

3. ENVIRONMENTAL STUDIES

B.A. Part-I

Scheme of examination

Time	Min Marks	Max.Marks
3 hrs	36	100

This paper will contain 100 multiple choice questions. Each question will carry 1 mark. Students should be encouraged to visit places of Environmental Importance including Natural and Manmade Habitat.

Note:

1. The marks secured in this paper shall not be counted in awarding the division to a candidate.
2. The candidates will have to clear this compulsory paper in three chances.
3. Non-appearing or absence in the examination of compulsory paper will be counted as a chance.

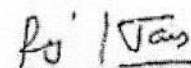
Unit.1: The Multidisciplinary nature of environmental studies

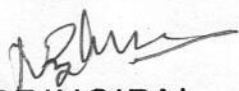
Definition, scope and importance- Relationship between Environmental Studies and other branches of science and social sciences.

Need for Environmental awareness, Environmental education in present day context.

Unit.2: Natural Resources and Challenges

- a. Natural resources and associated problems, Classification of resources: renewable resources, non renewable resources, classes of earth resources, resources regions: Definition and criteria, resource conservation.
- b. Forest resources: Use and over- exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- c. Water resources: Use and over-utilization of surface and groundwater, floods, drought conflicts over water, dams-benefits and problems.
- d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, case studies.
- f. Energy resources: Growing energy need, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies.
- g. Land resources: Land as a resource, Land degradation man induced Landslides, soil erosion and desertification.


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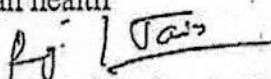
- e) Noise Pollution
- f) Thermal Pollution
- g) Nuclear Hazards
- Solid waste management" Causes, effects and control measures. of urban and industrial wastes
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods earthquake, cyclone and landslides

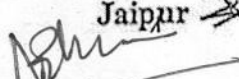
Unit 6 : Social issues, Environment, Laws and Sustainability

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies
- Environmental ethics: Issues and possible solution.
- Climate change, global warming, acid rain ozone layer depletion, nuclear accidents and holocaust. Case studies
- Wasteland reclamation.
- Consumerism and waste product.
- Environmental Protection Act.
- Air (Prevention and Control of Pollution) Act
- Wild life protection Act
- Forest Conservation Act
- Biological Diversity Act
- Issues involved in enforcement of environmental legislation
- Public Awareness.

Unit 7: Human Population and the Environment

- Population growth, variation among nations
- Population explosion-Family Welfare Programme
- Environment and Human health
- Human Rights
- Value Education
- HIV/AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and human health
- Case Studies


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BOTANY
B. Sc. Part III (Pass Course Syllabus)

Scheme

Min. Pass Marks : 36

Paper I

3 hrs. duration

Max Marks: 100

Max. Marks 33

Paper II

3 hrs. duration

Max. Marks 33

Paper III

3 hrs. duration

Max. Marks 34

Practical Min. Marks: 18

4 hrs, duration

Max. Marks 50

3 hours

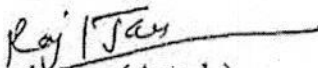
4 hours

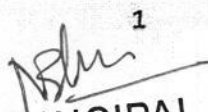
Duration of examination of each theory paper-

Duration of examination of practicals-

Note:

1. There will be 5 questions in each paper. All questions are compulsory. Candidate has to answer all questions in the main answer book only.
2. Q.No. will have 20 very short answer type Questions(not more than 20 words) of half marks each covering entire syllabus.
3. Each paper is divided into four units. There will be one question from each unit. These Q.No. 2 to 5 will have internal choice.


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Paper-II

Ecology & Economic Botany

(2 hrs /week)

Unit-1

Plants and Environment: Atmosphere (four distinct zone viz, stratosphere, troposphere, mesosphere and thermosphere). Adaptation (Morphological, anatomical and physiological responses) of plants to water (Hydrophytes and Xerophytes).

Light (global radiation, photosynthetically active radiation. Zonation in water body: littoral, limnetic and profundal zones; photoperiodism, heliophytes and sciophytes)

Temperature (Raunkier's classification of plants: megatherm, mesotherm, microtherm, heikistotherm; themoperiodicity and vernalisation).

Soil (soil profile, development-weathering and maturation). Soil texture, soil types, role of pH, organic matter, soil water, soil nutrients. Interactions among organisms (neutralism, amensalism, allelopathy), competition, predation, parasitism, protocooperation, mutualism. Environmental protection act.

Unit-2

Community, Ecosystem and Phytogeography: Community characteristics: stratification, life forms and biological spectrum, frequency density and cover. Ecological succession: types (primary and secondary) mechanism nivation, migration, ecesis, reaction and climax: xerosere, hydrosere,

Ecosystems: Structure-abiotic and biotic components, trophic level, food chain, food web, ecological pyramids, energy flow (Box and Pipe model of Odum). Biogeochemical cycles of carbon, and phosphorus, Vegetation types of Rajasthan, Endangered plants of Rajasthan.

Unit-3

Basic concept of center of origin of cultivated plants. Food plants-rice, wheat, maize, potato, sugarcane. Vegetables : General account with a note on radish, onion, garlic, cabbage, spinach, cauliflower, cucumber, tomato, lady finger and pea. Fruits: General account with a note on apple, banana, ber, mango, mulberry, jamun, watermelon, muskmelon, guava and orange. Vegetable oil: groundnut, mustard and coconut.

Unit-4

Spices: General account with an emphasis on those cultivated in Rajasthan

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M.Sc. Chemistry
(Two Year Course)

Note : In each question paper 10 questions will be set. Candidates have to answer 5 questions selecting at least one question from each unit.

M.Sc. I Year (Previous)

Paper	Course No.	Course	Exam Duration (Hours)	Max Marks	Min Marks
Paper-I	CH-401	Inorganic Chemistry	03	100	36
Paper-II	CH-402	Organic Chemistry	03	100	36
Paper-III	CH-403	Physical Chemistry	03	100	36
Paper-IV	CH-404	Spectroscopy and Diffraction Methods	03	50	18
Paper-V	CH-405	Green and Sustainable Chemistry	03	50	18
Paper-VI	CH-406	Analytical Techniques	03	50	18
Practical	CH-407		14	200	72
			Total Marks	650	

M.Sc. II Year (Final)

Paper	Course No.	Course	Exam Duration Hours	Max Marks	Min Marks
Paper-I	CH-501	Applications of Spectroscopy, Photochemistry and Solid State Chemistry	03	100	36
Paper-II	CH-502	Bioinorganic Chemistry Bioorganic Chemistry Biophysical Chemistry	03	75	27
Paper-III	CH-503	Environmental Chemistry	03	50	18
Paper-IV	CH-504	Elective Paper	03	50	18
Paper-V	CH-505	Elective Paper	03	50	18
Paper-VI	CH-506	Elective Paper	03	50	18
Paper-VII	CH-507	Elective Paper	03	50	18
Seminar	CH-508			25	9
Practical	CH-509		14	200	72
			Total Marks	650	
M.Sc. I Year (Previous) & II Year (Final)			Grand Total	1300	

The following alternative groups of elective papers are approved for M.Sc. II Year course.
College / department having more than 30 seats has to offer minimum two elective groups.

Group-I	CH-504	Organotransition Metal Chemistry
	CH-505	Bioinorganic and Supramolecular Chemistry
	CH-506	Photoinorganic Chemistry
	CH-507	Polymers
Group-II	CH-504	Organic Synthesis-I
	CH-505	Organic Synthesis-II
	CH-506	Heterocyclic Chemistry
	CH-507	Chemistry of Natural Products
Group-III	CH-504	Analytical Chemistry
	CH-505	Physical Organic Chemistry
	CH-506	Chemical Dynamics
	CH-507	Electrochemistry

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UNIT - I

Introduction, principle and concepts of Green Chemistry

Need for green chemistry; Inception and evolution of green chemistry; Twelve principles of green chemistry with their explanations and examples; Designing a green synthesis using these principles; Green chemistry in day to day life.

UNIT - II

Non-traditional greener alternative approaches

Different approaches to green synthesis: (a) Uses of green reagents in organic synthesis - Dimethyl carbonate, polymer supported reagents - peracids and chromic acid; (b) Green catalysts, role of catalysis in sustainable development, homogeneous and heterogeneous catalysts; Introduction, advantages and applications of - (i) Nanocatalysts, (ii) Phase transfer catalysts, (iii) Biocatalysts, (iv) Organocatalysts, in organic synthesis.

UNIT - III

Applications of non-conventional energy sources

Introduction of microwave induced synthesis: Microwave activation, equipment, time and energy benefits, limitations. Organic transformations under microwaves - Fries rearrangement, Diels-Alder reaction, decarboxylation, saponification of ester, alkylation of reactive methylene compounds; Heterocyclic synthesis - β -Lactams, pyrrole, quinoline.

Introduction of ultrasound assisted green synthesis: Instrumentation, physical aspects, applications in organic transformations.

Electrochemical synthesis: Introduction, synthesis of sebacic acid and adiponitrile.

UNIT - IV

Environmentally Benign Solutions to Organic Solvents

Ionic liquids as green solvents: Introduction, properties and types of ionic liquids. Synthetic applications - Diels-Alder reaction, epoxidation and Heck reaction.

Aqueous phase reactions: Enhancement of selectivity, efficiency. Synthetic applications - 1,3-Dipolar Cycloadditions, Carbon-Carbon bond-forming processes and bromination reactions.

Fluorous solvents in green chemistry: Scope, definition and their synthetic applicability.

Role of supercritical carbon dioxide in green chemistry.

Ethyl lactate as a renewable green solvent: Properties and applications.

UNIT - V


Synthesis of Nanomaterials

Greener synthesis of Nanomaterials- Microwaveassisted synthesis of Quantum Dots (QD) in aqueous medium, Magnetic Nanoparticles, MW-assisted Nano Catalysis in water.

Synthesis of Nanoparticles using Bacteria, Yeast, Algae and Fungus.

SUGGESTED BOOKS AND REFERENCES:

1. P.A.G. Blackie, Organic synthesis in water, Springer.
2. P.T. Anastas, J.C. Warner, Green Chemistry, theory and practice, Oxford University Press.
3. M. Lancaster, Green Chemistry: An introductory text, Royal Society of Chemistry.
4. V. Polshettiwar, T. Asefa, G. Hutchings, Nanocatalysis: Synthesis and applications, Wiley.
5. M.A. Ryan, M. Tinnesand, Introduction to Green Chemistry, American Chemical Society.
6. P.T. Anastas, Handbook of Green Chemistry, John Wiley and Sons.
7. V.K. Ahluwalia, MKidwai, New Trends in Green Chemistry, Springer.
8. Paul T Anastas, Innovations in Green Chemistry and Green Engineering, Springer.


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Biopolymers and their molecular weights: Evaluation of size, shape, molecular weight and extent of hydration of biopolymers by various experimental techniques. Sedimentation equilibrium, hydrodynamic methods, diffusion, sedimentation velocity, viscosity, electrophoresis and rotational motions.

Books Suggested

1. Principles of Bioinorganic Chemistry, S.J. Lippard and J.M. Berg, University Science Books.
2. Bioinorganic Chemistry, I. Bertini, H.B. Gray, S.J. Lippard and J.S. Valentine, University Science books.
3. Inorganic Biochemistry vols. I and II, ed. G.L. Eichhorn, Elsevier.
4. Progress in Inorganic Chemistry, Vols 18 and 38 ed. J.J. Lippard, Wiley.
5. Principles of Biochemistry, A. L. Lehninger. Worth Publishers.
6. Bioorganic Chemistry : A Chemical Approach to Enzyme Action, Hermann Dugas and C. Penny, Springer Verlag.
7. Understanding Enzymes, Trevor Palmer, Prentice Hall.
8. Enzyme Chemistry: Impact and Applications, Ed. Collin J Suckling, Chemistry.
9. Enzyme Mechanisms, Ed. M.I. Page and A. Williams, Royal Society of Chemistry.
10. Fundamentals of Enzymology, N.C. Price and L. Stevens, Oxford University Press.
11. Immobilized Enzymes : An Introduction and Applications in Biotechnology, Michael I.D. Trevan, John Wiley.
12. Enzymatic Reaction Mechanisms. C, Walsh, W.H. Freeman.
13. Enzyme Structure and Mechanism. A. Fersht, W.H. Freeman.
14. Biochemistry : The Chemical Reactions of Living Cells, D.E. Metzler. Academic Press.
15. Biochemistry, L. Stryer, W.H. Freeman.
16. Biochemistry, J. David Rawn. Neil Patterson.
17. Biochemistry. Voet and Voet, John Wiley.
18. Outlines of Biochemistry, E.E. Conn and P.K. Stumpf. John Wiley.
19. Bioorganic Chemistry : A Chemical Approach to Enzyme Action. H Dugas and C. Penny, Springer-Verlag.
20. Macromolecules : Structure and Function. F Wold. Prentice Hall.

Paper-III : CH-503

Environmental Chemistry

(2 Hrs. or 3 period / week)

Exam Duration : 3 hrs.

Max. Marks : 50

Unit-I

Atmosphere: Atmospheric layers. Vertical temperature profile, heat radiation, budget of the earth atmosphere systems. Properties of troposphere, thermodynamic derivation of lapse rate. Temperature inversion. Calculations of Global mean temperature of the atmosphere. Pressure variation in atmosphere and scale height. Biogeochemical cycles of carbon, nitrogen, sulphur, phosphorus and oxygen. Residence times.

Atmospheric Chemistry: Sources of trace atmospheric constituents : nitrogen oxides, sulphur dioxide and other sulphur compounds, carbon oxides, chlorofluorocarbons and other halogen compounds, methane and other hydrocarbons.

Tropospheric Photochemistry: Mechanism of photochemical decomposition of NO_2 and formation of ozone. Formation of oxygen atoms, hydroxyl, hydroperoxy and organic radicals and hydrogen peroxide. Reactions of hydroxyl radicals with methane and other organic compounds. Reactions of OH radicals with SO_2 and NO_x . Formation of nitrate radical and its reactions. Photochemical smog, meteorological conditions and chemistry of its formation.

Unit-II

Air Pollution : Air pollutants and their classification. Aerosols - sources, size distribution and effect on visibility, climate and health.

Acid Rain : Definition, acid rain precursors and their aqueous and gas phase atmospheric oxidation reactions. Damaging effects on aquatic life, plants, buildings and health. Monitoring of SO_2 and NO_x - Acid rain control strategies.

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Stratospheric Ozone Depletion :Mechanism of ozone formation, Mechanism of catalytic ozone depletion. Discovery of Antarctic ozone hole. Instrumental methods for detection of ozone depletion gases.

Green House Effect :Terrestrial and solar radiation spectra. Major green house gases and their sources and Global warming potentials. Climate change and consequences.

Urban Air Pollution : Exhaust emissions, damaging effects of carbon monoxide. Monitoring of CO. Control strategies.

Unit-III

Aquatic Chemistry and Water Pollution :Redox chemistry in natural waters. Dissolved oxygen, biological oxygen demand, chemical oxygen demand, determination of DO, BOD and COD. Aerobic and anaerobic reactions of organic sulphur and nitrogen compounds in water, acid-base chemistry of fresh water and sea water. Aluminum, nitrate and fluoride in water. Eutrophication. Sources of water pollution. Treatment of waste water and sewage. Purification of drinking water, techniques of purification and disinfection.

Unit-IV

Environmental Toxicology

Toxic Heavy Metals - Mercury, lead, arsenic and cadmium. Causes of toxicity. Bioaccumulation, sources of heavy metals. Chemical speciation of Hg, Pb, As and Cd. Biochemical and damaging effects.

Toxic Organic Compounds - Pesticides, classification, properties and uses of organochlorine and organophosphorus pesticides, detection and damaging effects.

Polychlorinated Biphenyls – Properties, uses and environmental contamination and effects.

Polynuclear Aromatic Hydrocarbons - Sources, structures and as pollutants.

Unit-V

Soil and Environmental Disasters

Soil composition, micro and macronutrients. soil pollution by fertilizers, plastic and metals. Methods of remediation of soil.

Bhopal gas tragedy, Chernobyl, Three mile island, Minamata Disease, Seveso (Italy), London smog.

Books Suggested:

1. Environmental Chemistry. Colin Baird, W.H. Freeman Co. New York. 1098.
2. Chemistry of Atmospheres. R.P. Wayne. Oxford.
3. Environment Chemistry, A.K. De, Wiley Eastern, 2004.
4. Environmental Chemistry, S.E. Manahan, Lewis Publishers.
5. Introduction to Atmospheric Chemistry, P.V. Hobbs, Cambridge.

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University of Rajasthan
Syllabus: B.Sc. Part-III (Pass Course)

Zoology
(2022-2023)

Scheme:
Max. Marks: 100

Min. Pass Marks: 36

Paper I	: 3 Hrs duration	33 Marks
Paper II	: 3 Hrs duration	33 Marks
Paper III	: 3 Hrs duration	34 Marks
Practicals	: 4 Hrs. duration	50 Marks

NOTE:

1. There will be two parts of every theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 (Paper I & II) or 10 (Paper III) very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part, i.e., three from each unit /section out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks.
2. The candidate has to answer all questions in the main answer book only.

PAPER -I: Z-301

STRUCTURE AND FUNCTIONS OF CHORDATE TYPES

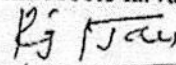
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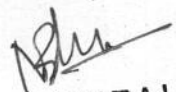
1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus.
Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks
2. The candidate has to answer all questions in the main answer book only.

Section - A

Chordates

1. Comparison of habit, external features and anatomy of *Herdmania* and *Branchiostoma* (excluding development).
2. Ascidian tadpole larva and its metamorphosis.
3. Affinities of Hemichordata, Urochordata and Cephalochordata
4. Habit, habitat and salient features of *Petromyzon*, *Ammocoete* larva.


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Section – B

Structure, organs and Systems: Brain, endoskeleton, Digestive, Circulatory, Respiratory, Excretory, Nervous & Reproductive

Pisces- Labeo
Amphibian-Frog
Reptile-Varanus
Aves-Pigeon
Mammal- Rat

Section – C

Chordate Adaptations

1. Pisces: Scales and fins, migration and parental care.
2. Amphibia: Parental care.
3. Reptilia: Poisonous and non poisonous snakes, poison apparatus.
4. Aves: Flight adaptations, types of feather, bird migration.
5. Mammals: Adaptive radiation, dentition.

PAPER –II: Z-302

ECOLOGY, ENVIRONMENTAL BIOLOGY AND EVOLUTION

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 9 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selection at least one question from each unit/section. Each question will carry 6 marks
2. The candidate has to answer all questions in the main answer book only.

Section – A

Ecology

1. Basic concepts in ecology, its meaning and history.
2. Concepts of limiting factors.
3. Ecosystem: Biotic and abiotic factors.
4. Ecosystem: Production, consumption and decomposition in an ecosystem: Concepts of food-chain, food web, trophic structure, ecological pyramids
5. Biogeochemical cycles of O₂, CO₂, H₂O, N, P and role of microbes.
6. Ecosystem: Homeostasis, functional aspects, productivity concepts and determination, ecotone, edge effects, niche.
7. Population ecology: Density and methods of its measurement, natality, mortality, age ratio and distribution, pyramids, fluctuations, biotic potential, dispersal, growth forms, population interactions and propagation, brief idea of demography.
8. Community ecology: Characteristics of natural communities, structure, composition, stratification.
9. Ecological succession: Types and patterns, concept of climax, details of xerosere and hydrosere successions.

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10. Habitat ecology: Brief account of fresh water, marine, terrestrial and estuarine water ecosystems.
11. Ecology and human future: Growth rate role of human kind in modifying natural communities in term of public health and welfare with respect to use of pesticides, conservation and pollution.

Section - B

Environmental Biology

1. Environment and its concepts, hydrosphere, lithosphere and atmosphere.
2. Natural resources: Conservation and management of natural resources: Renewable (forest, wildlife, water) and non renewable (soil, minerals and energy).
3. Environmental pollution: General outline and various types of pollution of water, air, and soil. Sources and remedies for noise, radiation.
4. Green House effect, Ozone layer depletion, El-Nino and La Nina effects.
5. Basic concepts of bioaccumulation, biomagnifications, biodegradation of pollutants.
6. Impact of urbanization: Development and distribution of urban centers, factors, problems and solutions of urbanization, fauna of oriental region.
7. Wildlife conservation: Vanishing and threatened animals and plants with special reference in Rajasthan, Wildlife management efforts by Government and non Government organization.
8. Space ecology: Space ecosystem, space problems and their solutions, colonization.

Section - C

Evolution

1. Darwinism and Neo Darwinism, Lamarckism and Neo Lamarckism, natural Selection.
2. Variation, Isolation, Mutations.
3. Concept of Species and Speciation.
4. Adaptations (Desert, freshwater, Deep Sea and Flight), Mimicry.
5. Polymorphism: population genetics, Genetic drift and Hardy-Weinberg Law.
6. Evolution Man, Phylogeny of Horse.
7. Zoogeography: Principles and concepts of Parallelism, endemism etc. and factors influencing animal distribution.
8. Zoogeographical realms and faunal peculiarities, evolution of realms, plate tectonics and continental drifts and Island Zoogeography.

PAPER -III: Z-303

APPLIED ZOOLOGY, ETHNOLOGY AND BIOSTATISTICS

NOTE:

1. There will be two parts of this theory question paper with total duration of 3 hours. First part of question paper will comprise question No. 1 containing 10 very short answer (Maximum 25 words) type questions, each of 1 mark. This part is compulsory to attempt. Questions should be evenly distributed covering entire syllabus. Second part of question paper will be of long answer type questions having three sections. There will be total 9 questions (Q. No. 2 to 10) in this part i.e. three from each unit /section, out of which candidate will be required to attempt any 4 question selecting at least one question from each unit/section. Each question will carry 6 marks
2. The candidate has to answer all questions in the main answer book only.

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UNIVERSITY OF RAJASTHAN
UGC CURRICULUM FOR POSTGRADUATES

M.Sc. Zoology Final (Annual Scheme)

3 Hours Duration		100 Marks
Paper I	Biology of Chordates	(each paper)
Paper II	Environmental Biology and Ethology	
Paper III	Genes and Differentiation	
Paper IV	Tools and techniques in Biology	
Paper V	Special Paper	
Paper VI	Special Paper	
	Laboratory Exercises	
	Demonstration and Tutorials	

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Note: The theory paper of M.Sc. Final (Zoology) will have the following pattern.

Question paper will have 5 (five) questions in all having equal marks.

- (i) Question number 1 will be compulsory and will have 10 very short answer question of 2 mark each.
- (ii) Question numbers 2 and 3 will consist of only short answer type questions with 4 subdivisions of 5 marks each. There will be internal choice, in these questions.
- (iii) Question numbers 4 and 5 will be long answer type questions with internal choice.

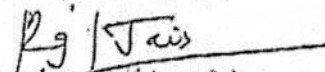
PAPER I: BIOLOGY OF CHORDATES

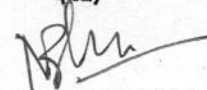
Duration: 3 Hours

Max. Marks – 100

Periods: 70

1. Origin and outline classification of the chordates. 3
2. Interrelationships of Hemichordata, Urochordata and Cephalochordata and their relations with other deuterostomes. 5
3. Life histories of sessile and pelagic tunicates, *Ascidia*, *Herdmania*, *Pyrosoma*, *Salpa*, *Doliolum* and *Oikopleura*. 8
4. Neoteny 4
5. Origin, evolution and adaptive radiation of Chordates. 20
- 5.1 Geological time-scale and fossils.


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18. Milton, H. : Analysis of Vertebrate Structure, John Wiley and Sons Inc., New York.
19. Monielli, A.R.: The chordates, Cambridge University Press, London.
20. Montagna, W. : Comparative Anatomy, John Wiley & Sons, Inc., New York.
21. Romer, A.S. : Vertebrate Body, W.B. Saunders Company, Philadelphia.
22. Romer, A.S. : Vertebrate Palentology, University of Chicago Press, Chicago.
23. Sedgwick, A.A.: Text Book of Zoology, Vol.-II.
24. Smith, H.S.: Evolution of Chordata Structure, Hold Rinehart and Winstoin, Inc., New York.
25. Tansley, K.: Vision in Vertebrate, Chapman and Hall Ltd., London.
26. Torrey, T.W.: Morphogenesis of Vertebrates, John Wiley & Sons, New York.
27. Walters, H.E. and Sayles, L.D.: Biology of Vertebrates, Macmillan and Co., New York.
28. Waterman, A.J. : Chordata Structure and Function, MacMillan Co., New York.
29. Weichert, C.K. and Presch, W. Elements of Cordate Anatomy, MacGraw Hill Book Company, New York.
30. Young J.Z. : Life of Vertebrates, The Oxford University Press, London.

M.Sc. FINAL (ZOOLOGY)

PAPER II : ENVIRONMENTAL BIOLOGY AND ETHOLOGY

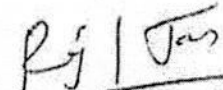
Duration : 3 Hours


Max. Marks – 100

Periods : 70

Unit I - Environmental Biology

1. Interactions between environment and biota 5
 - 1.1 Concept of habitat and ecological niches
 - 1.2 Limiting factors.
 - 1.3 Energy flow, food chain, food web and trophic levels, ecological pyramids.
 - 1.4 Biotic community: Concept, structure, dominance, fluctuation and succession.
 - 1.5 Various nutrient cycles in nature.


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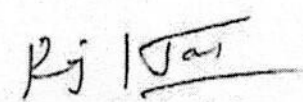
- | | | |
|----|--|---|
| 2. | Ecosystem dynamics and management | 6 |
| | 2.1 Complexity, stability and homeostasis of ecosystems. | |
| | 2.2 Functional aspects and productivity concept. | |
| | 2.3 Niche, ecotone and overlapping of niches. | |
| | 2.4 Character displacement, speciation and extinction. | |
| 3. | Environmental impact assessment | 5 |
| | 3.1 Environmental pollution. | |
| | 3.2 Population and impact of urbanization. | |
| 4. | Principles of conservation: Conservations strategies | 5 |
| | 4.1 Various natural resources. | |
| | 4.2 Present status and future needs. | |
| | 4.3 Management. | |
| | 4.4 Biodiversity of India and Rajasthan and their management. | |
| 5. | Prospects and strategies for sustainable communities. | 2 |
| 6. | Organisation and dynamics of ecological communities | 7 |
| | 6.1 The habitat approach. | |
| | 6.2 A detailed knowledge of communities of fresh water, marine, terrestrial and esturine areas with respect to | |
| | 6.2.1 Extent | |
| | 6.2.2 Zonation | |
| | 6.2.3 Environment | |
| | 6.2.4 Biota | |
| | 6.2.5 Adaptations | |
| 7. | The ecological outlook | 5 |
| | 7.1 Applied human ecology | |
| | 7.2 Radiation (electromagnetic and ionizing) and environment | |
| | 7.3 Climatic changes (<i>El Nino</i> and <i>La Nina</i>) | |
| | 7.4 Space ecology | |
| | 7.5 Human future | |

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Unit II: Ethology

1. **Introduction to Ethology**
 - 1.1 Branches and significance of Ethology: Ethophysiology, Ethoendocrinology, Neuroethology, Human ethology, Behavioural genetics, sociobiology.
 - 1.2 Milestones of Ethology : Konrad Lorenz, Niko Tinbergen, Karl Von Frisch, BF Skinner, HF Harlow.
 - 1.3 Proximate and ultimate mechanisms of ethology.
2. **Concepts of Ethology :**
 - 2.1 Motivation and Innate behaviour (Fixed action pattern).
 - 2.2 Sign stimulus, super normal stimulus.
 - 2.3 Action specific energy and Innate releasing mechanism.
 - 2.4 Difference between learned and Innate behaviours.
3. **Nervous system and Behaviour**
 - 3.1 Mammalian brain structure and behaviour.
 - 3.2 Hypothalamus and Innate behaviour.
 - 3.3 Behavioural endocrinology including effect of drugs.
 - 3.4 Orientation - taxis and kinesis, bird migration and navigation
 - 3.5 Biological clocks, Chronobiology.
4. **Learning and Imprinting**
 - 4.1 Introduction and definitions.
 - 4.2 Habituation; Conditioning.
 - 4.3 Trial and error; Imprinting .
 - 4.4 Neural mechanism of learning .
 - 4.5 Birds song learning behavior in the context of Tinbergen's 4 aims.
5. **Sociobiology**
 - 5.1 Introduction- definition, WO Wilson, Richard Dawkins, WD Hamilton.
 - 5.2 Units of sociobiology.

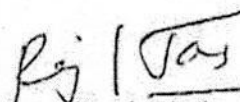

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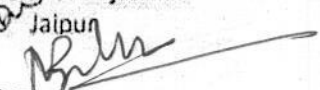

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- 5.3 Hamilton's theory and Altruism, cooperation, reciprocation and Eusociality,
 5.4 Properties, advantages of a social group, Social organisation in primates.
6. **Social Behaviour**
- 6.1 Parental care- Types , Parent offspring conflict.
 6.2 Courtship and mating.
 6.3 Aggression and territory
 6.4 Evolution of social systems.
7. **Communication in animals**
- 7.1 Auditory, Echolocation, Infra- and ultra- sounds.
 7.2 Tactile, Visual ,
 7.3 Pheromones- vertebrates and invertebrates
 7.4 Language of honey bees-circle and waggle dance.
8. **Human Behaviour-**
- 8.1 Desmond Morris, Sarah Hrdy.
 8.2 Sign stimulus, Imprinting.
 8.3 Kinship , Aggression.
 8.4 Pheromones.

Recommended Books (Environmental Biology)

1. Begon, M. Harper, J.I. and Townsend, C.R.: Ecology, Individuals, Populations and Communities. Blackwell Science, Oxford University Press, Oxford.
2. Cherrett, J.M.: Ecological Concepts, Blackwell Scientific Publication, Oxford, U.K.
3. Elseth, B.D. and Baumgartner, K.M.: Population Biology, Van Nostrand Col, New York.
4. Iorgenson, S.E.: Fundamentals of Ecological Modeling, Elsevies.
5. Krebs, C.J.: Ecological Methodology, Harper and Row, New York.
6. Krebs, C.J.: Ecology, Harper and Row, New York.


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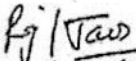
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M.Sc. (BOTANY)
M.Sc. (ANNUAL PATTERN)


(M.Sc. Previous)

- Paper I Cell & Molecular Biology of Plants
Paper II Cytology, Genetics & Cytogenetics
Paper III Biology & Diversity of Lower Plants : Cryptogams
Paper IV Taxonomy & Diversity of Seed Plants
Paper V Plant Physiology and Metabolism
Paper VI Microbiology and Plant Pathology

(M.Sc. Final)

- Paper VII Plant Morphology, Development Anatomy and Reproductive Biology
Paper VIII Plant Ecology
Paper IX Plant Resource Utilization & Conservation
Paper X Biotechnology & Genetic Engineering of Plants & Microbes
Paper XI Elective I
Paper XII Elective II
Elective Papers XI & XII
Paper XI(a) : Advanced Plant Pathology—I
Paper XII(a) : Advanced Plant Pathology—II
OR
Paper XI(b) : Seed Science and Technology—I
Paper XII(b) : Seed Science and Technology—II
OR
Paper XI(c) : Ecosystem Ecology
Paper XII(c) : Environmental biology
OR
Paper XI(d) : Advanced Plant Physiology—I
Paper XII(d) : Advanced Plant Physiology—II
OR
Paper XI(e) : Advanced Morphology and Morphogenesis—I
Paper XII(e) : Advanced Morphology and Morphogenesis—II
OR
Paper XI(f) : Biosystematics of Angiosperms—I
Paper XII(f) : Biosystematics of Angiosperms—I
OR
Paper XI(g) : Biotechnology—I
Paper XII(g) : Biotechnology—II


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Paper-VIII : Plant Ecology

Scheme of Examination

Max. Marks 100

Each paper will have 9 questions, out of which a student has to attempt 5 questions including the question No.1 which will be compulsory. The question No.1 will carry 20 marks and will be of short answer type questions with a limit of 20 words.

Unit-I

Science of Ecology: Introduction of Ecology, Evolutionary ecology, ecological models;

Population: Characteristics of population, population size and exponential growth, limits of population growth, Competition and coexistence, intra-specific interactions, interspecific interactions, scramble and contest competition model, mutualism, commensalism and allelopathy, prey-predator interactions.

Vegetation organization : Concepts of community and continuum, community coefficients; interspecific associations, ordination, species diversity and pattern diversity in community, concept of habitat and ecotone, ecological niche.

Unit-II

Vegetation development : Temporal changes (cyclic and non-cyclic), mechanism of ecological succession (relay floristic and initial floristic composition), succession models (facilitation, tolerance and inhibition models), Changes in ecosystem properties during succession, concept of climax.

Ecosystem: Nature and size of ecosystem, components of an ecosystem (Producers, consumers and decomposers), Grazing (grassland) and Detritus food chain in freshwater ecosystems, food webs, ecological energetic: Solar radiation and energy intakes at the earth's surface, energy flow models, Productivity of various ecosystems of the world and global biogeochemical cycles of carbon and nitrogen.

Unit-III

Ecosystem stability : Concept (resistance and resilience), ecological perturbations (natural and anthropogenic) and their impact on plants and ecosystems, Restoration of degraded ecosystem, ecology of plant invasion, environmental impact assessment, ecosystem restoration.

Biomes and biodiversity : Major biomes of the world and impact of changing climate on biomes, Biodiversity: Concept and levels; role of biodiversity in ecosystem functions and stability, assessment (local, national and global), speciation and extinction,

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Biodiversity act of India and related international conventions, diversity indices, IUCN categories of threat, Hot spots.

Unit-IV

Conservation: Conservation (ex-situ and in situ) and management. International conservational organizations, sustainable development, nature resource management in changing environment, molecular ecology, genetic analysis of single and multiple population, conservation genetics.

Energy: Sources, Fossil fuels, Nuclear fuel, Solar energy, Fuel cells, Biomass, Hydropower, Wind Power, Geothermal, Tidal & Wave energy, Energy conservation.

Suggested Readings

1. Smith, R.L. 1996. Ecology and Field Biology, Harper Collins, New York.
2. Muller-Dombois, D. and Ellenberg, H. 1974. Aims and Methods of Vegetation Ecology, Wiley, New York.
3. Begon, M. Harper, J.L. and Townsend, C.R. 1996. Ecology, Blackwell Science, Cambridge, U.S.A.
4. Ludwig, J. and Reynolds, J.F. 1988. Statistical Ecology. John Wiley & Sons.
5. Odum, E.P. 1971. Fundamentals of Ecology, Saunders, Philadelphia.
6. Odum, E.P. 1983. Basic Ecology, Saunders, Philadelphia.
7. Barbour, M.G. Burk, J.H. and Pitts, W.D. 1987. Terrestrial Plant Ecology, Benjamin/Cummings Publication Company, California.
8. Kormondy, E.J., 1996. Concepts of ecology. Prentice-Hall of India Pvt. Ltd., New Delhi.
9. Chapman, J.L. and Reiss, M.J. 1988. Ecology; Principles and Applications. Cambridge University Press, Cambridge; U.K.
10. Molan, B. and Billharz, S. 1997. Sustainability Indicators. John Wiley & Sons, New York.
11. Heywood, V.H. and Watson, R.T. 1985. Global Biodiversity Assessment Cambridge University Press.
12. N.S. Subrahmanyam and A.V. S.S. Sambamurty. 2000. Ecology. Narosa Publishing House, Delhi.
13. S.K. Maitri. 2004. Handbook of Methods in Environmental Studies Vol. 1 & 2. ABD Publisher, Jaipur.
14. J. L. Chapman and M. J. Reiss. 1995. Ecology principles and applications. Cambridge University Press.
15. C. Faurie, C. Ferra, P. Medori and J. Devaux. 2001. Ecology Science & Practice. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

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Paper -IX : Plant Resource Utilization and Conservation

Scheme of Examination

Max. Marks 100

Each paper will have 9 questions, out of which a student has to attempt 5 questions including the question No.1 which will be compulsory. The question No.1 will carry 20 marks and will be of short answer type questions with a limit of 20 words.

Unit-I

Plant Biodiversity : Concept, status in India, utilization and concerns.

Sustainable development : Basic Concepts. Origins of agriculture.

World centres of primary diversity of domesticated plants : plant introductions and secondary centres

Unit- II

Origin, evolution, botany cultivation and uses of: (i) Food, forage and fodder crops, (ii) fibre crops, (iii) medicinal and aromatic plants, and (iv) vegetable oil-yielding crops.

Unit-III

Important fire-wood and timber-yielding plants and non wood forest products (NWFPs) : such as bamboos, rattans, rawmaterials for paper making, gums, tannins, dyes, resins and fruits.

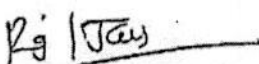
Green revolution : Benefits and adverse consequences. Innovations for meeting world food demands.


Plants used as avenue trees for shade, pollution control and aesthetics. Principles of conservations, extinctions, environmental status of plants based on International Union for Conservation of Nature.

Unit-IV

Strategies for conservation-in situ conservation : International efforts and Indian initiatives, protected areas in India- sanctuaries, national parks: biosphere reserves, wetlands, mangroves and coral reefs, conservation of Wild biodiversity.

Strategies for conservation-ex situ conservation: Principles and practices, botanical gardens, field gene banks, Seed banks, in vitro repositories, cryobanks, general account of the activities of Botanical Survey of India (BSI), National Bureau of Plant Genetic Resources (NBPGR), Indian Council of Agricultural Research (ICAR), Council of Scientific and Industrial Research (CSIR), and the Department of Biotechnology (DBT) for conservation, non-formal conservation efforts.


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Paper-XI (a) : Advanced Plant Pathology - I

Schemes of Examination

Max. Mark : 100

Each paper will have 9 questions, out of which a student has to attempt 5 questions including the question No.1 which will be compulsory. The question No.1 will carry 20 marks and will be of several short objective type of questions such as multiple choice type, one line answer type, one word type and fill in the blanks type.

Unit-I

Plant Pathology : History & Scope. Nature, Origin & Evolution of parasitism. Biotic and abiotic pathogens. Pathogen factors in disease development. Penetration, infection and pathogenesis. Physiological specialisation in phytopathogenic microbes.

Unit-II

Host factors in disease development: Inoculum potential; Phenomena of resistance and susceptibility. Protective and defence mechanisms in plants; Phytoalexins. Breeding for disease resistant plants.

Environmental factors in disease development: Epiphytotic and plant disease forecasting.

Unit-III

IPM, Application of biotechnology and information technology to pest management.

Molecular Plant Pathology : Molecular diagnosis, identification of genes and specific molecules in disease development; molecular manipulation of resistance. Non-parasitic diseases and control measures.

Unit-IV

Principles of plant protection, Physical, chemical and biological control of plant diseases,

Classification and anatomy of galls : Some insect induced plant galls of Rajasthan, mechanism and physiology of insect galls.

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Paper-XI (c) : Ecosystem Ecology

Schemes of Examination

Max. Mark : 100

Each paper will have 9 questions, out of which a student has to attempt 5 questions including the question No.1 which will be compulsory. The question No.1 will carry 20 marks and will be of short answer type questions with a limit of 20 words.

Unit-I

Grassland Ecosystems - Characteristics of grasslands, stratification, grasslands and grazing, grasslands and drought, grassland and animal life, Grasslands types with special reference to Prairie and Savannah, Indian grasslands.

Forest Ecosystems - Stratification of the forest, Forest types - Boreal, Temperate and Tropical forests, Forest animal life

Unit II

Freshwater Ecosystems -Classification of Freshwater Habitats, Lentic: Lakes & Ponds: Temperature and Oxygen stratification, Zonation based on light penetration, Flora and fauna, Productivity classes of lakes, Marshes and Swamps, Bogs Lotic: Springs, Streams and Rivers.

Marine and Estuarine Ecosystems - Characteristics of marine environment: Salinity, Temperature and pressure, Zonation and Stratification, Tides, Estuarine ecosystem: Types of Estuaries, Flora and fauna, Estuarine productivity, Coral reef ecosystem, Mangrove ecosystem

Unit III

Urban Ecosystem -Urban environment and Climatic conditions, additional physical complexes (modified surfaces including parking lots, roofs, and landscaping, buildings, transportation networks, infrastructure and public amenities), flora and fauna (human beings as largest macro consumer), Implications of urbanization: problems of air pollutants, drinking water supply, floods, waste disposal.

Rural ecosystems: Rural environment and climate, physical complexes (fields, agricultural implements and machines), Flora and

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fauna, Problems of discharge of chemical fertilizers, pesticides and drinking water. Management of waste, Principle; Social Forestry.

Unit III

Desert Ecosystem: Desert: Definition, classification (hot and cold), physiography, desert features, flora, fauna and water, formation, topography, distribution and characteristics of world deserts; **Thar desert: Sand dunes:** types, origin and morphology of sand dunes; Vegetation types and plant communities, biological production, conservation of flora and fauna, wild life, Succession in vegetation of western Rajasthan and coastal sand dunes, economic importance of desert plants (general economic plants, medicinal, famine food plants and crops);

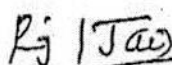
Saline Arid zones: Saline tracts of Rajasthan and plants of saline arid zones (Halophytes), Economic and social considerations in the management of salt affected soils, afforestation in salt affected soils, Importance of halophytes.

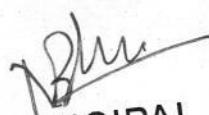
Suggested Readings

1. P. L. Jaiswal, A.M. Wadhvani and N.N. Chhabra (Eds.). 1983. Desertification and its Control. ICAR, New Delhi.
2. Smith, R.L. 1996. Ecology and Field Biology, Harper Collins, New York.
3. Subrahmanyam, N.S. and A.V.S.S. Sambamurty 2000. Ecology. Narosa Publishing House, New Delhi.
4. G. M. Masters and W. P. Ela. 2008. Introduction to environmental engineering and sciences. PHI Learning Private Limited, New Delhi.
5. W. P. Cunningham and M. A. Cunningham. 2003. Principles of Environmental Science: Inquiry and Applications. Tata McGraw-Hill Publishing Company Limited, New Delhi

Suggested Laboratory Exercises

1. Find out stomatal index of Xerophytes (*Nerium*, *Calotropis*, *Zizyphus*,) growing in your locality.
2. Study of trichomes of xerophytes (*Zizyphus*, *Lantana*, *Calotropis*, *Aerua*) growing in your locality.
3. Study spread of root system of a perennial species in the soil
4. Study ecological adaptations of halophytes in your nearby area.


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18. Economics**B.A. Part III -**

Scheme:	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150
Paper-I	3 hours duration	Arts 100 Science 75
Paper- II	3 hours duration	Arts 100 Science 75

Note:

1. There shall be two papers in each class. Each paper shall have 3 questions from every unit. In Addition to these nine questions (3 questions for each unit) there shall be one multiple choice/objective type/ short answer question in each of the two papers
This question shall be compulsory.
2. The student shall be required to attempt five questions in all in each paper selecting atleast one question from each unit and one compulsory multiple choice/objective type/ short answer question
3. The multiple choice/ objective type/short answer questions shall consist of 20 questions in B.A. Examination and 15 questions in B. Sc. Examination of one mark each.

ECONOMICS

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No.1 consisting of very shot type -X (Ten) question. The candidate is required to answer each question in 20 words. Part -B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Part C shall contain three essay type questions (one from each section) with internal choice. A candidate will be required to attempt five questions in all. All questions of part A and part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All question carry equal marks.

**Paper 1: Introduction To International Trade, Development And
Public Economics**

Section - A

Features of International Trade, Gains from Trade. Trade Theories: Adam Smith, Recardo, Harberler, Mill and H O Theory (Elementary treatment). Free Trade and Protaction, foreign

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Section-B

Development and Environment: The Environment Kuznets Curve; Trade and Environment; **Environmental Problems;** Trans-boundary Environmental Problems: Global Warming and Climate Change; **Methods of Environment Valuation:** Hedonic Pricing, Contingent Valuation Method and Travel Cost Method.

Section-C

International Environmental Policy: Conventions and Treaties, UN Effort to Protect the Environment, Stockholm, Rio, Johansberg, Agenda 21, OECD Environmental Committee Report, Kyoto, Convention on Biodiversity, Paris Climatic Conventions; **Environmental Governance in India;** WTO and Environment.

Recommended Books:

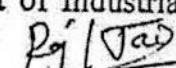
1. Charles Kolstad, Intermediate Environmental Economics, Oxford University Press, 2nd Edition, 2010
2. Robert N. Stavins (ed.), Economics of the Environment: selected Readings, W.W.Norton, 5th edition, 2005.
3. Roger Perman, Yue Ma, James McGilvray and Michael Common, Natural Resource and Environmental Economics, Pearson Education/ Addison Wesley, 3rd edition, 2003.
4. Maureen L. Cropper and Wallace E. Oates, 1992, "Environmental Economics: A Survey", Journal of Economic Literature, Volume 30, pp. 675-740.


Paper-II (C): Economy of Rajasthan**Section-A**

Position of Rajasthan in Indian Economy: Population, Area, Agriculture, Industry and Infrastructure. **Population:** Size and Growth, District Wise Distribution of Rural and Urban Population, Demographic Features, Occupational Structure and Human Resource Development (Literacy, Health and Nutrition Indicators). **Natural Resources Endowments:** Land, Water, Livestock and Wild Life, Minerals and Mineral Policy of the State. **State Domestic Product:** trends and Composition. **Agriculture:** land Reforms, Land Utilization, Cropping Pattern, Production and Productivity, Agriculture Finance, Marketing and Insurance, Importance of Livestock and Animal Husbandry, Dairy Development Programmes, Famines and Droughts in Rajasthan.

Section-B

Infrastructure in the State (Irrigation, Power, Road), **Industrial Development of the State** (Agricultural and Mineral Based Industries, Small Scale and Cottage Industries, Export Based Units, Rajasthan Handicrafts). **Growth Centres and Development of Industrial areas.**


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Enterprises in Rajasthan. Role of Different Corporations in Industrial Development (RIICO, RFC & RAJSICO), Industrial Finance, Service Sector: Education, Health, Tourism Development in Rajasthan.

Section-C

Economic Planning and Development in Rajasthan. Constraints in The Economic Development of Rajasthan. Special Area Development Programmes in Rajasthan. Woman Empowerment and Child Development. Problems of Poverty and Unemployment in Rajasthan. Panchayati Raj and Rural Development in Rajasthan. Budgetary Trends in Rajasthan. Centre State Financial Relations.

Books Recommended:

1. Economic Review, Directorate of Economics And Statistics, Department of Planning, Rajasthan Jaipur. (Hindi & English.)
2. Statistical Abstract Directorate Of Economics And Statistics. Department of Planning, Rajasthan Jaipur.
3. लक्ष्मीनारायण नाथूराम का राजस्थान की अर्थव्यवस्था, रमेश बुक डिपो, जयपुर।

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18. ECONOMICS**B.A. Part-I**

Scheme:	Min. Pass Marks	Max. Marks
Arts	72	200
Science	54	150
Paper-I 3 hours duration	Micro Economic Theory	Arts 100 Science 75
Paper-II 3 hours duration	Indian Economy	Arts 100 Science 75

Note: There will be two papers of Economics. Each paper shall consist of three parts. Part A shall contain question No 1 consisting of very short type X (Ten) questions. The candidate is required to answer each question in 20 words. Part B shall contain question No 2 consisting of V (five) questions. The candidate is required to answer each question in 100 words. Parts C shall contain three essay type questions (one from each section) with internal choice.

A candidate will be required to attempt five questions in all. All questions of Parts A and Part B are compulsory while rest 3 questions are to be attempted from parts C selecting one question from each section. All questions carry equal marks. Each question will carry 20 marks for Arts students and 15 marks for Science students.

PAPER 1- MICRO ECONOMIC THEORY**Section - A**

Nature and scope of Economics, Methodology: Micro and Macro Economics, Static and Dynamic analysis, Positive and Normative Economics.

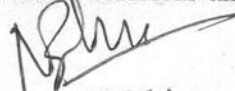
Theory of Consumer Behavior: Utility Analysis, Indifference Curve Analysis: Consumer's Equilibrium, Price, Substitution and Income Effects, Normal, Inferior and Giffen Goods. Law of Demand and the Demand Curve. Elasticity of Demand: Price, Income and Cross Elasticity, Arc and Point Elasticity, Relationship between Elasticity, AR, MR and TR. Factors affecting Price Elasticity of Demand. Substitute and Complementary Goods, Consumer's Surplus.

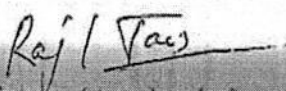
Section- B

Production Function: Law of Variable Proportions, Three Stages of Production Function, Law of Returns to Scale. Iso-quant and Iso -Cost, Optimum Factor Combination. Theory of Cost: Short-run and Long- Run Cost Curves. Market Structures: Determination of Price and Output in the Short and Long Run under Perfect Competition, Monopoly, Discriminating Monopoly, Monopolistic Competition, Excess Capacity.

Section - C

Theory of Distribution, Marginal Productivity Theory, Factor Pricing Under Perfect and Imperfect Competition in Labor Market, Ricardian Theory of Rent, Modern Theory of Rent and Quasi-rent. Theory of Interest: Classical and Liquidity Preference, Theory of Profit, Risk and Uncertainty.


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Books Recommended:

1. Lipsey and Crystal : Economics 13ed, Oxford University Press.
2. Karl E. Case, Ray C. Fair and Sharon Oster, Principles of Economics 9th Edition, Pearson Education Inc.
3. Hal R. Varian : Intermediate Microeconomics WW Norton and Co. Fifth Edition.
4. D. Salvatore: Micro Economics, Harper Collins, 1991.
5. H.L. Ahuja: Advanced Economic Theory, S. Chand and Company, New Delhi. (English & Hindi).
6. लक्ष्मीनारायण नाथूरामकाव्यष्टि अर्थशास्त्र, रमेशबुकडिपो, जयपुर।

Reference Books :

1. R.H. Leftwich : Price System and Resource Allocation, Holt, Reinhart and Winston; 3rd Edition.
2. Samuelson and Nordhaus: Economics, McGraw Hill/Irwin; Latest Edition.
3. J.P. Gould and C.E Ferguson: Micro Economic Theory revised By , J.P Gould and E.P. Lazer, All India Traveller Book Seller, Delhi.

Paper – II Indian Economy**Section-A**

Basic Features and Present Position of Indian Economy, Natural Resources, Population: Demographic Features and Major trends, Concept of Population Dividend, Population Policy, Human Resource Development. National Income in india: trends and composition. Agriculture: Role and Importance of Agriculture in the Indian Economy, Land Reforms, Growth of Modern Inputs : Irrigation, HYV, Fertilizers. Institutional Credit, Microfinance, Marketing of Agricultural Goods Support Price, Concept of Crop Insurance, Food Security.

Section- B

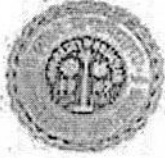
Industry: Role. Strategy and Challenges, Growth of MSMEs, Public and Private Sector Industries. Industrial Finance, Industrial Policy of 1991, New Policy Initiatives for Industrial Development. New Economic Policy and Disinvestment, Foreign direct investment, Services Sector in India: IT, Education and Health. Foreign Trade: Size, Composition and Direction; Recent trends, Foreign Trade Policy.

Section-C

Planning in India: Objectives and Achievements, NITI Aayog, National Development Agenda, Problems Of Poverty; Unemployment, Inflation And Regional Inequalities; Rural Development programmes and Policy; Sectoral Reforms in Infrastructure after 1991.

Books Recommended :

1. Rudra Datt and K.P.M Sundaram: Indian Economy (Hindi & English), S. Chand, New Delhi.
2. S.K. Mishra and V.K. Pure: Indian Economy, Himalaya Publishing House, New Delhi.
3. A.N. Agarwal: Indian Economy, Vikas Publishing Co., New Delhi.
4. Laxminarayan Nathuramka: Bhartiya Arthvyavastha, Ramesh Book Depot, Jaipur.
5. Uma Kapila, Indian Economy since Independence, Academic Foundations.
6. Government of Indian; Economic Survey (Hindi & English.)



UNIVERSITY OF RAJASTHAN JAIPUR

'Anandam' has been implemented as a compulsory subject (Session 2020-21 onwards) in all UG/PG Degree courses, for students taking admission in UG (1st Year) & PG (Prev.) of Annual Scheme and Ist Semester of all UG/PG Semester Scheme courses in all Constituent Colleges, Affiliated Colleges and University Teaching Departments/ Centers in Session 2020-21. 'Anandam' will continue as a compulsory subject in all subsequent years of all UG/PG Annual Scheme courses and each semester of Semester Scheme Courses.

Syllabus and Marking Scheme for Anandam

A. Syllabus of Anandam constitutes -


- Individual Activities - Entry of one act of goodness by student in Daily diary/register (to be monitored by mentors)
- Group Activity - Community service project (Two projects/session in Annual scheme and one project/semester) to be done by students outside College/University hours (approved by Mentors in prescribed format).
- 30 minutes/day Anandam class in time table, in which Mentors will monitor the record of daily diary and presentations on group service projects.
- Report of Group projects approved by mentors to be submitted in prescribed formats (format available on University website).
- Lectures, Webinars, Interactive sessions to be organized in College/ Department for students in monthly Anandam Day.

B. Marking Scheme - The subject will carry 100 marks/session in annual scheme courses and 50 marks per semester (2 credit course) in semester scheme courses.

Distribution of marks is as follows -

Parameter	Semester Scheme (UG/PG) Max. Marks	Annual Scheme (UG/PG) Max. Marks
1. Entries in Daily Diary	05	10
2. Synopsis of Project	10	20
3. Participation in Anandam Day	10	20
4. Report of Group Project	25	50
Total	50	100

There will be no written Exam/theory paper and Anandam will be a practical subject. Marks will be uploaded by Project Evaluation Committee of concerned teaching unit/College in a manner similar to Practical subjects.


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Evaluation of Group project reports will be done by a Project Evaluation Committee at concerned college/teaching unit with distribution of marks (point 4. in above Table) as follows-

	Parameter	Semester Scheme	Annual Scheme
1	Presentations / Videos/ Photographs submitted with Report.	05	10
2	Media reports or Certificates of Government Organizations / NGOs/ Community Forums / Social Organizations, etc.	05	10
3	Challenging Issues / Problem Solving/ Innovation addressed in Project Report.	15	30
	Total (Max. Marks)	25	50

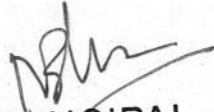
C. No student will be declared Fail in Anandam Subject.

Only Grades (O,A,B,C) for the compulsory subject Anandam will be printed in the Mark-sheets according to the marks obtained by the student as per following -

Grade	Annual Scheme (UG & PG) Max Marks -100	Semester Scheme (UG & PG) Max. Marks 50
Grade O	90 - 100	45 - 50
Grade A	70 - 89	35 - 44
Grade B	50-69	25-34
Grade C	< 50	< 25

D. In Annual Scheme courses the marks obtained in Anandam will not be counted for total marks obtained, similar to other Compulsory Subjects. Similarly, in Semester scheme courses, the grades (O,A,B,C) obtained in Anandam as a compulsory (2-Credit) course will not contribute to the CGPA calculation.

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58 Syllabus : B.A. Part-I
12. SOCIOLOGY

B.A. Part-I Examination-2020

Scheme:

Max. Marks 200

Min. Pass Marks 72

Paper-I 100 3 hrs. duration

Paper-II 100 3 hrs. duration

नोट : समाजशास्त्र के दो प्रश्न-पत्र होंगे। प्रत्येक प्रश्न-पत्र 3 घण्टों में विभाजित होगा। प्रत्येक प्रश्न-पत्र के दो भाग होंगे। प्रथम भाग 40 अंकों का होगा। इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंकों के एक प्रश्न में, एक-एक अंक के 20 लघु प्रश्न होंगे तथा प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20 शब्दों में देना होगा। दूसरे अनिवार्य प्रश्न के अंतर्गत दो-दो अंकों के 10 प्रश्न होंगे। प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 40 शब्दों में देना होगा। निर्धारित शब्द सीमा से अधिक शब्दों में उत्तर देने पर अंक काटे जा सकेंगे। प्रश्न-पत्र के लिए निर्धारित कुल 3 घण्टों की अवधि में से अधिकतम 1 घंटे की अवधि प्रश्न-पत्र के इस भाग के लिए निर्धारित होगी।

प्रश्न-पत्र के इस प्रथम भाग के दोनों प्रश्न, 3 घण्टों में विभाजित पाठ्यक्रम के तीनों खण्डों से संबंधित होंगे। अर्थात् प्रश्न-पत्र के इस भाग में पूरे पाठ्यक्रम से संबंधित प्रश्न होंगे।

प्रश्न-पत्र के द्वितीय भाग में, पाठ्यक्रम के तीनों खण्डों में से प्रत्येक में से दो-दो निबन्धात्मक प्रकृति के प्रश्न होंगे। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए, कुल 3 प्रश्न हल करने होंगे। प्रत्येक प्रश्न 20 अंकों का होगा। प्रश्न-पत्र का यह भाग 60 अंकों का होगा।

Note: There shall be two papers in all, and each paper shall be of three hours duration and of 100 marks. Each paper shall consist of two parts. Part I shall carry 40 marks. There shall be 2 questions in Part-I, first question will consist of 20 short questions of 1 mark each, carrying a word limit of 20 words. The second question will consist of 10 questions of 2 marks each, carrying a word limit of 40 words. Marks may be deducted if the word limit is exceeded. This part of the question paper will be given maximum one hour duration and shall relate to all the three sections covering thereby the entire course.


Part-II of the question paper shall be divided into three sections comprising 6 essay type questions of 20 marks each. Candidates will be required to attempt 3 questions selecting one question from each section. This part of the question paper shall be of 60 marks.

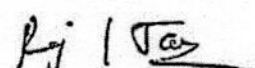
Paper I: Introduction to Sociology

Max Marks: 100

Unit 1: Understanding Sociology

- Origin of Sociology, Meaning, Nature, Subject Matter and Scope of Sociology.
- Sociology and other Social Sciences.
- Scientific and Humanistic Perspectives.


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Unit 2: Basic Concepts in Sociology

- Society, Community, Social Group.
- Institution, Social Structure, Social System, Status and Role, Social Action, Culture, Norms and Values.
- Associative and Dissociative Social Processes.

Unit 3: Dynamics in Sociology

- Social Stratification: Concept, Forms and Theories (Functional and Marxist).
- Social Change and Mobility: Concept and Forms, Theories of Social Change (Linear, Cyclical).
- Socialization: Concept, Stages and Theories (Sigmund Freud, G.H. Mead and C.H. Cooley).

Essential Readings: (in English):

1. Beteille Andre, 2002: Sociology: Essay on Approach and Method, New Delhi: OUP
2. Bottomore, T.B. 1972: Sociology: A Guide to Problems and Literature,
3. Bombay: George Allen and Unwin (India). (Hindi Edition also)
4. Davis, Kingsley, 1981: Human Society, Delhi: Surjeet Publications.
5. Giddens Anthony, 2005: Sociology, London, Polity Press
6. Harlambos, M: 1998: Sociology: Themes and Perspectives. New Delhi: Oxford
7. Inkeles, Alex. 1987: What is Sociology? New Delhi: Prentice-Hall of India Pvt Ltd.
8. Jayaram, N. 1988: Introductory Sociology, Madras: Macmillan India.
9. Johnson, Harry M. 1995: Sociology: A Systematic Introduction. New Delhi: Allied Publishers.
10. Rawat, H.K. 2007: Sociology: Basic Concepts, Rawat Publications, Jaipur.
11. Rawat, H.K. 2013: Contemporary Sociology, Rawat Publications, Jaipur
12. Schaefer, Richard T. and Robe i P. Lamun. 1999: Sociology, New Delhi, Tata McGraw Hill.
13. Singh J.P. 2008: Sociology: Concepts and Theories, Prentice-Hall of India Pvt. Ltd.

Essential Readings: (in Hindi):

1. सिंधी, नरेन्द्र कुमार एवं गोस्वामी, वसुधाकर, 2007, समाजशास्त्र विवेचन, जयपुर : राजस्थान हिन्दी ग्रन्थ अकादमी
2. आहूजा, राम एवं आहूजा, मुकेश, 2008, समाजशास्त्र विवेचना एवं परिपेक्ष्य, जयपुर : रावत पब्लिकेशन्स
3. बोधी, एस. एल. एवं जैन पी. सी., 2006, समाजशास्त्र नई दिशाएँ, जयपुर : रावत पब्लिकेशन्स
4. सिंह, जे. पी., 2008, समाजशास्त्र : अवधारणाएँ एवं सिद्धान्त, नई दिल्ली : प्रेंटिस हल ऑफ इण्डिया प्राइवेट लिमिटेड
5. सिंह, जे. पी., 2008, आधुनिक भारत में सामाजिक परिवर्तन, नई दिल्ली : प्रेंटिस हल ऑफ इण्डिया प्राइवेट लिमिटेड
6. मैकाइवर, आर. एम. एवं पेज चार्ल्स एच. 1992 : समाज (एक परिचयात्मक विश्लेषण), आगरा : रतन प्रकाशन मन्दिर (अनुवादक जी. विश्वेश्वरया एवं रामपाल सिंह गौड़)

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12. Sociology

Syllabus : B.A. Part-II

B.A. Part-II

Scheme :

Min. Pass Marks	72	
Paper-I	3 hrs. duration	Max. Marks 200
Paper-II	3 hrs. duration	Marks 100
		Marks 100

नोट : समाजशास्त्र के दो प्रश्न-पत्र होंगे। प्रत्येक प्रश्न-पत्र 3 घण्टों में विभाजित होगा। प्रत्येक प्रश्न-पत्र के दो भाग होंगे। प्रथम भाग 40 अंकों का होगा। इस भाग में दो अनिवार्य प्रश्न होंगे। 20 अंकों के एक प्रश्न में, एक-एक अंक के 20 लघु प्रश्न होंगे तथा प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 20 शब्दों में देना होगा। दूसरे अनिवार्य प्रश्न के अंतर्गत दो-दो अंकों के 10 प्रश्न होंगे। प्रत्येक प्रश्न का उत्तर परीक्षार्थी को अधिकतम 40 शब्दों में देना होगा। निर्धारित शब्द सीमा से अधिक शब्दों में उत्तर देने पर अंक काटे जा सकेंगे। प्रश्न-पत्र के लिए निर्धारित कुल 3 घण्टों की अवधि में से अधिकतम 1 घंटे की अवधि प्रश्न-पत्र के इस भाग के लिए निर्धारित होगी।

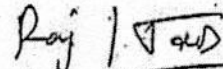
प्रश्न-पत्र के इस प्रथम भाग के दोनों प्रश्न, 3 घण्टों में विभाजित पाठ्यक्रम के तीनों खण्डों से संबंधित होंगे। अर्थात् प्रश्न-पत्र के इस भाग में पूरे पाठ्यक्रम से संबंधित प्रश्न होंगे।

प्रश्न-पत्र के द्वितीय भाग में, पाठ्यक्रम के तीनों खण्डों में से प्रत्येक में से दो-दो निबन्धात्मक प्रकृति के प्रश्न होंगे। परीक्षार्थियों को प्रत्येक खण्ड में से कम से कम एक प्रश्न का चयन करते हुए, कुल 3 प्रश्न हल करने होंगे। प्रत्येक प्रश्न 20 अंकों का होगा। प्रश्न-पत्र का यह भाग 60 अंकों का होगा।

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SB
Paper II: Sociology of Village

Syllabus : B.A. Part-II

Max Marks: 100

Unit 1: Introduction to Rural Sociology

- Concept of Rural Sociology & its Development
- Basic Concepts : Village, Peasant Society, Agrarian Structure, Little, Great & Multiple traditions, Rural-Urban Continuum
- Features of Economy & Polity in relation to village

Unit 2: Social Structure of Village

- Family, Caste, Kinship and Gender
- Religion and Village Life
- Formal and Informal Administrative Structures : Village Panchayats, Caste Panchayat

Unit 3: Change in Indian Village Structure

- Agrarian Distress in Villages : Suicide, Indebtedness, Poverty
- Agrarian Movement in India
- Impact of Urbanization & Globalization in Village Systems

Essential Readings: (in English) :

1. Desai A.R., 1959: Rural Sociology India, Popular Prakashan, Bombay.
2. Rao M.S.A., 1874: Urban Sociology in India, Orient Longman, New Delhi.
3. Desai A.R., 1979: Rural Sociology India in Transition, Popular Prakashan, Bombay.
4. D'Souza Alfred, 1978: The Indian City, Poverty, Ecology and Urban Development, Manohar Publication, New Delhi.
5. Ramkrishana Mukarjee, 1957: The Dynamics of Rural Society, Berlin.

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