowmick Practical: NA	100

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Semester-I

Sl. No	Paper Code	Topic	Faculty	Marks
Honours				
1	CC-1	Basic Circuits and Network Analysis	Theory: Madhurima Chatterjee Practical: Arnab Samadder, Madhurima Chatterjee	100
2	CC-2	Mathematical Foundation for Electronics	Theory: Arnab Samadder Practical: Dr. Sourav Kumar Bhowmick	100


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HISTORY
ODD SEMESTERS
SYLLABUS ALLOCATION

SEMESTER I (HONS AND GE)

PAPER	TOPIC	FACULTY
CC-1 HISTORY OF INDIA FROM THE EARLIEST TIMES TO C. 300 BCE	RECONSTRUCTING EARLY INDIAN HISTORY	SEBANTI BANDYOPADHYAY
	HUNTER GATHERERS AND THE ADVENT OF FOOD PRODUCTS	AMINUDDIN SEIKH
	THE HARAPPAN CIVILIZATION	SUBHASRI GHOSH
	CULTURES IN TRANSITION	SOUMITA ROY
CC-2—SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD OTHER THAN INDIA	EVOLUTION OF HUMAN KIND	TANIYA ROY
	FOOD PRODUCTION	TANIYA ROY
	BRONZE AGE CIVILIZATIONS	TANIYA ROY
	NOMADIC GROUPS IN CENTRAL AND WEST ASIA	SEBANTI BANDYOPADHYAY
	SLAVE SOCIETY IN ANCEINT GREECE AND ROME	SUBHASRI GHOSH
	POLIS IN ANCIENT GREECE	SUBHASRI GHOSH
GE—I/CC—I HISTORY OF INDIA FROM EARLIEST TIMES UPTO 300 CE	SOURCES AND INTERPRETATIONS	SEBANTI BANDYOPADHYAY
	A BROAD SURVEY OF PALEOLITHIC, MESOLITHIC AND NEOLITHIC CULTURES	SEBANTI BANDYOPADHYAY
	THE HARAPPAN CIVILIZATION	SEBANTI BANDYOPADHYAY
	THE VEDIC PERIOD	SOUMITA ROY
	TERRITORIAL STATES AND THE RISE OF MAGADHA	SOUMITA ROY

	JAINISM AND BUDDHISM	SOUMITA ROY
	EMERGENCE AND GROWTH OF MAURYAN EMPIRE	SOUMITA ROY
	THE SATAVAHANA PHASE	SOUMITA ROY
	THE SANGAM AGE	AMINUDDIN SEIKH
	THE AGE OF THE INDO-GREEKS, SAKAS, PARTHIANS AND KUSHANAS	AMINUDDIN SEIKH

SEMESTER III (HONS AND GE)


PAPER	TOPIC	FACULTY
CC-5 HISTORY OF INDIA (CE 750—1206)		
	STUDYING EARLY MEDIEVAL INDIA	TANIYA ROY
	POLITICAL STRUCTURES	TANIYA ROY
	AGRARIAN STRUCTURE AND SOCIAL CHANGE	TANIYA ROY
	TRADE AND COMMERCE	SUBHASRI GHOSH
	RELIGIOUS AND CULTURAL DEVELOPMENTS	SOUMITA ROY AND SUBHASRI GHOSH
CC-6 RISE OF THE MODERN WEST—I	TRANSITION DEBATE	TAPTI DE
	THE EXPLORATION OF THE NEW WORLD	TAPTI DE
	RENAISSANCE	TAPTI DE
	REFORMATION MOVEMENTS	TAPTI DE
	ECONOMIC DEVELOPMENTS	SEBANTI BANDYOPADHYAY
	DEVELOPMENT OF NATIONAL MONARCHY	SEBANTI BANDYOPADHYAY
CC-7 HISTORY OF INDIA (C. 1206-1526)	INTERPRETING THE DELHI SULTANATE	AMINUDDIN SEIKH
	SULTANATE POLITICAL STRUCTURE	AMINUDDIN SEIKH
	RELIGION AND CULTURE	AMINUDDIN SEIKH
	SOCIETY AND ECONOMY	SEBANTI BANDYOPADHYAY

SEC A (1)—ARCHIVES AND MUSEUMS	DEFINITION AND HISTORY OF DEVELOPMENT	TANIYA ROY
	TYPES OF ARCHIVES AND MUSEUMS	TANIYA ROY
	MUSEUM PRESENTATION AND EXHIBITION	SEBANTI BANDYOPADHYAY
	MUSEUMS, ARCHIVES AND SOCIETY	SEBANTI BANDYOPADHYAY
GE—3 HISTORY OF INDIA FROM 1206—1707	FOUNDATION, EXPANSION AND CONSOLIDATION OF THE DELHI SULTANATE	SEBANTI BANDYOPADHYAY
	MILITARY, ADMINISTRATIVE AND ECONOMIC REFORMS UNDER THE KHALJIS AND TUGHLUQS	SEBANTI BANDYOPADHYAY
	BHAKTI AND SUFI MOVEMENTS	SOUMITA ROY
	PROVINCIAL KINGDOMS	SOUMITA ROY
	SECOND AFGHAN STATE	SOUMITA ROY
	EMERGENCE AND CONSOLIDATION OF THE MUGHAL STATE	AMINUDDIN SEIKH
	AKBAR TO AURANGZEB	AMINUDDIN SEIKH
	ECONOMY, SOCIETY AND CULTURE UNDER THE MUGHALS	AMINUDDIN SEIKH
	GE SEC A (1)—HISTORICAL TOURISM AND PRACTICE	DEFINING HERITAGE
UNDERSTANDING BUILT HERITAGE		TANIYA ROY
FIELD WORK		TANIYA ROY

SEMESTER V (HONS AND GENERAL)

PAPER	TOPIC	FACULTY
CC-11 HISTORY OF MODERN EUROPE (C. 1780-1939)	THE FRENCH REVOLUTION AND ITS EUROPEAN REPERCUSSIONS	TAPTI DE
	RESTORATION AND REVOLUTION	TAPTI DE
	CAPITALIST INDUSTRIALIZATION AND SOCIAL AND ECONOMIC TRANSFORMATION	TAPTI DE AND SEBANTI BANDYOPADHYAY
	VARIETIES OF NATIONALISM	TAPTI DE AND SEBANTI BANDYOPADHYAY
	IMPERIALISM: WAR AND CRISIS	TAPTI DE AND SEBANTI BANDYOPADHYAY
	EUROPE BETWEEN TWO WORLD WARS	SEBANTI BANDYOPADHYAY
CC-12 HISTORY OF INDIA (C. 1750S—1857)	INDIA IN THE MID-18 TH CENTURY	AMINUDDIN SEIKH
	EXPANSION AND CONSOLIDATION OF COLONIAL POWER	AMINUDDIN SEIKH
	COLONIAL STATE AND IDEOLOGY	AMINUDDIN SEIKH
	RURAL ECONOMY AND SOCIETY	AMINUDDIN SEIKH
	TRADE AND INDUSTRY	AMINUDDIN SEIKH
	POPULAR RESISTANCE	SEBANTI BANDYOPADHYAY
DSE A—1 HISTORY OF BENGAL (C.1757—1905)	POLITICAL HISTORY OF BENGAL UNDER THE NAWABS	SUBHASRI GHOSH
	ADMINISTRATIVE HISTORY	SUBHASRI GHOSH
	COLONIAL ECONOMY	SUBHASRI GHOSH
	CULTURAL CHANGES AND SOCIO-RELIGIOUS REFORM MOVEMENTS	SUBHASRI GHOSH
	SOCIAL REFORMS AND WOMEN'S QUESTION	SUBHASRI GHOSH
	PROTEST MOVEMENT AND INSURGENCIES	SUBHASRI GHOSH
DSE B—1 HISTORY OF MODERN EAST ASIA—I CHINA (C.1840-1949)	IMPERIALISM AND CHINA	TANIYA ROY
	HISTORY OF CHINA	TANIYA ROY

GE— DSE A—2— SOME ASPECTS OF EUROPEAN HISTORY C. 1780-1945	THE FRENCH REVOLUTION	SEBANTI BANDYOPADHYAY
	NAPOLEONIC ERA AND AFTERMATH	SEBANTI BANDYOPADHYAY
	REVOLUTION OF 1830 AND 1848	SEBANTI BANDYOPADHYAY
	UNIFICATION OF ITALY AND GERMANY	SEBANTI BANDYOPADHYAY
	SOCIAL AND ECONMIC CHANGES	SEBANTI BANDYOPADHYAY
	IMPERLIASIT CONFLICTS: WORLD WAR I	SEBANTI BANDYOPADHYAY
	RISE OF FASCISIM AND NAZISM	SEBANTI BANDYOPADHYAY
	ORIGINS OF WORLD WAR II	SEBANTI BANDYOPADHYAY
GE SEC A—2 INDIAN HISTORY AND CULTURE	ENVIRONMENT, CULTURE, TRADITION AND PRACTICES	SOUMITA ROY
	URBANIZATION AND URBANISM	SOUMITA ROY
	SOCIAL INQUIRY AND GENDER	SOUMITA ROY
	CULTURAL HERITAGE	SOUMITA ROY
	CULTURAL FORMS AND EXPRESSIONS	SOUMITA ROY


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Zoology Honours Semester 1
CORE COURSE 1. Non-Chordates I
ZOOA-CC1-1-TH

		Faculty Members
Non-Chordates I: Protists to Pseudocoelomates		
Unit 1: Basics of Animal Classification		TKR
Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Concept of classification – three kingdom concept of Carl Woese, 1977 and five kingdom concept of Whittaker, 1969		
Unit 2: Protista and Metazoa		TKR
Protozoa General characteristics and Classification up to phylum (according to Levine <i>et. al.</i> , 1980)		
Locomotion in <i>Euglena</i> , <i>Paramecium</i> and <i>Amoeba</i> ; Conjugation in <i>Paramecium</i> . Life cycle and pathogenicity of <i>Plasmodium vivax</i> and <i>Entamoeba histolytica</i>		LM
Metazoa Evolution of symmetry and segmentation of Metazoa		
Unit 3: Porifera		MR
General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6 th Ed.); Canal system and spicules in sponges		
Unit 4: Cnidaria		TKR & MR
General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6 th Ed.), Metagenesis in <i>Obelia</i> ; Polymorphism in Cnidaria; Corals and coral reef diversity, Role of symbiotic algae in reef formation. Conservation of coral and coral reefs.		
Unit 5: Ctenophora		MR
General characteristics		
Unit 6: Platyhelminthes		TS
General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6 th Ed.) Life cycle and pathogenicity and control measures of <i>Fasciola hepatica</i> and <i>Taenia solium</i>		
Unit 7: Nematoda		TS

General characteristics and Classification up to classes (Ruppert and Barnes, 1994, 6 th Ed.) Life cycle, and pathogenicity and control measures of <i>Ascaris lumbricoides</i> and <i>Wuchereriabancrofti</i> Parasitic adaptations in helminthes	
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CORE COURSE 2: Molecular BiologyZOOA-CC1-2-TH

Full Marks 50	Faculty Members
Unit 1: Nucleic Acids	TS
Salient features of DNA, Chargaff's Rule, Hypo and Hyperchromic shift. Watson and Crick Model of DNA. RNA types & Function.	
Unit 2: DNA Replication	LM
Mechanism of DNA Replication in Prokaryotes, Prove that replication is Semi-conservative, bidirectional and discontinuous, RNA priming, Replication of telomeres.	
Unit 3: Transcription	LM
Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.	
Unit 4: Translation	LM
Genetic code, Degeneracy of the genetic code and Wobble Hypothesis. Mechanism of protein synthesis in prokaryotes.	
Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA	DC
Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing and RNA editing	
Unit 6: Gene Regulation	DC
Regulation of Transcription in prokaryotes: <i>lac</i> operon and <i>trp</i> operon; Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors, miRNA mediated gene silencing. Epigenetic Regulation: DNA Methylation, Histone Methylation & Acetylation.	
Unit 7: DNA Repair Mechanisms	TS
Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair	
Unit 8: Molecular Techniques	TS
PCR, Western and Southern blot, Northern Blot	

Zoology honours Semester III
Syllabus (UNIT WISE)

ZOOA-CC-5-TH

Full Marks 50	4 Credits	Faculty Members
Unit 1: Introduction to Chordates		TKR
General characteristics and outline classification of Phylum Chordata (Young, 1981)		
Unit 2: Protochordata		TKR
General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes (Young, 1981). Metamorphosis in <i>Ascidia</i> . Chordate Features, structure of pharynx and feeding in <i>Branchiostoma</i>		
Unit 3: Agnatha		TKR
General characteristics and classification of cyclostomes up to order (Young, 1981)		
Unit 4: Pisces		TKR
General characteristics and classification up to living sub classes (Young, 1981); Accessory respiratory organ, Migration in fishes; Parental care in fishes; Swim bladder in fishes.		
Unit 5: Amphibia		DR
General characteristics and classification up to living Orders (Young, 1981); Metamorphosis, Paedomorphosis, Parental care in Amphibia		
Unit 6: Reptilia		DR
General characteristics and classification up to living Orders (Young, 1981); Poison apparatus and Biting mechanism in Snake. Poisonous & Non-Poisonous snake.		
Unit 7: Aves		TS
General characteristics and classification up to living Sub-Classes (Young, 1981); Exoskeleton and migration in Birds; Principles and aerodynamics of flight		
Unit 8: Mammals		TS
General characters and classification up to living sub classes (Young, 1981); Exoskeleton derivatives of mammals; Adaptive radiation in mammals with reference to locomotory appendages; Echolocation in Micro chiropterans		

CORE COURSE 6: Animal Physiology: Controlling and Co-ordinating

ZOOA-CC-6-TH

Full Marks 50		Faculty Members
Unit 1: Tissues		MR
Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue		
Unit 2: Bone and Cartilage		LM
Structure and types of bones and cartilages, Ossification		
Unit 3: Nervous System		LM
Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and non-myelinated nerve fibres; Types of synapse, Synaptic transmission and Neuromuscular junction		
Unit 4: Muscular system		LM
Histology of different types of muscle; Ultra-structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre		
Unit 5: Reproductive System		MR
Histology of mammalian testis and ovary; physiology of mammalian reproduction – menstrual and oestrous cycle		
Unit 6: Endocrine System		MR
Histology and function of thyroid, pancreas and adrenal. Function of pituitary Classification of hormones; Mechanism of Hormone action; Signal transduction pathways for Steroidal and Non-steroidal hormones; Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary; Placental hormones		

CORE COURSE 7: Fundamentals of

Biochemistry ZOOA-CC-7-TH

Full Marks 50	4 Credits	Faculty Members
Unit 1: Carbohydrates		DC
Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosaccharides; Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis		
Unit 2: Lipids		MR

Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpenoids. Lipid metabolism: β -oxidation of fatty acids - a. Palmitic acid {saturated (C 16:0)}, b. Linoleic acid {unsaturated (C 18:2)}; Fatty acid biosynthesis	
Unit 3: Proteins	TS
Amino acids: Structure, Classification, General and Electro chemical properties of α -amino acids; Physiological importance of essential and non-essential amino acids, Proteins Bondsstabilizing protein structure; Levels of organization; Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids	
Unit 4: Nucleic Acids	DM
Structure of Purines, Pyrimidines, Nucleosides and Nucleotides; Nucleic Acid Metabolism: Catabolism of adenosine, Guanosine, cytosine and thymine.	
Unit 5: Enzymes	MR
Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition.	
Unit 5: Oxidative Phosphorylation	DC
Redox systems; Mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System	

PART III: SEMESTER 5

CORE COURSE

11.EcologyZOOA CC-11-

TH

Syllabus Allocation (UNIT WISE)	Faculty Members
Unit 1: Introduction to Ecology	DC
Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.	
Unit 2: Population	TKR
Unitary and Modular populations Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population regulation - density- dependent and independent factors, Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.	

Unit 3: Community	DR
Community characteristics: species diversity, abundance, dominance, richness, Vertical stratification, Ecotone and edge effect; Ecological succession with one example.	
Unit 4: Ecosystem	DR
Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow, Ecological pyramids and Ecological efficiencies; Nitrogen cycle.	
Unit 5: Applied Ecology	DC
Types & level of biodiversity Mega-diversity countries, Biodiversity Hot spot, Flagship species, Keystone species, Wildlife Conservation (<i>in situ</i> and <i>ex situ</i> conservation), concept of protected areas. Red data book, Indian wild life act & Schedule. Concept of corridor, advantages and problem of corridor. Threats to survival and conservation strategies for Tiger, Olive ridley, White Rumped Vulture.	

PART III: SEMESTER 5
CORE COURSE 12.Principle of Genetics
ZOOA-CC12-TH

Syllabus Allocation (UNIT WISE)	Faculty Members
Unit 1: Mendelian Genetics and its Extension	LM
Principles of inheritance, Incomplete dominance and co-dominance, Epistasis, Multiple alleles, Isoallele (White eye mutations), Pseudoallele (Lozenge Locus) & Cis-trans test for allelism, Lethal alleles, Pleiotropy, Penetrance & Expressivity	
Unit 2: Linkage, Crossing Over and Linkage Mapping	SDR
Linkage and Crossing, Complete & Incomplete Linkage, Measuring Recombination frequency and linkage map construction using three factor crosses, Interference and coincidence Sex linkage in <i>Drosophila</i> (White eye locus) & Human (Haemophilia).	
Unit 3: Mutations	LM
Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example from <i>Drosophila</i> and Human of each), variation in chromosome number; Non- disjunction of X chromosome in <i>Drosophila</i> ; Non-disjunction of Human Chromosome 21. Molecular basis of mutations in relation to UV light and chemical mutagens. Mutation detection in <i>Drosophila</i> by attached X method. Biochemical mutation detection in <i>Neurospora</i> .	
Unit 4: Sex Determination	DM
Mechanisms of sex determination in <i>Drosophila</i> and in man; Dosage compensation in <i>Drosophila</i> & Human	
Unit 5: Extra-chromosomal Inheritance	SDR / DM
Kappa particle in <i>Paramoecium</i> , Shell spiralling in snail	
Unit 6: Genetic Fine Structure	LM
Complementation test in Bacteriophage (Benzer's experiment on rII locus)	
Unit 7: Transposable Genetic Elements	DM / TS
IS element in bacteria, Ac-Ds elements in maize and P elements in <i>Drosophila</i> , LINE, SINE, Alu elements in humans	

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Syllabus Distribution for Academic Session: 2022-2023

SEMESTER	Paper Code	Faculty
II	CC-3	Dr. Rabia Sultana Dr. Kunal Sinha Prof. Arnab Samadder
	CC-4	Prof. Madhurima Chatterjee
IV	CC-8	Prof. Arnab Samadder
	CC-9	Dr. Kunal Sinha Dr. Sourav kumar Bhowmick
	CC-10	Dr. Rabia Sultana Prof. Arnab Samadder
	SEC-2	Dr. Sourav kumar Bhowmick
VI	CC-13	Prof. Madhurima Chatterjee
	CC-14	Dr. Sourav kumar Bhowmick
	DSE-A2	Prof. Arnab Samadder
	DSE-B2	Dr. Kunal Sinha

Dr. Kunal Sinha
Assistant Professor and Head
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HISTORY
EVEN SEMESTERS
SYLLABUS ALLOCATION

SEMESTER II (HONS AND GE)

PAPER	TOPIC	FACULTY
CC-3 HISTORY OF INDIA C. 300 BCE—C.300 AD	ECONOMY AND SOCIETY (CIRCA 300 BCE TO CE 300)	SUBHASRI GHOSH
	CHANGING POLITICAL FORMATIONS	SUBHASRI GHOSH
	TOWARDS EARLY MEDIEVAL INDIA	TANIYA ROY
	RELIGION, PHILOSOPHY AND SOCIETY	TANIYA ROY
	CULTURAL DEVELOPMENTS	SOUMITA ROY
	CC-2—SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE ANCIENT WORLD OTHER THAN INDIA	CRISIS OF THE ROMAN WORLD
GROUP—B	RELIGION AND CULTURE IN MEDIEVAL EUROPE	TAPTI DE AND SEBANTI BANDYOPADHYAY
	FEUDAL SOCIETY: ITS ORIGIN AND ITS CRISIS	TAPTI DE
	JUDAISM AND CHRISTIANITY UNDER ISLAM	AMINUDDIN SEIKH
GE—2/CC—2 HISTORY OF INDIA FROM EARLIEST TIMES C. 300 TO 1206	THE RISE AND GROWTH OF GUPTAS	SOUMITA ROY
	HARSHA AND HIS TIMES	SEBANTI BANDYOPADHYAY
	SOUTH INDIA: POLITY, SOCIETY, ECONOMY AND CULTURE	TANIYA ROY
	TOWARDS THE EARLY MEDIEVAL	TANIYA ROY
	EVOLUTION OF THE POLITICAL STRUCTURE	TANIYA ROY
	EEMRGENCE OF RAJPUT STATES	SEBANTI BANDYOPADHYAY
	ARABS IN SINDH	AMINUDDIN SEIKH

	STRUGGLE FOR POWER IN NORTHERN INDIA	AMINUDDIN SEIKH
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SEMESTER IV (HONS AND GE)

PAPER	TOPIC	FACULTY
CC-8 RISE OF MODERN WEST—II	REVOLUTION	TAPTI DE
	CRISIS IN EUROPE	SEBANTI BANDYOPADHYAY
	THE ENGLISH REVOLUTION	SEBANTI BANDYOPADHYAY
	SCIENTIFIC REVOLUTION	TAPTI DE
	MERCANTALISM	SEBANTI BANDYOPADHYAY
	EUROPEAN POLITICS IN THE 17TH AND 18TH CENTURIES	SEBANTI BANDYOPADHYAY
	CC-9 HISTORY OF INDIA (C. 1526—1605)	SOURCES AND HISTORIOGRAPHY
	ESTABLISHMENT OF MUGHAL RULE	AMINUDDIN SEIKH
	CONSOLIDATION OF MUGHAL RULE UNDER AKBAR	AMINUDDIN SEIKH
	EXPANSION AND INTEGRATION	TANIYA ROY
	RURAL SOCIETY AND ECONOMY	TANIYA ROY
	POLITICAL AND RELIGIOUS IDEALS	TANIYA ROY
CC-10 HISTORY OF INDIA (C. 1605-1750s)	SOURCES	AMINUDDIN SEIKH
	MUGHAL EMPIRE UNDER AURANGZEB	AMINUDDIN SEIKH
	VISUAL CULTURE	SUBHASRI GHOSH
	TRADE AND COMMERCE	TANIYA ROY
SEC B (2)—ART APPRECIATION	PREHISTORIC AND PROTOHISTORIC ART	SUBHASRI GHOSH
	INDIAN ART C.600 BCE—600 CE	SUBHASRI GHOSH

	INDIAN ART C.600 CE—1200 CE	SUBHASRI GHOSH
	INDIAN ART AND ARCHITECTURE (C.1200 CE—1800 CE)	SUBHASRI GHOSH
	MODERN AND CONTEMPORARY INDIAN ART AND ARCHITECTURE	SUBHASRI GHOSH
GE—4	INTERPRETING THE 18TH CENTURY	AMINUDDIN SEIKH
HISTORY OF INDIA FROM 1707-1950	EMERGENCE OF INDEPENDENT STATES	AMINUDDIN SEIKH
	EXPANSION AND CONSOLIDATION OF COLONIAL POWER	AMINUDDIN SEIKH
	UPRISING OF 1857	SOUMITA ROY
	COLONIAL ECONOMY	SOUMITA ROY
	SOCIO-RELIGIOUS REFORM MOVEMENTS IN THE 19TH CENTURY	SOUMITA ROY
	EMERGENCE AND GROWTH OF NATIONALISM	SEBANTI BANDYOPADHYAY
	COMMUNALISM	SEBANTI BANDYOPADHYAY
	ADVENT OF FREEDOM	SEBANTI BANDYOPADHYAY
	GE SEC A (1)—MUSEUMS AND ARCHIVES IN INDIA	DEFINITIONS
HISTORY OF SETTING UP MUSEUMS		TANIYA ROY
FIELD WORK		TANIYA ROY
TRAINING AND EMPLOYMENT		TANIYA ROY

SEMESTER VI (HONS AND GENERAL)

PAPER	TOPIC	FACULTY
CC-13 HISTORY OF INDIA (C. 1857-1964)	CULTURAL CHANGES AND SOCIO-RELIGIOUS REFORM MOVEMENTS	AMINUDDIN SEIKH
	NATIONALISM: TRENDS UPTO 1919	AMINUDDIN SEIKH
	GANDHIAN NATIONALISM AFTER 1919	AMINUDDIN SEIKH
	NATIONALISM AND SOCIAL GROUPS	SEBANTI BANDYOPADHYAY
	COMMUNALISM	SEBANTI BANDYOPADHYAY
	INDEPENDENCE AND PARTITION	SEBANTI BANDYOPADHYAY
	EMERGENCE OF A NEW STATE	
CC-14 HISTORY OF WORLD POLITICS (1945—1994)	THE COLD WAR	SUBHASRI GHOSH
	THE USA IN WORLD POLITICS	SUBHASRI GHOSH
	THE USSR IN WORLD POLITICS	SUBHASRI GHOSH
	MANIFESTATION OF COLD WAR	SUBHASRI GHOSH
	DE-STALINISATION	SUBHASRI GHOSH
	DISINTEGRATION AND DECLINE OF SOVIET UNION	SUBHASRI GHOSH
	EMERGENCE OF PEOPLE’S REPUBLIC OF CHINA	SUBHASRI GHOSH
	WEST ASIAN CRISIS	SUBHASRI GHOSH
	DECOLONIZATION	AMINUDDIN SEIKH
	PROTEST POLITICS	AMINUDDIN SEIKH
DSE A—3 HISTORY OF BENGAL (C.1905-1947)	PARTITION OF BENGAL AND SWADESHI MOVEMENT	TAPTI DE
	COMMUNAL POLITICS	TAPTI DE
	GANDHIAN NATIONALISM AFTER 1919	TAPTI DE
	GOVERNMENT OF INDIA ACT, 1935	TAPTI DE
	PEASANT MOVEMENTS IN BENGAL	TAPTI DE

	SUBHAS CHANDRA BOSE AND THE CONGRESS	TAPTI DE
	INDEPENDENCE AND PARTITION	TAPTI DE
DSE B—1 HISTORY OF MODERN EAST ASIA—I JAPAN (C.1868-1945)	TRANSITION FROM FEUDALISM TO CAPITALISM	TANIYA ROY
	JAPANESE IMPERIALISM	TANIYA ROY
	DEMOCRACY AND MILITARISM	TANIYA ROY
GE— DSE B—1— PATTERNS OF CAPITALISM IN EUROPE: C. 16 TH CENTURY TO EARLY 20 TH CENTURY	DEFINITIONS AND CONCEPTS	AMINUDDIN SEIKH
	COMMERCIAL CAPITALISM	AMINUDDIN SEIKH
	INDUSTRIAL REVOLUTION IN ENGLAND	AMINUDDIN SEIKH
	INDUSTRIAL CAPITALISM IN FRANCE	SEBANTI BANDYOPADHYAY
	GROWTH OF INDUSTRIES IN GERMANY	SEBANTI BANDYOPADHYAY
	IMPACT OF INDUSTRIAL REVOLUTION ON EUROPEAN SOCIETY, POLITY AND ECONOMY	SEBANTI BANDYOPADHYAY
GE SEC B—2 ORALITY AND ORAL CULTURE IN INDIA	DEFINING ORALITY	SOUMITA ROY
	HISTORIOGRAPHY OF ORALITY	SOUMITA ROY
	LIFE HISTORIES	SOUMITA ROY
	RESEARCH METHODOLOGIES	SOUMITA ROY
	DOCUMENTATION: WRITTEN AND VISUAL	SOUMITA ROY

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PART I: SEMESTER 2
CORE COURSE 3: Non-Chordates II – Coelomates
ZOOA-CC2-3-TH

Full Marks 50	4 Credits	50 Hours	
Unit 1: Introduction		2	TKR
Evolution of coelom			
Unit 2: Annelida		10	AKM
General characteristics and Classification up to classes (Ruppert and Barnes, 1994) Excretion in Annelida through nephridia; Metamerism in Annelida.			
Unit 3: Arthropoda		16	TKR
General characteristics and Classification up to classes (Ruppert and Barnes, 1994); Insect Eye(Cockroach only). Respiration in Prawn and Cockroach; Metamorphosis in Lepidopteran Insects; Social life in Termite			
Unit 4: Onychophora		2	AKM
General characteristics and Evolutionary significance			

Unit 5: Mollusca		10	AKM/TS
General characteristics and Classification up to classes (Ruppert and Barnes, 1994); Nervous system in <i>Pila sp.</i> Torsion in Gastropoda. Feeding and respiration in <i>Pila sp.</i>			
Unit 6: Echinodermata		8	TS
General characteristics and Classification up to classes (Ruppert and Barnes, 1994); Water-vascular system in <i>Asterias</i> . Echinoderm larva and affinities with chordates			
Unit 7: Hemichordata		2	LM
General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates			

Full Marks 30	2 Credits
List of Practical	
<p>1. Study of following specimens:</p> <p>a. Annelids - <i>Aphrodite, Nereis, Chaetopterus</i>, Earthworm, <i>Hirudinaria</i></p> <p>b. Arthropods - <i>Limulus, Palaemon, Balanus, Eupagurus, Scolopendra, Peripatus</i>, Silkworm – life history stages, Termite – members of a colony and Honey bee – members of the colony</p> <p>c. Molluscs - <i>Dentalium, Patella, Chiton, Pila, Achatina, Pinctada, Sepia, Octopus, Nautilus</i></p> <p>d. Echinoderms - <i>Asterias, Ophiura, Clypeaster, Echinus, Cucumaria</i> and <i>Antedon</i></p> <p>2. Anatomy study: Nervous system, Reproductive system (Male & female), Mouth parts & Salivary apparatus in <i>Periplaneta</i> sp.</p>	

PART I: SEMESTER 2
CORE COURSE 4: Cell Biology
ZOOA-CC2-4-TH

Full Marks 50	4 Credits	50 Hours	
Unit 1: Plasma Membrane		7	DC
Ultra-structure and composition of Plasma membrane: Fluid mosaic model, Transport across membrane - Active and Passive transport, Facilitated transport, Cell junctions: Tight junctions, Gap junctions, Desmosomes			
Unit 2: Cytoplasmic organelles I		5	LM
Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes; Protein sorting (TS) and mechanisms of vesicular transport			
Unit 3: Cytoplasmic organelles II		7	LM
Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemiosmotic hypothesis; Peroxisomes: Structure and Functions			

Centrosome (Kinetochore and centromeric DNA): Structure and Functions		
Unit 4: Cytoskeleton	5	LM
Type, structure and functions of cytoskeleton; Accessory proteins of microfilament & microtubule		
Unit 5: Nucleus	8	DM
Nuclear envelope, Nuclear pore complex, Nucleolus; Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome),		
Unit 6: Cell Cycle	10	DC
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		
Unit 7: Cell Signalling	8	SDR/TS
Cell signalling transduction pathways; Types of signalling molecules and receptors (Classification and Example only): RTK & JAK/STAT. Apoptosis		

Cell Biology Lab; ZOOA-CC-2-4-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Preparation of temporary stained squash of onion/arum root tip to study various stages of mitosis 2. Study of various stages of meiosis from grasshopper testis 3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells. 4. Preparation of permanent slide to demonstrate: <ol style="list-style-type: none"> a. DNA by Feulgen reaction b. Cell viability study by Trypan Blue staining 		

PART II: SEMESTER 4
CORE COURSE 8. Comparative Anatomy of Vertebrates
ZOOA-CC4-8-TH

Full Marks 50	4 Credits	50 Hours	
Unit 1: Integumentary System		10	TKR
Structure, function and derivatives of integument in amphibian, birds and mammals			
Unit 2: Digestive System		6	TS
Comparative anatomy of stomach; dentition in mammals			
Unit 3: Respiratory System		6	DM
Respiratory organs in fish, birds and mammals			
Unit 4: Circulatory System		7	RD
General plan of circulation, Comparative account of heart and aortic arches			
Unit 5: Urinogenital System		5	MR
Succession of kidney in different vertebrate groups; evolution of urino-genital ducts			
Unit 6: Nervous system and sense organs		8	TKR
Comparative account of brain in vertebrates; cranial nerves; olfactory and auditory receptors in vertebrates			
Unit 7: Skeletal system		8	RD
Overview of axial and appendicular skeleton – limbs, girdles of pigeon; jaw suspension in mammals			

Comparative Anatomy of Vertebrates Lab; ZOOA-CC4-8-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs 2. Study of disarticulated skeleton of toad, Pigeon, Guineapig (limb bones, vertebrae, limb and girdle) 3. Comparative study of heart and brain, with the help of model/picture 4. Identification of skulls: Pigeon, one herbivore (Guineapig) and one carnivore (Dog) animal 		

PART II: SEMESTER 4

CORE COURSE 9: Animal Physiology: Life Sustaining Systems

ZOOA-CC4-9-TH

Full Marks 50	4 Credits	50 Hours	
Unit 1: Physiology of Digestion		10	MR
Structural organisation and function of gastro-intestinal tract; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids and Proteins in Human			
Unit 2: Physiology of Respiration		10	MR
Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbondioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning			
Unit 3: Physiology of Circulation		8	SDR
Structure and functions of haemoglobin; Blood clotting system; Haematopoiesis; Basic steps and its regulation; Blood groups; ABO and Rh factor			
Unit 4: Physiology of Heart		8	SDR
Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses; Cardiac Cycle and cardiac output			
Unit 5: Thermoregulation & Osmoregulation		6	TS
Thermal regulation in camel and polar bear, Osmoregulation in aquatic vertebrates			
Unit 6: Renal Physiology		8	MR
Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance			

Animal Physiology: Life Sustaining Systems Lab; ZOOA-CC4-9-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Determination of ABO Blood group 2. Estimation of haemoglobin using Sahli's haemoglobin meter 3. Identification of blood cells from human blood 4. Preparation of haemin crystals and haemochromogen crystals 5. Identification of blood cells from cockroach haemolymph 6. Demonstration of blood pressure by digital meter 		

PART II: SEMESTER 4

CORE COURSE 10: Immunology

ZOOA-CC4-10-TH

Full Marks 50	4 Credits	50 Hours	
Unit 1: Overview of Immune System		3	DC
Introduction – concept of health and disease; Cells and organs of the Immune system			
Unit 2: Innate and Adaptive Immunity		9	DC
Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).			
Unit 3: Antigens		6	LM
Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes			
Unit 4: Immunoglobulins		10	MR
Structure and functions of different classes of immunoglobulins, Antigen-antibody interactions, Immunoassays (ELISA and RIA), Monoclonal antibody production			
Unit 5: Major Histocompatibility Complex		6	SDR
Structure and functions of MHC molecules. Structure of T cell Receptor and its signalling, T cell development & selection			
Unit 6: Cytokines		3	SDR
Types, properties and functions of cytokines.			

Unit 7: Complement System	5	SDR
Components and pathways of complement activation.		
Unit 8: Hypersensitivity	4	LM
Gell and Coombs' classification and brief description of various types of hypersensitivities.		
Unit 9: Vaccines	4	DC
Various types of vaccines. Active & passive immunization (Artificial and natural).		

Immunology Lab; ZOOA-CC4-10-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Demonstration of lymphoid organs (by picture). 2. Histological study of Bursa fabricius, spleen, thymus and lymph nodes through slides/ photographs 3. Demonstration of ELISA 		

PART III: SEMESTER 6

CORE COURSE 13: Developmental Biology

ZOOA-CC6-13-TH

Full Marks 50	4 Credits	50 Hours	
Unit 1: Early Embryonic Development		20	MR
Gametogenesis: Spermatogenesis, Oogenesis (sea urchin & mammal); Types of eggs, Egg membranes; Fertilization in sea urchin and mammal; Planes and patterns of cleavage; Types of Blastula [frog and chick]; Fate map in chick embryo, fate mapping using vital dye and radioactive technique; Gastrulation in frog and chick; Embryonic induction and organizers in <i>Xenopus</i> (Spemann & Mangold's experiment)			
Unit 2: Late Embryonic Development		10	MR
Extra-embryonic membranes in Chick; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)			
Unit 3: Post Embryonic Development		8	AKM
Development of brain and Eye in Chick. Molecular Induction in Brain and Eye development.			

Unit 4: Implications of Developmental Biology	12	AKM
<i>In vitro</i> fertilization (IVF), Stem cell: Concept of potency, types, markers and applications of stem cell therapy in bone marrow transplantation and cartilage regeneration		

Developmental Biology Lab; ZOOA-ZooA-CC6-13-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Study of whole mounts of developmental stages of chick embryo through permanent slides: 24, 48, and 96 hours of incubation 2. Study of the developmental stages and life cycle of <i>Drosophila</i> 3. Study of different sections of placenta (photomicrograph/ slides) 4. Identification of Invertebrate larva through slides/ photographs of Phylum Annelida, Arthropoda, Mollusca and Echinodermata 		

PART III: SEMESTER 6

CORE COURSE 14.Evolutionary Biology

ZOOA-CC6-14-TH

Full Marks 50	4 Credits	50 Hours
Unit 1	5	LM
Origin of Life (Chemical basis), RNA world hypothesis		
Unit 2	5	LM
Historical review of Evolutionary concepts: Lamarkism, Darwinism and Neo Darwinism		
Unit 3	6	LM
Geological time scale, Fossil: types and age determination by Carbon dating, Evolution of horse		
Unit 4	6	TKR

Unit 5	10	TKR
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Species concept, Isolating mechanisms, modes of speciation; Speciation by chromosome rearrangement in <i>Drosophila</i> . Adaptive radiation/macroevolution (exemplified by Galapagosfinches).		
Unit 6	2	AKM
Origin and Evolution of Man, Unique Hominid characteristics contrasted with primate characteristic		
Unit 7	10	LM
Population genetics: Hardy-Weinberg Law; factors disrupting H-W equilibrium (Genetic Drift, Migration and Mutation and Selection in changing allele frequencies (only derivations required). Simple problems related to estimation of allelic and gene frequencies.		
Unit 8	3	AKM
Extinction, back ground and mass extinctions, detailed example of K-T extinction		
Unit 9	5	TKR
Phylogenetic trees, construction and interpretation of Phylogenetic tree using parsimony, convergent and divergent evolution.		

Evolutionary Biology Lab, ZooA-CC6-14-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Study of fossils from models/ pictures: Dickinsonia, Paradoxides (Trilobita), Asteroceras (Ammonoid), Pentremites (Blastoid Echinoderm), Ichthyosaur, Archaeopteryx, Cynodont. 2. Study of homology and analogy from suitable specimens. 3. Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Construction of dendrogram following principles of phenetics & cladistics from a data table. 		

PART III: SEMESTER 6

DSE1. Animal Cell Biotechnology

ZOOA-DSE(A)-6-1-TH

Full Marks 50	4 Credits	50 Hours
Unit 1: Introduction		2
Concept and Scope of Biotechnology		
Unit 2: Techniques in Gene manipulation		15

Recombinant DNA technology, Restriction endonucleases. Cloning Vectors & their features: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, and HAC. Shuttle and Expression Vectors. Construction of Genomic libraries and cDNA libraries Transformation techniques: Cloning in bacteria and detection technique of clone	
Unit 3: Animal cell Culture	15
Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines, Culture media – Natural and Synthetic, Stem cells, Cryopreservation of cultures. Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, Polymerase chain reaction: Allele specific, RAPD & RT PCR.	
Unit 4: Fermentation	10
Different types of Fermentation: Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized. Downstream Processing: Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization.	
Unit 5: Application in Health	8
Hybridoma technology, Production of recombinant Proteins: Insulin and growth hormones.	

Animal Cell Biotechnology Lab, ZOOA-DSE(A)-6-1-P

Full Marks 50	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Packing and sterilization of glass and plastic wares for cell culture. 2. Preparation of culture media. 3. Preparation of genomic DNA from <i>E. coli</i>/animals/ human. 4. Plasmid DNA isolation (pUC 18/19) and DNA quantitation using agarose gel electrophoresis (by using lambda DNA as standard). 5. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting, PCR, DNA Microarrays (By Photograph). 		

PART III: SEMESTER 6

DSE2. Animal Biotechnology

ZOOA-DSE(A)-6-2-TH

Full Marks 50	4 Credits	Class
Unit 1: Introduction		5
Organization of <i>E.coli</i> and <i>Drosophila</i> genome.		
Unit 2: Molecular Techniques in Gene manipulation		23
Recombinant DNA technology, Restriction endonucleases. Cloning Vectors & their features: Plasmids, Phage vectors, Cosmids, Phagemids, BAC, YAC, and HAC. Shuttle and Expression Vectors. Construction of Genomic libraries and cDNA libraries Transformation techniques: Cloning in bacteria and detection technique of clone Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, Polymerase chain reaction: Allele specific, RAPD & RT PCR, DNA Fingerprinting		
Unit 3: Genetically Modified Organisms		12
Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock-out mice.		
Unit 4: Culture Techniques and Applications		10
Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of		

genetic diseases (Cystic fibrosis, Sickle cell anaemia, Thalassaemia).
 Dolly & Polly cloning
 Genetically modified economically important animal
 Gene Therapy

Animal Biotechnology Lab, ZOOA-DSE(A)-6-2-P

Full Marks 30	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Genomic DNA isolation from <i>E. coli</i> and Plasmid DNA isolation (pUC 18/19) from <i>E. coli</i> 2. To study following techniques through photographs - Southern Blotting, Northern Blotting, Western Blotting, PCR, DNA fingerprinting 3. Project report on animal cloning & Application & ethical Issues. 		

Students will choice either of ZOOA-DSE(B)-6-1-TH or ZOOA-DSE(B)-6-2-TH

PART III: SEMESTER 6

DSE1. Animal Behaviour and Chronobiology

ZOOA-DSE(B)-6-1-TH

Full Marks 50	4 Cre dits	50 Hours	
Unit 1: Patterns of Behaviour		10	DC & TKR
Stereotyped Behaviours (Orientation, Reflex); Individual Behavioural patterns; Instinct vs. Learned Behaviour; FAP, Associative learning, classical and operant conditioning, Habituation, Imprinting.			
Unit 2: Social and Sexual Behaviour		20	TKR
Social organisation in termites; Communication (dance & pheromones in Bees) Social behaviour: Altruism (Hamilton's rule and concept of haplodiploidy), Cooperation and Selfishness Sexual Behaviour: Sexual dimorphism, Mate choice in peacock, Intra-sexual selection (male rivalry in red deer) Kinship theory: Relatedness & inclusive fitness; parental care in fishes (Nest Building & coast benefit), conflict within families: parent offspring conflict and sibling rivalry			
Unit 3: Chronobiology & Biological Rhythm		20	DC
Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms, Circannual rhythms; Photic and non-photic zeitgebers; Role of melatonin. Biological clock and its adaptive significance. Circannual rhythm in bird migration.			

Animal Behaviour and Chronobiology Lab, ZOOA-DSE(B)-6-1-P

Full Marks 50	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. To study nests and nesting habits of the birds and social insects. 2. To study the behavioural responses of wood lice to dry and humid conditions(demonstration only). 3. To study geotaxis behaviour in earthworm. 4. To study the phototaxis behaviour in insect larvae. 5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report. 6. Study of circadian functions in humans (daily eating, sleep and temperature patterns). 		

PART I: SEMESTER 2.

CORE COURSE 2.Comparative Anatomy & Developmental Biology

ZOOG-CC2-2-TH

Full Marks 50	4 Credits	50 Hours
Unit 1: Integumentary System		TKR
Derivatives of integument with respect to glands in Birds & Mammals		
Unit 2: Digestive System		RD
Stomach and Dentition		
Unit 3: Respiratory System		RD
Brief account of Gills, lungs, air sacs and swim bladder		
Unit 4: Circulatory System		BB
Evolution of heart and aortic arches		
Unit 5: Urino-genital System		LM
Succession of kidney, Evolution of urino-genital ducts		
Unit 6: Early Embryonic Development		BB
Gametogenesis: Spermatogenesis and oogenesis with respect to mammals.		
Fertilization: Sea-Urchin; Early development of frog; structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula; types of morphogenetic movements; Fate of germ layers		
Unit 7: Late Embryonic Development		LM
Placenta types and function; Metamorphic events in frog life cycle and its hormonal regulation		

PART II: SEMESTER 4.
CORE-COURSE 4. Genetics & Evolutionary Biology
ZOOG-CC4-4-TH

Full Marks 50	4 Credits	50 Hours
Unit 1: Mendelian Genetics and its Extension		TS
Principles of Inheritance, Chromosome theory of inheritance, Incomplete dominance and co-dominance, Multiple alleles, lethal alleles, sex linked inheritance in <i>Drosophila</i> (White eye locus) & Human (Thalassemia).		
Unit 2: Linkage, Crossing Over		TS
Linkage and crossing over, Complete & Incomplete Linkage, Recombination frequency as a measure of linkage intensity. Holiday Model		
Unit 3: Mutation		BB
Chromosomal mutation, Deletion, duplication, inversion, translocation, aneuploidy, gene mutation, induced mutation, types & example		
Unit 4: Sex determination		BB
Genic Balance theory and dosage compensation in <i>Drosophila</i> .		
Unit 5: Origin of Life		RD
Chemical Origin of life		
Unit 6: Evolutionary Theories		RD
Lamarckism, Darwinism, Neo-Darwinism.		
Unit 7: Process of Evolutionary changes		RD
Isolating mechanism, Natural Selection.		
Unit 8: Speciation		RD/MR
Sympatric, Allopatric, Parapatric		

Biology of Insect. ZOOG-DSE-B-6-1-P

Full marks 25	60 Hours	2 Credits
List of Practical		
<ol style="list-style-type: none"> 1. Study of different kinds of mouth parts of insects (TKR) 2. Study of following insect vectors through permanent slides/photographs: <i>Aedes</i>, <i>Culex</i>, <i>Anopheles</i>, <i>Pediculus humanuscapitis</i>, <i>Pediculus humanuscorporis</i>, <i>Phlebotomus argentipes</i>, <i>Musca domestica</i>, 3. Submission of a project report on any one of the insect vectors and disease transmitted by the insect. 		

Ecology & Wild life Biology; ZOOG-DSE-B-6-2-TH

Full Marks 50	Credits 4	Class 60
Unit 1: Introduction to Ecology		AKM
Ecosystem, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.		
Unit 2: Population		AKM
Attributes of population: Life tables, fecundity tables, survivorship curves, dispersal and dispersion. Geometric, exponential and logistic growth, equation and patterns, Population regulation: density-dependent and independent factors,		
Unit 3: Community		DR
Community characteristics: species diversity, abundance, dominance, richness, Vertical stratification, Ecotone and edge effect.		
Unit 4: Ecosystem		BB
Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies		
Unit 5: Wild Life		MR / DC
Wildlife Conservation (in-situ and ex-situ conservation): Necessity for wildlife conservation; National parks & sanctuaries, Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve		

Ecology & Wild life Biology; ZOOG-DSE-B-6-2-P

Full marks 30	60 Hours	2 Credits
List of Practical		
1. Identification of flora, mammalian fauna, avian fauna DC		
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses) DC		
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc. DC		
4. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, salinity, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO ₂ PM / LM		


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