Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

Department of Zoology

Program: B.Sc Medical

Fish and Fisheries

SCHEME

Course Name	**Fish and Fisheries**	**Course Type**	**Theory**
Course Code	**5.1**	**Class**	B.Sc, Medical (Zoology) Vth Sem.
Instruction Delivery	**Per week Lectures: 4, Tutorial:2, Practical: -2** **Total No. Classes Per Sem: 56(L), 28(T), 28-(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	**Manisha Yadav**	**Course Instructors**	Theory: Manisha Yadav Practical: Manisha Yadav

COURSE OVERVIEW

Fisheries is an economic activity that involves harvesting fish or any aquatic organism from the wild (Capture Fisheries) or raising them in confinement (Culture Fisheries/ Aquaculture). It may be Traditional/ Small Scale Fisheries (SSF) for sustenance, or Large-Scale/ Commercial Fisheries for profit.

PREREQUISITE

Introduction to world fisheries and fresh water fishes of India. About fishing crafts and gears. Introduction of Seed production, Hatchery production and Nutrition: Sources of food. Description of field Culture and culture technology.

COURSE OBJECTIVE

The course is designed to develop an understanding of the basic fish and fisheries. Student can be conversant with scientific literature especially the literature related to aquaculture. This course provides the core knowledge of the potential impact of different fish culture technology. The students can have a visual and hand on experience with biological research materials and methods. By fostering an in-depth

engagement with zoological sciences, it empowers students to contribute meaningfully to the exploration of fish culture.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Describe production, utilization and demand of fisheries
2	Describe the differentiation between River system, reservoir, pond, tank fisheries; captive and culture fisheries, cold water fisheries.
3	Describe the fin fishes, Crustaceans, Molluscs and their culture
4	Decribe the Ponds-running water, recycled water, cage, culture; poly culture; Biotechnology, gene manipulation and cryopreservation of gametes.

COURSE CONTENT

Content
Unit I Introduction to world fisheries: Production, utilization and demand. Fresh Water fishes of India: River system, reservoir, pond, tank fisheries; captive and culture fisheries, cold water fisheries. **Unit II** Fishing crafts and gears. Fin fishes, Crustaceans, Molluscs and their culture. **Unit III** Seed production: Natural seed resources – its assessment, collection, Hatchery production. Nutrition: Sources of food (Natural, Artificial) and feed composition (Calorie and Chemical ingredients). **Unit IV** Field Culture: Ponds-running water, recycled water, cage, culture; poly culture. Culture technology: Biotechnology, gene manipulation and cryopreservation of gametes.

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan		Unit
1	Production, utilization and demand of fisheries	MCQ test on Fresh Water fishes of India	Diagram test	1
2	River system, reservoir, pond, tank fisheries			
3	Captive and culture fisheries, cold water fisheries.			
4	Fishing crafts and gears			2
5	Different types of fish crafts	MCQ test of Fishing crafts and gears	Diagram test On fish net	
6	Differenet types of nets used by fishermen			
7	Fin fishes			
8	Crustaceans, Molluscs	MCQ test		
9	Crustaceans, Molluscs and their culture.			
10	Natural seed resources – its assessment, collection, Hatchery production.	Diagram test on type study of Natural seed resources and sources of food		3
11	Nutrition: Sources of food (Natural, Artificial) and feed composition (Calorie and Chemical ingredients).			
12	Ponds-running water, recycled water, cage, culture; poly culture.			
13	Biotechnology, gene manipulation and cryopreservation of gametes.			4

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

Text Book

Textbook of fish biology and fisheries by S.S Khanna & H.R Singh

Reference Books

- Jhingran, V.G.Fish and Fisheries of India. Hindustan Publishing Co., 1975.
- Howar, W.S. & D.S. Randal Fish Physiology, Vols.: 1 to 4.
- Moyle Peterb, Fishes: An Introduction to Ichthyology. Prentice Hall, 1974.
- Meyer & Ashlock. Principles of systematic zoology.
- C.B.L. Srivastava – A text book of Fishery Science and Indian Fisheries. Kitab
- Mahal Agencies, Patna.

Web/Links for e-content

https://www.youtube.com/watch?v=9kvucECdHFc
https://www.youtube.com/watch?v=xSQIxO7YPrU&list=PL2eDEpNoa8lcikmPipK4D8tuRsF995wc
https://www.youtube.com/watch?v=4T7NEikw7PE&list=PL2e-DEpNoa8lcikmPipK4D8tuRsF995wc&index=4

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	Define Estuary? Explain about the Ecological significance of estuary?
2	Write an essay on Major river systems in India?
3	Define Reservoir? Major reservoirs in India
4	Write an essay on Types of lakes and based on circulation?
5	Write Different types of fishing crafts in India??
6	Write Techniques for the maintenance of the craft?
7	Write Different types of traditional gears in India
8	Write in detail about fish finding equipment?
9	Write the Principles and management of Fish conservation?
10	Write a note on Population dynamics?
11	Write an essay on world inland and marine fish production ?
12	Write an essay on EEZ concept and its implementation in fisheries?
13	Write the notes on Biology and fishery of important fishes in India
14	Write an essay on Economically Important Fresh Water Fishes of Andhra Pradesh?
15	Write about the important characters of Streams?
16	Write an essay on Major river systems in India?
17	Write an essay on East Coast river systems in India?
18	Write an essay on East Coast river systems in India?
19	Define Reservoir? Major reservoirs in India?
20	Write an essay on Types of lakes and based on circulation?
21	Write an essay on accessory respiratory organs in fishes.
22	Give an account on colouration in fishes
23	Give an account of feeding adaptations in fishes.

24	Write an essay on Migration.
25	Write about methods for determination of growth in fishes
26	Describe parental care in fishes.

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

Department of Zoology

Program: B.Sc Medical

Ecology and Evolution

SCHEME

Course Name	**Ecology and Evolution**	**Course Type**	**Theory**
Course Code	**5.2**	**Class**	B.Sc,Medical (Zoology) v Sem.
Instruction Delivery	**Per week Lectures: 5, Tutorial:3, Practical: -2** **Total No. Classes Per Sem: 70(L), 42(T), 28-(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	**Swati**	**Course Instructors**	Theory: Swati Practical: Swati

COURSE OVERVIEW

Ecology and Evolution covers the study of organisms interactions with their environment and other organisms include in the environment. This helps to understand the distribution of living and non living factors in the environment, and how they interact with each other. Also it consider the processes by which modern organisms have developed from ancestral ones.

PREREQUISITE

Definition, significance & concepts of habitat , ecological niche. Some abiotic factors light intensity, wind, temperature, humidity, biotic factors. Concepts , components of ecosystem,biogeochemical cycle and about study of population, phylogenetic history of Horse and Man.

COURSE OBJECTIVE

The course is designed to develop an understanding of the basic environmental biology as well as natural history and evolutionary reflationary of abiotic and biotic components. Student can be conversant with scientific literature especially the literature related to environmental biology. This course provides the core knowledge of the potential impact of different ecological and evolutionary concepts. The students can have a visual and hand on experience with biological research materials and methods. By fostering an in-depth

engagement with Botanical sciences, it empowers students to contribute meaningfully to the exploration of Ecology and Evolution.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Definition, Significance and concepts of habitat and ecological niche. Introduction, environmental factors, climatic factors, edaphic factors and biotic factors.
2	Definition, concepts and components of ecosystem. Ecological energy flow, food chain, food web, trophic structure, ecological pyramid and productivity.
3	Concepts and evidences of origin of life and theories of Evolution.
4	Concepts of phylogeny of Horse and Evolution of Man.

COURSE CONTENT

Content
Unit I 1. Basic concepts of ecology: Definition, significance. Concepts of habitat and ecological niche. 2 Factors affecting environment: Abiotic factors (light-intensity, quality and duration), temperature, humidity, topography; edaphic factors; biotic factors. Unit II 1. Ecosystem: Concept, components, properties and functions; Ecological energetics and energy flow-food chain, food web, trophic structure; ecological pyramids concept of productivity. 2. Biogeochemical cycles: Concept, reservoir pool, gaseous cycles and sedimentary cycles. 3. Population: Growth and regulation. Unit III Origin of life. 1. Concept and evidences of organic evolution. 2. Theories of organic evolution. 3. Concept of microevolution and concept of species Unit IV 1. Concept of macro-and mega-evolution. 2. Phylogeny of horse. 3. Evolution of man.

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Course Plan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan		Unit
1	Introduction to Ecology.	MCQ test on Characters, types and components of abiotic and biotic factors.	Diagram test	1
2	Study of climatic factors, Study of Edaphic factors.			
3	Study of Biotic factors.			
4	Concept, components, properties and function of Ecosystem.			2
5	Ecological energetics and Energy flow.	MCQ test of Concepts of Ecosystem	Diagram test	
6	Food chain, food web, trophic structure; ecological pyramids concept of productivity.			
7	Biogeochemical cycles			
8	**Population Ecology** basic concepts, biotic potential, Growth curves and characters.	MCQ test on Population Ecology.		
9	Concept and evidences of organic evolution.	Diagram test on study of Theories and Concepts of Evolution.		3&4
10	Theories of organic evolution.			
11	Concepts of Micro- and Macro-evolution.			
12	Phylogeny of horse and Evolution of man.			

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

- **Text Book** Sabharwal A. Modern text book of Zoology B. Sc. Part-II, Semester-v: Ecology and Evolution.

Reference Books

- 1. Evolutionary Ecology: Concepts and Case Studies.
- 2. On the Origin of Species by Charles Darwin (1859)
- 3. The Genetical Theory of Natural Selection by R.A. Fisher (1930)
- 4. Factors of Evolution by Ivan I. Schmalhausen (1949)

Web/Links for e-content

- https://www.youtube.com/watch?v=9dAcEBXAFoo
- https://www.youtube.com/watch?v=1ZqtqSZcJY4
- https://www.youtube.com/watch?v=GxE1SSqbSn4
- https://www.youtube.com/watch?v=HL99b1h9_9c
- https://www.youtube.com/watch?v=Pn9G1g_CD2o

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	What is the scope of ecology?
2	Define ecology and environment. Describe the various levels of organization.
3	Enlist the effect of light on plants.
4	Explain water as a climatic factor of the ecosystem.
5	Describe the topographic factor affecting living organisms.
6	Write the physico-chemical properties of soil.
7	Discuss the relationship between soil type and soil organisms.
8	How soil development takes place.
9	Define the biogeochemical cycles?
10	Describe the soil composition?
11	Difference between chemogenic and biogenic evolution?
12	Define about Neo-Darwinism?
13	Name the three biotic components of any natural ecosystem.
14	Explain the concept of food chain.
15	Name the two fundamental tropic levels and give the general make up of each.
16	How does natural selection cause evolution?
17	Describe the phytogeographical regions of India?
18	Who give the mutation theory and discuss the main points about it.
19	Differentiate between Micro and Macro evolution?
20	What are Coacervates in evolution?
21	Define about Homologous organs with examples?
22	What is founder effect? Discuss about it.
23	Differentiate between homologous and analogous organs?
24	Define about convergent and divergent evolution?
25	What is bottleneck effect? Explain with example.

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

Practicals

Evolutionary evidences and/or its demonstration through models/video/CD etc and preparation of working models of the different systems of the following animals:

- Adaptive modifications in feet and beaks of birds

- Evolutionary evidences of man and horse.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Botany

Program: BSc Medical

SCHEME **PAPER-I PLANT PHYSIOLOGY**

Course Name	**PLANT PHYSIOLOGY**	**Course Type**	**Theory**
Course Code	5.1	**Class**	BSc Medical (Botany) III Sem.
Instruction Delivery	**Per week Lectures: 3, Tutorial:1, Practical:2** **Total No. Classes Per Sem: 71 (L), 43(T), - 28(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Ms. Pratibha Saini	**Course Instructors**	Theory: Ms. Pratibha Saini Practical: Ms. Pratibha Saini

COURSE OVERVIEW

The paper delves into the comprehensive understanding of how plants function, grow, and interact with their environment. Students will explore key physiological processes such as photosynthesis, respiration, water transport, nutrient uptake, and hormonal regulation. The course combines theoretical knowledge with practical applications to understand how plants adapt to different environmental conditions and stresses.

PREREQUISITE

Plant Morphology, Molecular interactions,
Cell Biology, Ecology, Taxonomy, Anatomy,
Biochemistry- Structure and function of biomolecules

COURSE OBJECTIVE

The objective of this course is to acquaint students with following things:-

- In understanding the fundamental physiological processes such as photosynthesis, respiration, transpiration, nutrient uptake, and growth regulation in plants.
- Learning the biochemical pathways involved in photosynthesis and energy production, including light-dependent and light-independent reactions, and their importance to plant life.
- Understanding how plants perceive and respond to abiotic stresses such as drought, salinity, and extreme temperatures, including mechanisms of stress adaptation and tolerance etc

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

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Course Plan

CO No.	Course Outcomes
1	Comprehensive Knowledge of Plant Physiology: • Demonstrate a thorough understanding of the key physiological processes in plants, including photosynthesis, respiration, water and nutrient transport, and hormone regulation.
2	Ability to Explain Photosynthesis and Respiration: • Explain the biochemical pathways of photosynthesis (light-dependent and light-independent reactions) and cellular respiration, including their roles in energy production and plant metabolism.
3	Knowledge of Plant Growth and Development: • Apply knowledge of plant hormones (auxins, gibberellins, cytokinins, ethylene, and abscisic acid) to explain how plants regulate growth, development, and responses to environmental signals
4	Understanding of Water and Nutrient Relations: • Describe the mechanisms of water uptake, transport, and transpiration in plants, as well as the process of nutrient absorption and movement through the xylem and phloem
5	Understanding of Plant-Microbe Interactions: • Explain the significance of plant-microbe interactions, including symbioses with nitrogen-fixing bacteria and mycorrhizal fungi, in improving plant growth and nutrient uptake

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

COURSE CONTENT

Content
UNIT- I Plant-water relations: Importance of water to plant life; physical properties of water; imbibition, diffusion and osmosis; absorption and transport of water; transpiration; physiology of stomata. Mineral nutrition: Essential macro and micro elements and their role; mineral uptake; deficiency symptoms. UNIT-II Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation. Photosynthesis : significance; historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photo phosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration. UNIT-III Growth and development : Definitions; phases of growth and development; seed dormancy; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; physiology of senescence; fruit ripening; UNIT-IV Plant hormones- auxins, gibberellins, cytokinins, abscissic acid and ethylene, history of their discovery, mechanism of action; photo-morphogenesis; Phytochromes and their discovery, physiological role and mechanism of action.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Plant water relation	Theory test	1
2	Plant water relation		
3	**Plant water relation**		
4	Absorption of water		
5	Absorption of water		
6	Transport of water	Theory test	1
7	Transport of water		
8	Transpiration		
9	Transpiration		
10	**Transpiration**		
11	**Mineral nutrition**		
12	Mineral nutrition		
14	**Mineral nutrition**		
15	Uptake of Mineral Nutrition		
16	Uptake of Mineral Nutrition	Theory Test	1
17	Uptake of Mineral Nutrition		1
18	**Translocation of organic substances**		2
19	Translocation of organic substances		
20	Translocation of organic substances		
21	Photosynthesis		
22	Photosynthesis		

23	Photosynthesis		
24	Photosynthesis		
25	Photosynthesis	Theory Test	**2**
26	Plant growth &Development		
27	Seed Dormancy		
28	Plant movements		
29	Plant movements	Theory Test	**3**
30	Photoperiodism		
31	Photoperiodism		
32	Physiology of flowering - Florigen		
33	Vernalization		3
34	Senescence & Fruit ripening		
35	Plant Hormones		
36	Plant Hormones		
37	Plant Hormones		
38	Plant Hormones		
39	Plant Hormones		4
40	Plant Hormones		
41	Photomorphogenesis	Theory Test	
42	Phytochrome		
43	Phytochrome		

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Course Plan

Text Book

Modern's Botany ,

Pardeep's Botany vol. V,

JBD New Concept in Botany.

Reference Books

Dennis,D.T., Turpin, D.H., Lefebvre,D.D. and Layzell (eds.). 1997: Plant Metabolism (2nd Edition), Longman, Essex, England.

Galston, A.W. 1989: Life Processes in Plants, Scientific American Library, Springer-Verlag, New York, USA.

Hopkins, W.G., 1995: Introduction to Plant Physiology, John Wiley & Sons, Inc., New York, USA.

Mohr, H. and Schopfer, P. 1995: Plant Physiology. Springer-Verlag, Berlin Germany.

Web/Links for e-content

- **https://www.youtube.com/watch?v=PEgebKlDsVE&list=PLBH3OLLSN1qt8mOvhyYviFBKDyR1-_bur**
- **https://www.youtube.com/watch?v=oFHntZ1-wW0&list=PL1zxEeUFe9lfMjSvOkMsMRxgrokn3vK_k**
- **https://www.youtube.com/watch?v=U-nqD4uVbZk&list=PLKlDmF-iIyAlOcxY_ZYbrwW-NxsmFsIIh&index=4**

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Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

1. What is seed Dormancy? Discuss the various methods for its removal.
2 Write short note on Osmosis & its significance.
3. Explain C3 Cycle in detail.
4. Why "Transpiration is a necessary evil"
5. Differentiate between osmosis & diffusion.
6. Write short note on Phytochrome & cryptochrome.
7. Give an account of physiological role & functions of gibberellins.
8.. Write short note on vernalization.
9. Compare the role of Auxins & Cytokinin in plants.
10. What is Translocation? Discuss the factors affecting rate of translocation.
11. Discuss Kreb cycle in detail. Give its balance sheet.
12. Write short note on Ascent of Sap.
13. Explain active water absorption in plants
14. Explain Transpiration pull theory.
15. Explain photoperiodism in detail.
16. Briefly explain plant movements .
17. Explain physiology of flowering.
18. Describe auxin in detail.
19. Describe abscisic acid in detail.
20. Explain Z- scheme in detail.
21. Describe CAM in detail.
22. Write short note on Photomorphogenesis.
23. Write short note on photolysis of bacteria.
24. What are macronutrients? Give role of calcium & Nitrogen in detail.
25. What is plamolysis ? Give its significance.
26. Discuss theory for opening & closing of stomata.
27. Write short note on Munch Mass Hypothesis.
28. Differentiate between Transpiration & Guttation.
29. Write short note on Imbibition.
30. Write short note on ageing.

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

Department of Botany

Program: B.Sc Medical

Ecology

SCHEME

Course Name	**Ecology**	**Course Type**	**Theory**
Course Code	**BOT.5.2**	**Class**	B.Sc,Medical (Botany) v Sem.
Instruction Delivery	**Per week Lectures: 5, Tutorial:3, Practical: -2** **Total No. Classes Per Sem: 70(L), 42(T), 28-(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	**Swati**	**Course Instructors**	Theory: Swati Practical: Swati

COURSE OVERVIEW

Ecology covers the study of organisms interactions with their environment and other organisms include in the environment. This helps to understand the distribution of living and non living factors in the environment, and how they interact with each other.

PREREQUISITE

Definition, significance & concepts of habitat , ecological niche. Some abiotic factors light intensity, wind, temperature, humidity, biotic factors. Concepts , components of ecosystem,biogeochemical cycle's & about study of population.

COURSE OBJECTIVE

The course is designed to develop an understanding of the basic enviornmental biology as well as natural history and evolutionary reflationary of abiotic and biotc components. Student can be conversant with scientific literature especially the literature related to environmental biology. This course provides the core knowledge of the potential impact of different ecological concepts. The students can have a visual and hand on experience with biological research materials and methods. By fostering an in-depth

engagement with Botanical sciences, it empowers students to contribute meaningfully to the exploration of Ecology.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Definition, Scope, importance, level of organization.
2	Introduction, environmetal factors, climatic factors, edaphic factors and biotic factors.
3	Describe the concept, characterstics and methods of analysis in ecology.
4	Decribe the structure, functions of ecological factors.

COURSE CONTENT

Content
UNIT-I Introduction to Ecology: Definition; scope and importance; levels of organization . Environment: Introduction; environmental factors- climatic (water, humidity, wind, light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction). **UNIT-II** Adaptations of plants to water stress and salinity (morphological and anatomical featureson hydrophytes, xerophytes and halophytes). Population ecology: Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads. **UNIT-II** Community ecology: Concepts; characteristics (qualitative and quantitative analytical and synthetic); methods of analysis; ecological succession. Ecosystem: Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow) Biogeochemical cycles: Carbon, nitrogen, phosphorus and hydrological cycle. **UNIT-IV** Phyto-geography: Phyto- geographical regions of India; vegetation types of India (forests). Environmental pollution: Sources, types and control of air and water pollution. Global change: Greenhouse effect and greenhouse gases; impacts of global warming; carbon trading; Ozone layer depletion; Biomagnification

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan		Unit
1	Introduction to Ecology.	MCQ test on Characters, types and components of abiotic factors.	Diagram test	1
2	Study of climatic factors.			
3	Study of Edaphic factors.			
4	Enviornmental factors			2
5	Study of Biotic factors.	MCQ test of Biotic factors.	Diagram test	
6	Study of all living organisms.			
7	Stydy of interactions between Living organisms.			
8	**Population Ecology** basic concepts, biotic potential, Growth curves and characters.	MCQ test		
9	**Community ecology** Concepts, characteristics, Methods of analysis and Ecological succession.	Diagram test on study of population ecology and community ecology		3&4
10	**Ecosystem** Structure, functions and Components of ecosystem.			
11	**Biogeochemical cycles** Carbon, Nitrogen, Phosphorus, hydrological Cycle.			
12	**Phytogeography** Vegetation types, Environmental pollution. **Global warming.**			

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Course Plan

- **Text Book** Sabharwal A. Modern text book of Botany B. Sc. Part-II, Semester-v: Ecology

- **Reference Books 1. Odum, E.P. 1983: Basic Ecology, Saunders, Philadelphia.**
- **2. Kormondy, E.J. 1996: Concepts of Ecology, Prantice-Hall of India**
- **Pvt. Ltd., New Delhi.**
- **3. Mackenzie, A. et al. 1999: Instant Notes in Ecology, Viva Books Pvt.**
- **Ltd., New Delhi.**
- **Web/Links for e-content**
- https://www.youtube.com/watch?v=9dAcEBXAFoo
- https://www.youtube.com/watch?v=1ZqtqSZcJY4
- https://www.youtube.com/watch?v=GxE1SSqbSn4
- https://www.youtube.com/watch?v=HL99b1h9_9c

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Course Plan

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	What is the scope of ecology?
2	Define ecology and environment. Describe the various levels of organisation.
3	Enlist the effect of light on plants.
4	Explain water as a climatic factor of the ecosystem.
5	Describe the topographic factor affecting living organisms.
6	Write the physico-chemical properties of soil.
7	Discuss the relationship between soil type and soil organisms.
8	Describe the anatomical characters of hydrophytes?
9	What are xerophytes? What are the chief features of xeric habitats?
10	Define, a plant community?
11	Describe the various types of life forms found in plant community.
12	Descibe in brief the characterstics of a plant community.
13	Name the three biotic components of any natural ecosystem.
14	Explain the concept of food chain.
15	Name the two fundamental tropic levels and give the general make up of each.
16	Describe the vegetation of western and eastern Himalayas?
17	Describe the phytogeographical regions of India?
18	Give an account of major plant communities of India?
19	Explain the main effects of water pollution?
20	How is underground water polluted?
21	Air pollution can change the climate. Discuss the statement.
22	Write in detail the effects of air pollution?
23	Enlist the effect of wind on living organisms.
24	How soil development takes place.
25	Describe the soil composition?

Sh. L. N. Hindu College, Rohtak (Haryana)

Course Plan

Practicals

1. Devise an experiment to demonstrate the Ecological process (As per list).Perform it and show it to the examiner.

2. Comment on ecological experiment (model/chart).

3. Ecological experiment/ecological specimen (As per list)

4. Note Book, Collection and field report

5. Viva-voce

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Chemistry

Program: BSc IIIrd

Organic Chemistry (CH-503)

SCHEME

Course Name	**Organic Chemistry**	**Course Type**	**Theory**
Course Code	**CH-503**	**Class**	BSc V Sem.
Instruction Delivery	**Per week Lectures: 2, Tutorial:1, Practical: 1** **Total No. Classes Per Sem: 32(L), (T), -(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr Manish Kumar	**Course Instructors**	Theory: Dr Manish Kumar Practical: -- Dr Manish Kumar

COURSE OVERVIEW

Organic chemistry is a subdiscipline within chemistry involving the scientific study of the structure, properties, and reactions of organic compounds and organic materials, i.e., matter in its various forms that contain carbon atoms. Study of structure determines their structural formula. Study of properties includes physical and chemical properties, and evaluation of chemical reactivity to understand their behavior. The study of organic reactions includes the chemical synthesis of natural products, drugs, Heterocyclic compounds and polymers, and study of individual organic molecules in the laboratory and via theoretical (in silico) study.

PREREQUISITE

Organic chemistry, NMR spectroscopy, biomolecules and Proteins

COURSE OBJECTIVE

The objective of this course is to study the principle of nuclear magnetic resonance spectroscopy, determination of compounds structure.
It helps in study of Chemistry of carbohydrates and structure of glucose and fructose. It also objects the structures of disaccharides: maltose, sucrose and lactose

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Remember the principle of nuclear magnetic resonance spectroscopy
2	Remember the Chemical shift of various functional group in organic compounds.
3	Understand the monosaccharides structures and their properties.
4	Understand the disaccharides carbohydrates, structures and their properties.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

COURSE CONTENT

Content
NMR Spectroscopy-I Principle of nuclear magnetic resonance, the PMR spectrum,number of signals, peak areas, equivalent and nonequivalent protons positions of signals and chemical shift,shielding and deshielding of protons, proton counting,splitting of signals and coupling constants, magnetic equivalence of protons. **NMR Spectroscopy-II** Discuss ion of PMR spectra of the molecules: ethyl bromide, npropyl bromide, isopropyl bromide, 1,1-dibromoethane, 1,1,2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone. Simple problems on PMR spectroscopy for structure determination of organic compounds **Carbohydrates-I** Classification and nomenclature. Monosaccharides, mechanism of osazone formation, inte rconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides. Erythro and threo diastereomers. Conversion of glucose in to mannose. Formation of glycos ides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose. **Carbohydrates-II** An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Principle of nuclear magnetic resonance	Practice Questions on equivalent protons.	1
2	PMR spectrum, number of signals, peak areas		
3	equivalent and nonequivalent protons positions of signals		
4	chemical shift, shielding and deshielding of protons	Practice Questions on chemical shift and factors effecting shift of	

5	proton counting and splitting of signals	protons.	

6	coupling constants, magnetic equivalence of protons.	Practice Questions on electrophilic substitution and Basicity of heterocycles.	1
7	Questions on calculation of no. of peaks		
8	Questions on Chemical shift in different organic molecules		
9	Discuss ion of PMR spectra of the molecules	Practice questions on structure determination of organic molecules.	2
10	ethyl bromide, npropyl bromide, isopropyl bromide, 1,1-dibromoethane,		
11	1,1,2-tribromoethane, ethanol, acetaldehyde, ethyl acetate, toluene		
12	benzaldehyde and acetophenone		
13	Simple problems on PMR spectroscopy		
14	structure determination of organic compounds		
15	Questions on PMR spectra different molecules		
16	Classification and nomenclature. Monosaccharides	Practice questions on osazone formation	3
17	mechanism of osazone formation, interconversion of glucose and fructose		
18	chain lengthening and chain shortening of aldoses		
19	Erythro and threo diastereomers. Conversion of glucose in to mannose	Practice questions on cyclic ring structure of glucose and fructose	
20	Formation of glycosides, ethers and esters	Practice questions on chain shortening and leangthening.	
21	Determination of ring size of glucose and fructose		
22	Structures of ribose and deoxyribose	Practice questions on ribose ans deoxyribose	
23	Open chain and cyclic structure of D(+)-glucose & D(-) fructose		
24	Mechanism of mutarotation		
25	Revision of open and closed chain structures of glucose and fructose.		

26	Disaccharides : maltose, sucrose and lactose.	Practice questions on Structure of disaccharides Practice questions on organometallic reactions.	4
27	Ring chain structure of Disaccharides		
28	Polysaccharides starch and cellulose		
29	Grignard reagent		
30	Organozinc reaction		
31	Organolithium compounds		
32	Revision of PYQ of this chapter		

Text Book

A text book of Organic Chemistry by Bahl and Arun Bahl,
A text book of Organic Chemistry by L Finar Vol I

Reference Books

Oxford Organic Chemistry Second edition by J Clayden, N Greeves, S Warren

Web/Links for e-content

https://en.wikipedia.org/wiki/Heterocyclic_compound
https://youtu.be/omU8jC3Kzzw?si=FMr9lFfDlZg-kDHb
https://youtube.com/playlist?list=PLLFRJm7-ej7QD3NJgy7jip_7skHzdGKv_&si=VVHzHsUkMsC1DNgv

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	Discuss principle of NMR spectra
2	What is saturated state in NMR spectra?
3	Define equivalent and non-equivalent protons.
4	Discuss nuclear spin state.
5	What do you mean by chemical shift?
6	What is relaxation process in NMR spectroscopy?

7	How many equivalent protons in vinyl chloride?
8	How many signals in toluene, ethanol and Dibromoethane.
9	What is coupling constant?
10	Explain shielding and deshielding of protons.
11	1,1-Dibromoethane give 2 signals but 1,2- Dibromoethane gives one signal. Why?
12	How does electronegativity effect the chemical shift ?
13	How does H-bonding effect the chemical shift
14	Ethene absorbs at high signal than acetylene. Why?
15	What you expect from the spectra of p-dichlorobenzene?
16	Differentiate between starch and cellulose
17	Give the Ruff's degradation
18	How can ring size of glucose can be determined?
19	Give Haworth formula of amylose and sucrose
20	How will you convert fructose into glucose and mannose?
21	Explain kilani-fischer synthesis
22	What is mutarotation? give it for glucose.
23	Give reaction of both glucose and fructose with fehling's solution.
24	What is invert sugar?

25	Convert ethyl magnesium bromide into tret-butyl alcohol.
26	How the ring structure of glucose is determind?
27	Draw Haworth structure of maltose and lactose.
28	Discuss reaction alkyllithium with CO_2.
29	What is glucopyranose form and fructo furanose form?

30	Differentiate glucose and lactose
31	Discuss reaction of Grignard reagent to prepare carboxylic acids.
32	What do you understand chain lengthening of saccharide group?

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Chemistry

Program: BSc III

Inorganic Chemistry (CH-501)

SCHEME

Course Name	**Inorganic Chemistry**	**Course Type**	**Theory**
Course Code	**CH-501**	**Class**	BSc V Sem.
Instruction Delivery	**Per week Lectures: 2, Tutorial:2, Practical:** **Total No. Classes Per Sem: 32(L), (T), -(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Dr Manish Kumar	**Course Instructors**	Theory: Dr Manish Kumar Practical: -- Dr Manish Kumar

COURSE OVERVIEW

Inorganic chemistry deals with synthesis and behavior of inorganic and organometallic compounds. This field covers chemical compounds that are not carbon-based, which are the subjects of organic chemistry. The distinction between the two disciplines is far from absolute, as there is much overlap in the subdiscipline of organometallic chemistry. It has applications in every aspect of the chemical industry, including catalysis, materials science, pigments, surfactants, coatings, medications, fuels, and agriculture.

PREREQUISITE

Inorganic chemistry, Coordination chemistry, magnetic properties and Thermodynamic and kinetic stability

COURSE OBJECTIVE

The objective of this course is to study the bonding between the different metals with carbon atom of various organic groups. It also helps in study of metal carbonyls, metal ethylenic complexes: bonding, stability and their reactions.

It reflects the kinetic and thermodynamics stability of the complexes. It makes us understand about stability between different metal complexes with different type of ligands. The objective is to study the importance of different metals complexes and their magnetic properties. It also reflects the study of electronic spectra of different metal complexes.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Remember the bonding in metal and different type of ligands.
2	Remember the Splitting of d-orbitals in octahedral and tetrahedral field.
3	Understand the paramagnetic and diamagnetic nature of metal complexes

4	Understand the spectra of coordination compounds.

COURSE CONTENT

Content
Organometallic Chemistry **Metal-ligand Bonding in Transition Metal Complexes** Limitations of valence bond theory, an elementary idea of crystal-field theory, crystal field split ting in octahedral, tetrahedral and square planar complexes, factors affecting the crystal-field parameters. **Thermodynamic and Kinetic Aspects of Metal Complexes** A brief outline of thermodynamic stability of metal complexes and factors affecting the stability, substitution reactions of square planar complexes of Pt (II). **Magnetic Properties of Transition Metal Complexes** Types of magnetic behaviour, methods of determining magnetic susceptibility, spin-only formula. L-S coupling, correlation of s and eff values, orbital contribution to magnetic moments, application of magnetic moment data for 3dmetal complexes. **Electron Spectra of Transition Metal Complexes** Types of electronic transitions, selection rules for d-d transitions, spectroscopic ground states, spectrochemical series. Orgel-energy level diagram for d1 and d9 states, discussion of the electronic spectrum of [Ti(H2O)6]3+ complex ion

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

LESSON PLAN (THEORY AND TUTORIAL CLASSES)

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Limitations of VBT and points of CFT	Practice Questions on calculation of CFSE of metal complexes.	1
2	Splitting of metal orbitals in octahedral field		
3	Splitting of metal orbitals in tetrahedral and square planar complexes		
4	CFSE and spectrochemical series	Practice PYQ on CFT and spectrochemical series	
5	Various factors effecting CFSE		
6	Revision of structures of d-orbitals	Practice Questions on Factors effecting CFSE	1
7	Revision on CFSE		
8	Revision on factors effecting CFSE		
9	Thermodynamic stability of metal complexes	Practice questions on thermodynamic and kinetic stability	2
10	Factors effecting Thermodynamic stability		
11	Kinetic stability of metal complexes		
12	Factors effecting Kinetic stability	Practice questions on trans effect of thiourea	
13	Inert and labile complexes		
14	Trans effect		
15	Polarization theory and pi-bonding theory for trans effect		
16	Type of magnetic behaviour of substances	Revise type of magnetic properties	3
17	Magnetic susceptibility, Diamagnetic correction		
18	Curie temp., Neel's temp. and their graphs		
19	Spin only formula and L-S coupling	Practice PYQ on Curie and Neels temp.	
20	Correction in spin and orbital effective magnetic moment	Practice orbital contribution of	
21	Orbital contribution in complexes		

22	Application of magnetic character of 3d elements	metal complexes. Practice questions on calculation of mag. moment	
23	Revision of PYQ of curie temp.		
24	Revision of PYQ of orbital contribution		
25	Revision of PYQ on calculation of magnetic moment of various metals.		

26	Introduction of electronic spectra	Learn questions on electronic spectra and selection rule Learn questions on orgel energy level diagrams	4
27	Type of different electronic transitions		
28	Term symbol and ground state		
29	Orgel energy level diagrams of d^1 and d^9 systems		
30	Orgel energy level diagrams of d^2 and d^3 systems		
31	Question on ground state term symbol		
32	Revision of PYQ of this chapter		

Text Book

Concise Coordination chemistry by Gopalan and Ramalingam
A text book for Inorganic chemistry, vol II by Ajai Kumar

Reference Books

Concise Inorganic Chemistry by J.D. Lee
Advanced Inorganic Chemistry vol I by S.P. Tuli, Basu and Madan

Web/Links for e-content

https://en.wikipedia.org/wiki/Inorganic_chemistry
https://www.youtube.com/live/2LOUTZvcnz8?si=GfcjkSh5llURO2Xr
https://www.youtube.com/live/2LOUTZvcnz8?si=Iawv5RIDxtZBmaBb
https://youtube.com/playlist?list=PLqUcmwsbGS_GhYwACsmG4-ckDdIygVZme&si=QkITdaQRqceGedFh

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	What is CFSE?
2	$[NiCl_4]^{2-}$ is tetrahedral in shape. Why?

3	Distinguish between VBT and CFT
4	What are shapes of different d-orbitals?
5	What do you understand splitting of orbitals in octahedral complexes?
6	Discuss the splitting of d-orbitals in tetrahedral and squre planer complexes.
7	Discuss the structure and magnetic behaviour of complex $[Fe(CN)_6]^{4-}$
8	What is relation between CFSE in octahedral field and tetrahedral field?
9	Describe different types of magnetic substances
10	Defien Curie's and Neel's temperature
11	What is spin only formula for calculating magnetic moment?
12	Explain the linde's factor and calculate it for different compounds.
13	Describe temperature independent magnetism.
14	Discuss Orbital contribution in metal complexes.
15	Why Cu(I) is diamagnetic and Cu(II) is paramagnetic?
16	Define Curie-Weiss law.
17	Calculate the g value for a free electron.
18	Define nucleophilicity and basicity.
19	Discuss thermodynamic stability of the complexes.
20	Draw relationship between stepwise and overall formation constant.
21	Discuss various theories which explain trans effect.

22	What is kinetic stability of the complexes?
23	What are inert and labile complexes?
24	How does polarization theory differ from pi-bonding theory
25	Arrange the various ligands according to the increasing value of trans effect.
26	What are the selection rules in electronic spectra?
27	What are microstates? Calculate them for d^1 and p^2 configuration.
28	Why the $[Ti(H_2O)_6]^{3+}$ appears violet in colour?
29	What do you mean by term symbol? Also explain spin multiplicity
30	Write a short note on orgel energy level diagrams.
31	Calculate ground state term symbol for Cr (Z= 24)
32	Explain spin allowed and spin forbidden transitions.

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

Department of Chemistry

Program: B.Sc.(Non medical & Medical)

Physical Chemistry (CH-502)

SCHEME

Course Name	Physical Chemistry	**Course Type**	**Theory**
Course Code	CH-502	**Class**	B.Sc 5th sem
Instruction Delivery	**Per week Lectures: 2,Tutorial -1, Practical: -** **Total No. Classes Per Sem: 72(L), 28(T), -(P)** **Assessment in Weightage: Sessional (20%), End Term Exams (80%)**		
Course Coordinator	Mrs. Ritu	**Course Instructors**	Theory: Mrs. Ritu Practical: --

COURSE OVERVIEW

Physical chemistry is concerned with the quantum mechanics, spectroscopy & molecular structure.

PREREQUISITE

Basics of chemistry, Knowledge of physical chemistry terms.

COURSE OBJECTIVE

The objective of this course is to explore the knowledge of molecular spectroscopy. This course will also provide us knowledge of quantum mechanics & molecular structure.

COURSE OUTCOMES (COs)

After the completion of the course, the student will be able to:

CO No.	Course Outcomes
1	Remember the basic concept of quantum mechanics.
2	Understand the physical properties & molecular structure.
3	Apply the various concepts of spectroscopy.
4	Analyze the application of Vibrational & Raman spectroscopy.

COURSE

Sh. L. N. Hindu College, Rohtak (Haryana)
Course Plan

CONTENT

Content
Quantum mechanics:- black body radiation, Planck's radiation law ,Photoelectric effect, heat capacity of solids, Compton effect, wave function & significance of postulates of quantum mechanics quantum mechanical operator ,commutation relations ,hamiltonian operator, Hermitian operator average value of square of Hermitian as a positive quantity ,role of operator in Quantum Mechanics, to show Quantum mechanically that position and Momentum can't be predicted simultaneously determination of wave function and energy of a particle in one dimensional box. Physical properties and molecular structure:- optical activity, orientation of dipole in an electric field, dipole moment included dipole moment, measurement of dipole moment- temperature method and refractivity method, dipole moment and structure of molecules ,magnetic permeability, magnetic susceptibility and its determination, application of magnetic susceptibility, magnetic properties -paramagnetism, and ferromagnetism. Spectroscopy:- introduction ,electromagnetic radiation, region of spectrum, basic feature of Spectroscopy, degrees of freedom, Rotational spectrum, selection rule ,energy level of rigid rotator ,rotational spectra of diatomic molecules, spectral intensity distribution using population distribution, determination of Bond length and isotopic effect ,vibrational spectrum selection rules ,energy levels of simple harmonic oscillator, pure vibrational spectrum of diatomic molecules, determination of force and qualitative relation of force and bond energy, Raman spectra of di atomic molecule ,selection rules ,Quantum theory of Raman spectra.

LESSON PLAN (THEORY AND TUTORIAL CLASSES

L. No	Topic to be Delivered	Tutorial Plan	Unit
1	Introduction- electromagnetic radiation ,region of spectrum		1
2	Basic features of spectroscopy		
3	Born Oppenheimer approximation ,degrees of freedom		
4	Rotational spectrum -selection rules, energy levels of rigid rotator		
5	Rotational spectra of diatomic molecules, spectral intensity distribution using population distribution		

6	Determination of Bond length and isotopic effect	Discussion of previous year questions	
7	Vibrational spectrum -selection rules, energy levels of simple harmonic oscillator		2
8	Pure vibrational spectrum of diatomic molecules		
9	Determination of force constant and qualitative relation of force constant and bond energy, idea of vibrational frequency of different functional group		
10	Raman spectrum- concept of polarizibility ,pure rotational Raman spectra	Practice questions on vibrational frequency & force constant	
11	Pure vibrational Raman spectra of diatomic molecules ,selection rules		
12	Quantum theory of Raman spectra		
13	Revision of spectra		
14	Black body radiation, plancks Radiation Law, Photoelectric effect, postulates of quantum mechanics, quantum mechanical operator ,commutation relations		3
15	Hamiltonian operator ,average value of square of hermitian as a positive quantity.		
16	Role of operator in quantum mechanics ,To show Quantum mechanically that position and Momentum can't be predicted simultaneously.		
17	Determination of wave function and energy of a particle in one dimensional box		
18	Optical activity -polarization, clausius Mossotti equation.	Practice of Hamiltonian & Hermitian operator	4
19	Orientation of dipoles in an electric field ,dipole moment, measurement of dipole moment		
20	Temperature method and refractivity method		
21	Dipole moment and structure of molecules, magnetic		

	permeability, magnetic susceptibility and its determination		
22	Applications of magnetic susceptibility and magnetic properties -paramagnetism, diamagnetism and ferromagnetism		

23	Revision of molecular structure and physical properties	Discussion of previous year questions paper		
24	Revision of syllabus			
25	Practice of numericals of quantum			
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Text Book

Modern approach to physical chemistry by S.Kiran kavya"
Physical chemistry by Pardeep publication

Reference Books

- " Fundamentals of molecular spectroscopy by C.N.Banwell".
- "Spectroscopy by H. Kaur"

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Course Plan

Web/Links for e-content

- https://youtu.be/NZUnoTR-AL8?si=B7A1Ejd95ZMRKSg3
- https://youtu.be/BVJhfFoYAvk?si=KIc_N3gG5OlxE0wj
- https://youtu.be/kt0PZtoXL4Y?si=x70sf94GlRlw9lEg

PRACTICE QUESTIONS (QUESTION BANK)

S No	Problem
1	State and explain Born oppenheimer approximation.
2	Write note on Population of energy level in rotational spectrum.
3	Discuss force constant and its variation .How it is determined?
4	Discuss vibrational Raman spectrum of the atomic molecules.How P, Q,R branches appear?
5	Discuss planck's radiation law.
6	Explain the terms magnetic permeability & magnetic susceptibility.
7	Define Hermitian operator .Give characteristics of Hermitian operator.
8	Explain concept of particle in one dimensional box.
9	What is dipole moment ? Write its important applications.
10	What is eigen value and eigen function?
11	Discuss the temperature method for the measurement of dipole moment.

12	Explain in detail the rotational spectra of a diatomic molecule.

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Course Plan
