RFNS, Senior Science College, Akkalkuwa
Department of Botany

SEM- I
Paper-II
Bot. 302: Plant Physiology

Course Outcomes:

1. **Understanding Plant Physiology**: Students will understand the definition, scope, and importance of plant physiology.
2. **Water Relations in Plants**: Students will learn about the mechanisms and significance of diffusion, osmosis, and imbibition.
3. **Water Absorption**: Students will comprehend the mechanisms and factors affecting water absorption in plants.
4. **Ascent of Sap**: Students will understand various theories explaining the ascent of sap.
5. **Transpiration**: Students will learn about the types, mechanisms, and significance of transpiration.
6. **Mineral Nutrition**: Students will gain knowledge about the essential and non-essential elements, their functions, and deficiency symptoms.
7. **Plant Growth and Phytohormones**: Students will understand the definitions and roles of various phytohormones in plant growth and development.

SYLLABUS

Unit: 1. Introduction **01 L**

1.1 Definition, scope, and importance of plant physiology.

Unit: 2. Plant cell and water relation **05 L**

2.1 Diffusion, Definition, mechanism of diffusion with suitable example, Diffusion Pressure, Graham's law of diffusion and significance of diffusion.

2.2 Osmosis: Introduction, definition, mechanism of osmosis with suitable Osmometer, osmotic pressure, turgor pressure and wall pressure, DPD and its relation with OP, TP, and WP. Types of solution- Hypotonic, Hypertonic and Isotonic. Type of Osmosis- Exosmosis and Endosmosis, significance of osmosis , Plasmolysis, de-plasmolysis.

2.3 Imbibition: Definition, mechanism, imbibition pressure, Importance of imbibition.

Unit: 3. Absorption of water **05 L**

3.1 *Importance of water.*

3.2 Mechanism of water absorption.

a. Active absorption- Osmotic theory and non-osmotic theory.
b. Passive absorption.

3.3 Factors affecting water absorption.

Unit: 4. Ascent of Sap **05 L**

4.1 Introduction and definition

4.2 Theories of ascent sap.

a. Vital theories 7
b. Root pressure theory.
c. Physical force theories
d. Transpiration pull theory.

Unit: 5. Transpiration **05 L**

5.1 Definition, Magnitude and types of transpiration, Structure of stomata, mechanism of opening and closing of stomata.

5.2 Theories of stomatal opening and closing.

a. Theory of Starch- Glucose interconversion and stomatal opening in Succulent plants (Steward's Theory)

b. K+ pump theory.

5.3 Factors affecting rate of transpiration.

5.4 Significance of transpiration.

Unit: - 6. Mineral nutrition and absorption of mineral salt **05 L**

6.1 Introduction, essential and non-essential elements, Macro and micro nutrient elements.

6.2Specific functions and deficiency symptoms of- Nitrogen, Sulphur, Phosphorus, Potassium, Magnesium and Boron.

6.3 Mechanism of mineral salt absorption.

a) Passive absorption- Mass flow theory, Ion exchange and Donnan's equilibrium.

b) Active absorption- Carrier concept theory- Protein lecithin as carrier.

Unit: 7. Plant growth and Phytohormones **04 L**

7.1 Introduction, Definition of growth, Development and Differentiation

7.2 Definition of Phytohormones and role of Auxins, Gibberellins, Cytokinins, Ethylene and Abscisic acid.

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SEM II
PAPER- II
BOT.-: 402 PLANT METABOLISM

Course Outcomes:

1. Understand the fundamental concepts of plant physiology, including photosynthesis, respiration, and nitrogen metabolism.
2. Explain the structure and function of enzymes and their role in plant physiological processes.
3. Analyze the mechanisms of photosynthesis and respiration, including the light and dark reactions, and aerobic and anaerobic pathways.
4. Evaluate the factors affecting photosynthesis and respiration in plants.
5. Understand nitrogen metabolism and its importance in plant growth and development.

SYLLABUS

Unit 1: Introduction **02 L**

1.1: Definition
1.2: Plant cell as organic Laboratory
1.3: Anabolism and catabolism

Unit 2: Enzymes **04 L**

2.1: Definition, Structure and properties.
2.2: Classification of enzymes
2.3: Mode of enzyme action: Lock and key Model, Induced fit model

Unit 3: Photosynthesis **11 L**

3.1: Definition, photosynthetic apparatus (Structure of Chloroplast)
3.2: Role of photosynthetic pigments: Chlorophyll (Chl- a, Chl- b), Carotenoids and Phycobillins
3.3: Photosystem I and II
3.4: Mechanism
  a : Light Reaction: Cyclic and Non Cyclic Photophosphorylation.
  b : Dark Reaction: C3, C4 and CAM pathways.
3.6: Photorespiration: Definition, Sites and Mechanism of photorespiration.
3.7: Factor affecting the process of photosynthesis.

Unit 4: Respiration **07 L**

4.1: Introduction, Definition and Types of respiration.
4.2: Mechanism of Aerobic respiration.
  a) Glycolysis.
  b) Kreb's cycle.
  c) Electron Transfer System (ETS)
4.3 Mechanism of Anaerobic respiration: Alcoholic Fermentation
4.4 Factor affecting the process of respiration.

Unit 5: Nitrogen metabolism **06 L**

5.1: Introduction.
5.2: Types of Nitrogen fixation.
5.3: Biological nitrogen fixation.
5.4: Nitrate and ammonia assimilation.
5.5: Importance

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phyllode, pitcher and bladder.

Unit 5: Inflorescence **05L**

5.1 Definition, Significance and parts of inflorescence

5.2 Types of inflorescence

a) Racemose:- Raceme, Spike, Spikelet, Catkin, Spadix, Corymb, Umbel, Capitate and Head or Capitulum

b) Cymose:- Solitary, Uniparous, Biparous and Multiparous

c) Special type of inflorescence:-Cyathium, Verticillaster and Hypanthodium

Unit 6: Flower **06 L**

6.1 Definition

6.2 Parts of typical flower

6.3 Types of flower:- Hypogynous, Epigynous and Perigynous

6.4 Symmetry of flower :- Actinomorphic and Zygomorphic

6.5 **Calyx:-** Polysepalous calyx, Gamosepalous calyx, Caducous calyx, Deciduous calyx, Persistent calyx and Petaloid calyx

6.6 Corolla:

a) Forms of polypetalous corolla: Cruciform, Caryophyllaceous, Rosaceous and Paplionaceous

b) Forms of gamopetalous corolla:- Campanulate, Infundibuliform, Tubular, Rotate, Hypocrateriform, Ligulate, Bilabiate and Personate

6.7 Perianth:-Polyphyllous and Gamophyllous

6.8 Aestivation:-i) Definition ii) Types of Aestivation.

6.9 Androecium:

a) Attachment of anther to filament:- Basifixed, Dorsifixed and Versatile

b) Cohesion and Adhesion of stamens.

6.10 Gynoecium:

a) Apocarpous, Syncarpous, Monocarpellary, Bicarpellary and Polycarpellary

b) Placentation: Definition and types of Placentation.

Unit 7: Fruits **05 L**

7.1 Definition

7.2 Parts of typical fruit : nature of Pericarp

7.3 Types of fruits:-

a) Simple fruits:-

i) Dry fruits: a) Dehiscent:- Legume and Loculicidal Capsule
b) Schizocarpic:-Lomentum and Regma
c) Indehiscent:- Caryopsis, Cypsela

ii) Fleshy fruits:- a) Drupe and Hesperidium

b) Aggregate fruits:- Etaerio of berries and Etaerio of follicle

c) Composite fruits: Sorosis and Syconus.

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SEM II
Paper I
BOT. – 201: Diversity of Higher Cryptogams

Course Outcomes (COs)

1. **CO1:** Understand the definition, diversity, and characteristics of higher cryptogams.
2. **CO2:** Comprehend the life cycle, structure, and reproduction of Riccia and Funaria.
3. **CO3:** Gain knowledge about Pteridophytes, their classification, and economic importance.
4. **CO4:** Study the life cycle and structural details of Selaginella and Adiantum.
5. **CO5:** Develop practical skills in identifying and analyzing cryptogams.

SYLLABUS

Unit 1: *Introduction* **05 L**

1.1: Introduction, definition, and diversity of higher cryptogams.
1.2: Bryophytes - a) Introduction.
b) Habit and habitat.
c) General characteristics of Bryophytes.
d) Alternation of generations.
1.3: Classification of Bryophytes according to G. M. Smith (1955) up to classes with reasons, giving at least two examples from each class.
1.4: Economic and ecological importance of Bryophytes.

Unit 2: Study of life cycle of *Riccia* **05 L**

2.1: Systematic position with reasons.
2.2: Habit and habitat.
2.3: External and internal structure of gametophyte.
2.4: Vegetative reproduction.
2.5: Sexual reproduction (Development of sex organs not expected)
2.6: Fertilization.
2.7: Structure of mature sporophyte.
2.8: Structure and germination of spores.
2.9: Alternation of generation.

Unit 3: Study of life cycle of *Funaria* **05 L**

3:1. Systematic position with reasons.
3.2: Habit and habitat.
3.3: External and internal structure of gametophyte.
3.4: Vegetative reproduction.
3.5: Sexual reproduction (Development of sex organs not expected)
3.6: Fertilization.
3.7: Structure of mature sporophyte.
3.8: Alternation of generation.

Unit 4: Pteridophytes: **04 L**

4.1: Introduction, definition and general characteristics of Pteridophytes.
4.2: Habit and Habitat.
4.3: Classification of Pteridophytes according to G. M. Smith (1955) up to classes with reasons, giving at least two examples from each class.
4.4: Economic importance of Pteridophytes.

Unit 5: Study of life cycle of *Selaginella* **06L**

5.1: Systematic position with reasons.
5.2: Habit and habitat.

5.3: External and internal structure of sporophyte.
5.4: Asexual reproduction: position and structure of strobilus.
5.5: Sporangia (*megasporangium* and *microsporangium*).
5.6: Structure and germination of spores.
5.7: Structure of male and female gametophyte.
5.8: Position and structure of sex organs. (Development of sex organs not expected)
5.9: Fertilization.
5.10: Structure of mature embryo.
5.11: Alternation of generations.
5.12: Heterospory and its significance

Unit 6: Study of life cycle of *Adiantum* **05 L**

6.1: Systematic position with reasons.
6.2: Habit and habitat.
6.3: External and internal structure of sporophyte.
6.4: Asexual reproduction: position and structure of sorus.
6.5: Structure of sporangium.
6.6: Structure and germination of spore.
6.7: Structure of mature gametophyte.
6.8: Position and structure of sex organs. (Development of sex organs not expected).
6.9: Fertilization.
6.10: Alternation of generation.

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Course outcomes:

1. Provide identification technique of microbes, Viruses, Bacteria, Algae and Fungi.
2. Understand the systems of classification of Microbes, Viruses, Bacteria, Algae and Fungi, and its interdisciplinary approaches.
3. Provide lab-based training in writing short species descriptions and illustration.
4. Recognise members of the major microbes, Viruses, Bacteria, Algae, Fungi and their medicinal, economic importance for human welfare.

Course outcomes:

5. Understanding of angiospermic plants Causes of phenomenal succession and alternation Of generation.
6. Understand the systems of classification of angiosperms, nomenclature and Interdisciplinary approaches
7. Provide lab-based training in writing short species descriptions and illustration.
8. Recognise members of the major angiosperm families by identifying their diagnostic Features, economic and medicinal importance.
9. Understand botanical gardens and herbarium technique

Course outcome : plant Anatomy

By the end of this course, students will understand plant tissue systems, including the protective tissues that defend plants. They will learn about the primary structure of plants, focusing on the functions of parenchyma, collenchyma, and sclerenchyma tissues. The course will also cover secondary growth, such as how vascular and cork cambium contribute to a plant's increased thickness and support. This knowledge will help students analyze and apply plant tissue functions in both practical and research settings within botany and plant sciences

Course outcome: plant Embryology

Upon completing this course, students will acquire a thorough understanding of key aspects of plant reproduction. They will learn about microsporangium (anther) and megasporangium (ovule), exploring their roles in pollen and ovule development. The course will cover processes of pollination and fertilization, the formation of endosperm, and the development of the embryo within seeds. Students will also study seed structure, dispersal mechanisms, and reproductive phenomena such as apomixis and polyembryony. This knowledge will enable students to analyze reproductive strategies and seed biology, applying their understanding to practical and research contexts in plant science.

NORTH MAHARASHTRA UNIVERSITY, JALGAON
F.Y.B.Sc. Semester – I
PAPER II: Gg 102: Physical Geography-II (Atmosphere)
(With effect from June 2018)

Objectives:

- Gain comprehensive knowledge of the atmosphere's composition, structure, and functions.
- Understand the distribution of solar energy, temperature, and atmospheric pressure.
- Analyze global and local wind patterns and their influencing factors.
- Explore various forms of humidity, condensation, and precipitation.
- Apply climatologically principles in practical fields for societal benefits.

These objectives provide a framework for studying the atmosphere in Physical Geography, encompassing both theoretical concepts and their practical applications.

Unit	Topic	Sub-topics	Lectures
1.	Introduction to Atmosphere	A. Definitions of Atmosphere B. Meaning and Definition of Climate & Weather C. Composition of Atmosphere i. Gases, ii. Water Vapor iii. Dust Particles D. Structure of Atmosphere I. On the basis of Chemical Composition: i. Homosphere ii. Hetrosphere II On the basis of physical properties: i. Troposphere ii. Stratosphere iii. Thermosphere iv. Mesosphere a. Ionosphere b. Exosphere	10
2.	Insolation & Temperature	A. Meaning & Definition of Insolation, Solar Constant and Aledo of the Earth B. Distribution of Isolation- Factors Affecting the Distribution of Insolation C. Distribution of Temperature. I. Vertical Distribution II. Horizontal Distribution	13
3.	Atmospheric Pressure & Winds	A. Atmospheric Pressure i. Formation of Pressure Belts ii. Shifting of Pressure Belts and their Effect B. Winds I.Factors Affecting on Winds a. Pressure Gradient b. Coriolis Force c.Frictional Force II. Classification of Winds a. Planetary Winds- Definition &Types b. Periodical Winds: land & Sea Breezes) c. Monsoon Winds – Concept & Types	12
4.	Humidity &Applications of Climatology	A. Definition & Types of Humidity i. Absolute ii. Specific and iii. Relative Humidity B. Forms of Condensation: Fog, Dew, Frost, Clouds& Precipitation C. Forms of Precipitation: (Rain, Drizzle, Snow, Sleet.) D. Types of Rainfall i. Convectional ii. Orographic / Relief iii. Cyclonic or Frontal E. Applications of Climatology in the field of – Agriculture , Settlement, Health, Trade & Transport	10

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NORTH MAHARASHTRA UNIVERSITY, JALGAON
F.Y.B.Sc. Semester – I
PAPER III: Gg.103: PRACTICAL GEOGRAPHY (CARTOGRAPHIC TECHNIQUES) (With effect from June 2018)

Objectives:

- Gain proficiency in understanding and applying different types of scales in cartography.
- Learn to construct and interpret various types of graphs for data visualization.
- Develop skills in creating and analyzing statistical diagrams.
- Understand the principles and types of distributional maps and their applications in spatial analysis.

These objectives provide a structured approach to learning cartographic techniques, equipping students with essential skills for map reading, map making, and data visualization in geographical and environmental studies.

Unit	Topic	Sub-topics	Lectures
1.	Scale	1. Definition of scale 2. Methods of Representing scales a) Verbal scale b) Numerical scale c) Graphical scale 3. Conversion of scale (British and Metric system) 4. Construction of following scales a) Simple Graphical scale b) Time and Distance Scale (Only Metric System)	
2.	Graphs	1. Types of Graphs i. Simple Line Graph ii. Bar Graph iii. Combine Graph (Line & Bar Graph) iv. Climograph 2. Merit and Demerits of graphs	
3.	Statistical Diagram	1. Construction of the following Diagrams i. Wind Rose/ Star Diagram ii. Divided Circle iii. Proportional Circle	
4.	Distributional Maps	1. Meaning of Distributional Maps 2. Types of Distribution Maps i. Dot Map ii. Choropleth Map iii. Isopleth Map.	

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NORTH MAHARASHTRA UNIVERSITY, JALGAON
F.Y.B.Sc. Semester – II
PAPER II: Gg.202: PHYSICAL GEOGRAPHY (HYDROSPHERE)
(With effect from June 2018)

Objectives :

- Gain a comprehensive understanding of the hydrosphere, including its physical properties, movement patterns (waves and currents), and geological features (submarine relief).
- Analyze the role of oceanic processes in global climate regulation, biodiversity support, and natural hazards.
- Understand the formation and distribution of marine deposits and coral reefs, and their ecological significance.
- Apply knowledge of hydrosphere dynamics to environmental management, marine conservation, and sustainable development initiatives.

Unit	Topic	Sub-topics	Lectures
1.	Introduction to Hydrosphere and Submarine Relief	(a) Meaning and concept of Hydrosphere(b)Importance of the study of Hydrosphere in modern time (c) Surface configuration of ocean floor. (d) Submarine relief of following oceans: i)Atlantic ii) Indian Ocean	10
2.	Properties of ocean water	(A) Salinity: i) Definitions ii) Composition of salinity of ocean water according to Ditmar's research. iii) Factors affecting the distribution of salinity of ocean water. iv) Distribution of salinity- open ocean, partially enclosed sea, inland sea & lakes B) Temperature: i) Distribution of Ocean water temperature: a) Horizontal b) Vertical.C) Density: i) Definitions and characteristics of density of ocean water. ii) Factors controlling the density of ocean water.	12
3.	Movement of Ocean Water	(A) Oceanic Waves i) Definitions, Nature and Characteristics of Waves. ii) Breaking of waves iii) Tsunami waves: Definitions, characteristics and effects of Tsunami.(B) Ocean Currents: i) Definition and types. ii) Characteristics. iii) Causes of origin. iv) Ocean currents in following oceans. a) Atlantic Ocean b) Indian Ocean v) Effects of ocean currents	12
4.	Marine Deposits and Coral Reefs	(A)Marine Deposits. i) Meaning of marine deposit. ii) Classification based on the Sources of Origin. a) Terrigenous b) Biogenous c) Hydrogenous d) Cosmogenous (Only Meaning and examples) iii) Types of Ooze a) Calcareous Ooze b) Siliceous Ooze. (B) Coral Reefs. i) Definition and formation of Coral Reefs. ii)Types of Coral Reef: a) Fringing Reef b) Barrier Reef c) Atolls d) Table Reef e) Patch Reef.	11

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NORTH MAHARASHTRA UNIVERSITY, JALGAON
F.Y.B.Sc. Semester – II
PAPER III: Gg.203: PRACTICAL GEOGRAPHY (MAP PROJECTION)
(With effect from June, 2018)

Objectives:

- Understand the fundamentals of map projections, including their definitions and classifications.
- Gain practical skills in constructing different types of map projections using graphical methods.
- Evaluate the suitability of map projections for different geographical regions and purposes.
- Analyze the distortion effects inherent in various map projections and their implications for accurate representation and analysis.

These objectives provide a comprehensive framework for studying map projections, essential for cartographers, geographers, and anyone involved in spatial data representation and analysis.

Unit	Topic	Sub-topics	Lectures
1.	Map Projections	(a) Introduction to Map Projection: (i) Definition of Map and Globe (ii) Parallels of Latitudes (iii) Meridians of Longitudes (iv) Great Circles (b) Definition of Map Projections c) Necessity of Map projection	
2.	Classification of Map Projection	Classification of Map Projection on the basis of their development a) Perspective Projections b) Non Perspective Projections c) Conventional	
3.	CONSTRUCTION OF MAP PROJECTIONS	Construction of Map Projections by Graphical Methods only.(i) Zenithal Projection: 1) Zenithal Polar Gnomonic projection. 2) Zenithal Polar stereographic projection (ii) Conical Projections: 1) Conical projection with one standard parallels. 2) Bonne's projection (iii) Cylindrical Projections: 1) Cylindrical Equal Area Projection 2) Mercator's Projection iv) Conventional map projections. 1) Sinusoidal projection	
4.	Choice of Map projections	a) Usefulness of all projections. b) Problems with the choice of map projection. c) Choice of Map projections for different Purposes and Regions. d) Distortion (shape, size, direction, area)	

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FACULTY OF SCIENCE AND TECHNOLOGY

New Syllabus F.Y.B.Sc. Semester- I (CBCS Pattern) With effect from June- 2022

PAPER II: Gg. - 102: MORPHOLOGY OF LANDSCAPE

Objectives:

- Gain a comprehensive understanding of landscape morphology shaped by different geological processes such as wind, rivers, sea waves, and glaciers.
- Study the formation and characteristics of various erosional and depositional landforms associated with each geological process.
- Analyze the impact of these landforms on shaping landscapes and influencing human activities and environmental conditions.
- Apply knowledge of landscape morphology in environmental management, land use planning, and natural hazard mitigation.

Unit	Topic	Sub-topics	Lectures
1.	Introduction to Morphology of Landscape and Work of Wind	A. Introduction: Morphology and Landscape Landscape: Meaning & Definitions. Types of Landscape B. Mechanism of Wind Erosion and Deposition I. Erosional Landforms: Blowout Mushroom Rock Yardangs Zeugen Inselbergs II. Depositional Landforms: Ripplemarks Sand Dunes Barkhans Shifting Dune Loess II. Depositional Landforms: Shifting Dune Loess	09
2.	Work of River	A. Mechanism of river erosion and deposition I. Erosional Landforms: Gorge 'V' Shaped Valley Rapids Waterfall Pot Holes II. Depositional Landforms: Meander Ox-bow Lake Flood Plain Levee Delta	07
3.	Work of Sea Waves	A. Mechanism of Marine Erosion and Deposition I. Erosional Landforms: Sea Cliff Wave Cut Platform Sea Caves Sea Arch Sea Stack II. Depositional Landforms: Sea Beach Spits Lagoon Barrier island	07
4.	Work of Glacier	A. Mechanism of Glacial Erosion and Deposition I. Erosional Landforms: Circque U-shaped valley Hanging Valley Roche Montano Horn and Aerect II. Depositional Landforms: Moraines Drumlin Esker Parched Block Verve Kames	07

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FACULTY OF SCIENCE AND TECHNOLOGY
New Syllabus F.Y.B.Sc. Semester- I (CBCS Pattern) With effect from June- 2022
PAPER III: Gg.- 103: PRACTICAL GEOGRAPHY- CARTOGRAPHIC TECHNIQUES

Objectives :

- Gain proficiency in understanding and applying cartographic principles and techniques.
- Develop skills in constructing and interpreting maps, graphs, statistical diagrams, and distributional maps.
- Analyze the effectiveness and limitations of different cartographic methods in conveying spatial information.
- Apply knowledge of cartographic techniques to real-world scenarios in geography, environmental science, urban planning, and other fields requiring spatial analysis.

Unit	Topic	Sub-topics	Lectures
1.	Introduction to Cartography	A. Cartography i. Meaning and Concept ii. Importance of Cartography B.Maps i. Definition ii. Types- Physical and Cultural Maps C.Map Scale i. Definition. ii. Methods of Representing scales a) Verbal scale b) Numerical scale c) Graphical scale i. Conversion of scale: British and Metric system ii. Construction of following scales a) Simple Graphical Scale b) Time and Distance Scale (Only Metric System)	15
2.	Graphs	A. Definition and types of graphs B. Construction, uses, merits and demerits of the following Graphs i. Simple Line Graph B. Construction, uses, merits and demerits of the following Graphs ii. Bar Graph iii. Combine Graph (Line & Bar Graph) iv.Climograph	15
3.	Statistical Diagrams	A. Concept and uses of Statistical Diagrams B. Construction, uses, merits and demerits of the following Diagrams i. Wind Rose/Star Diagram B. Construction, uses, merits and demerits of the following Diagrams ii. Divided Circle iii. Proportional Circle	15
4.	Distributional Maps	Meaning and Types of Distributional Maps Construction, uses, merits and demerits of following Distributional Maps i. Dot Map ii. Choropleth Map iii. Isopleth Map	15

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FACULTY OF SCIENCE AND TECHNOLOGY
New Syllabus F.Y.B.Sc. Semester- II (CBCS Pattern)
With effect from June- 2022
PAPER II: Gg. - 202: HYDROSPHERE

Objectives :

- Gain a comprehensive understanding of the hydrosphere, including its components, properties, and importance in global systems.
- Study specific geological features of the ocean floor and their implications for oceanography and marine ecosystems.
- Analyze the physical properties of ocean water, including salinity, temperature, and density, and their role in ocean dynamics.
- Explore the dynamics of oceanic waves, currents, and tides, and their impacts on marine environments and human activities.
- Understand the nature and classification of ocean coasts, and their interactions with marine and terrestrial environments.

Unit	Topic	Sub-topics	Lectures
1.	Introduction to Hydrosphere and Submarine Relief	A. Meaning and Concept of Hydrosphere B. Importance of the Study of Hydrosphere in Modern Time C. Surface Configuration of Ocean Floor D. Submarine Relief of Indian and Atlantic Oceans	08
2.	Properties of Ocean Water	A. Salinity: Definitions & Meaning i. Composition of Salinity of Ocean Water ii. Factors Affecting the Distribution of Salinity of Ocean Water iii. Distribution of Salinity- Open Ocean, Partially Enclosed Sea, Inland Sea and Lakes B. Temperature i. Distribution of Ocean Water Temperature: a) Horizontal b) Vertical C. Density i.Definitions and Characteristics of Density of Ocean Water ii. Factors Controlling the Density of Ocean Water.	08
3.	Movement of Ocean Water	A. Oceanic Waves i. Definitions, Nature and Characteristics of Waves. ii. Breaking of Waves iii. Tsunami waves: Definitions, Characteristics and Effects of Tsunami B. Ocean Currents i. Definition and Types of Ocean currents ii. Characteristics of Ocean currents iii. Causes of Origin of Ocean currents iv. Ocean Currents in the Atlantic and Indian Oceans. v. Effects of Ocean Currents C. Ocean Tides i. Definition and Meaning ii. Types: Spring and Neap Tides iii. Importance of Tides iv. Effects of Tides	09
4.	Ocean Coast	A. Ocean Coast i. Definition and Nature of Ocean Coast ii. Types of Ocean Coast a. Submergence Coast b. Emergence Coast	05

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KAVAYITRI BAHINABAI CHAUDHARY NORTH MAHARASHTRA UNIVERSITY, JALGAON
FACULTY OF SCIENCE AND TECHNOLOGY
New Syllabus F.Y.B.Sc. Semester- II (CBCS Pattern)
With effect from June- 2022
PAPER III Gg.- 203: PRACTICAL GEOGRAPHY- MAP PROJECTION

Objectives :

- Gain a comprehensive understanding of map projections, their classifications, and construction methods.
- Learn to apply different map projections based on specific mapping purposes and regions.
- Analyze the challenges and distortions associated with map projections and their implications for accurate representation of geographic data.
- Develop skills in constructing and interpreting maps using various projection methods in different geographic contexts.

Unit	Topic	Sub-topics	Lectures
1.	Introduction to Map Projections	A. Introduction to Map and Globe i. Definitions of Map & Globe ii. Parallels of Latitudes iii. Meridians of Longitudes iv. Great Circle B. Introduction to Map Projection i. Definitions of Map Projection ii.Necessity of Map projection	15
2.	Classification of Map Projection	A. Classification of Map Projection on the basis of their development i. Perspective Projections A. Classification of Map Projection on the basis of their development ii. Non-Perspective Projections iii. Conventional map Projections	08
3.	Construction of Map Projections	A. Construction of Map Projections by Graphical Methods a. Zenithal Projection: i. Zenithal Polar Gnomonic projection. ii. Zenithal Polar Stereographic projection b. Conical Projections: i. Conical projection with one standard parallels ii. Conical projection with two standard parallels iii.Bonne's projection. c. Cylindrical Projections i. Cylindrical Equal Area Projection ii. Mercator'sProjection d. Conventional map projections. i. Sinusoidal projection. ii. Mollweide projection	27
4.	Choice & Use of Map projections	A. Choice of Map projections for different Purposes and regions B. Problems with the choice of map projection C. Distortion (shape, size, direction, area.)	10

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Akkalkuwa Dist. Nandurba

From 2022-23 to 2023-24

Course Name Gg. - 101: INTRODUCTION TO LITHOSPHERE

Course Outcomes:

After completion of this course, the students will be able…

CO1. To understand the geographical phenomena.

CO2. To understand the formation, types and importance of rocks and minerals.

CO3. To understand the landforms and their origin.

CO4. To know the external and internal forces that acting on the earth surface.

Course Name Gg. - 103: PRACTICAL GEOGRAPHY- CARTOGRAPHIC TECHNIQUES

Course Outcomes:

After completion of this course, the students will be able …

CO1. To understand various cartographic techniques used in geographical study.

CO2. To adopt the knowledge of drawing graphs, diagrams and distributional maps.

CO3. To analyse geographical data with the help of cartographic techniques.

Course Name Gg. - 201: ATMOSPHERE

Course Outcomes:

After completion of this course, the students will be able …

CO1. Identify the layers of earth's atmosphere.

CO2. Describe key features of each layer of the atmosphere

CO3. To interpret global energy budgets.

CO4. To understand the application of the climatology.

Course Name Gg. - 203: PRACTICAL GEOGRAPHY- MAP PROJECTION

Course Outcomes:

After completion of this course, the students will be …

CO1. Benefited with different kind of map projections & their importance.

CO2. Expert in drawing projections according to requirement.

CO3. Identify & choose map projections for different regions.

CO4. Enhance basics of latitudes, longitude & great circle among students.

from 2018-19 to 2020-21

Course Name: Gg.101: Physical Geography-I (Lithosphere-Part-I)

Course Outcomes:

After completion of this course, the students will be …

CO1: Understand the nature, scope, different branches of Physical Geography

CO2: Knowledge about Origin and distribution of Continent and Oceans

CO3: know about how to Identified different type of Rocks and Minerals and how they evolved

CO4: they know about Earth's Crust different layers forces shape the earth and landforms fold, faults.

Gg.201: PHYSICAL GEOGRAPHY (LITHOSPHERE- PART-II)

Course Outcomes:

After completion of this course, the students will be …

CO1: Student understand process, and type of Weathering and Soil Formation

CO2: Student understand Mechanism of river erosion and, River Erosional, Depositional, work and landform V' shaped valley, Gorge, Rapid,Waterfall, Pot holes, Meander, Ox-bow Lake, Flood Plain & levee, Delta

CO3: Mechanism of Wind Erosion and Deposition

CO4: Erosional Features: Blowout, Mushroom Rock,

Depositional Features: Ripplemarks, Sand dunes, Barkhans, Shifting dune, Loess.

CO5: Mechanism of Marine erosion anddeposition Land forms associated with the work of sea waves, Erosional features: Sea cliff, Wave-cut platform, Sea caves, Sea arch, Sea stack.Depositional features: Beaches, Offshore bar, Spit, Lagoon, Mudflat, Salt marshes

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NMV 1 2002
MS-3
Date
15-07-02
Akkalkuwa
Dist.
Nandurbar

Dept. Of Zoology

Course Outcome of Zoology from Academic Year 2016-17 to 2018-19 for Second Year Students

Students will understand the anatomy, physiology, and ecological roles of the sea star and Columba livia domestica (domestic pigeon). They will explore the unique regenerative abilities of sea stars and the adaptations of pigeons for flight and urban living. Additionally, students will examine the applications of zoology in medicine, including the use of model organisms in research, disease vector management, and the development of medical technologies. This knowledge will equip students with a foundational understanding of these organisms and the practical applications of zoological research in solving real-world health and environmental issues.

Course Outcome of Zoology from Academic Year 2019-20 to 2023-24 for Second Year Students

Students will understand the principles of physiology, biochemistry, genetics, and evolutionary biology, gaining insights into the functions, molecular interactions, and genetic mechanisms of organisms. They will learn the applications of these principles in medical diagnosis, including the identification of genetic disorders and disease biomarkers. Additionally, students will explore apiculture, understanding bee biology, behavior, and the importance of bees in ecosystems and agriculture. This comprehensive knowledge will prepare students for careers in research, healthcare, and environmental management, equipping them with skills to address biological and medical challenges.

Course Outcome of Zoology from Academic Year 2018-19 to 2022-23 for First Year Students

Students will gain a comprehensive understanding of animal diversity, learning to classify and describe major animal groups and their evolutionary relationships. They will explore the comparative anatomy of vertebrates, identifying structural adaptations across different classes and their functional

significance. In developmental biology, students will examine vertebrate embryological development, understanding genetic and molecular control mechanisms. This knowledge equips students to integrate concepts across zoology, fostering critical thinking and analytical skills essential for advanced studies or careers in biological research, conservation, and related fields.

Course Outcome of Zoology from Academic Year 2022-23 to2022-23 for First Year Students

Students will gain a comprehensive understanding of invertebrate and vertebrate zoology, focusing on the diversity, anatomy, and physiology of these groups. They will study the grasshopper and frog as model organisms, exploring their morphology, life cycles, and ecological roles. This course will enhance students' ability to compare and contrast different animal phyla, understand evolutionary relationships, and apply zoological knowledge to real-world problems. By the end, students will be well-prepared for advanced studies or careers in biological sciences, environmental management, and related fields.

Dr. M. Z. Shaikh
Head Department of Zoology
RFNS, Senior Science College, Akkalkuwa

Subject: Chemistry

F Y B Sc Course Outcomes from 2018-19 to 2021-22

Student will Understand Electrolytic conductance, Surface Chemistry, Mathematical Preparation in Chemistry, Graphical representation of equations, Derivative, Periodic properties, a) Atomic and ionic size b) Ionisation energy, c) Electron affinity, d) Electronegativity, S block element, Organic Chemistry, Hydrocarbons Alkanes, Alkenes, Alkynes, Haloalkanes and haloarenes, Alcohols, phenols and ethers, Ionic equilibria, VSEPR theory and shapes of covalent molecules, Physical Chemistry Experiments, Analytical Chemistry Experiments, Inorganic Qualitative Analysis, The Gaseous State, Liquid State, Second Law of Thermodynamics, Metals and metallurgy, P block elements, Aldehydes and ketones, Reactions of aliphatic aldehydes & Ketones, Aromatic aldehydes and ketones, Carboxylic acids and their derivatives, Amines, Volumetric analysis, Chemical bonding and structure, Physical Chemistry Experiments, Analytical Chemistry Experiments, Organic Qualitative Analysis

F Y B Sc Course Outcomes from 2022-23 to 2023-24

Students will develop knowledge about: Various theories and principles applied to reveal atomic structure. Nature of matter and experiments which confirmed it.Significance of quantum numbersApply the rules of logarithm for solving numerical in chemistry. Draw, calculate the slope of various graphs for chemistry experiments. Calculate derivative and integration of some simple functions especially related to chemical problems. The basics of kinetics theory and concepts therein. Factors causing the deviations from ideal behaviour of gases. Compressibility, liquification and related critical constants of a system. To know about the structure of atom.To acquire the knowledge about the arrangement of elements in a periodic table to familiar with the classification of elements in periodic table.To know about the principle involved in arrangements of electrons in atoms.To understand the shapes of different types of orbitals present in atoms.To understand the periodic law and systematic

study of elements. To find the factors affecting periodic properties. To understand periodic properties and their general trends in groups and periods. (Atomic size, Ionization energy, Electron affinity, Electro negativity, Metallic properties). To correlate these periodic properties with the chemical behaviour of elements. To understand the different methods used to determine electronegativity.The properties of organic compounds.Different types of bonds and structures of organic compounds. Different types of structural effects and their effect on the strength of acids and bases. Fundamentals of organic reaction mechanism, structural isomerism, methods of purification of organic compounds. Different types of solvents used in organic reactions.SP3, SP2 and SP hybridizations. Nomenclature of alkanes, alkenes and alkynes. Different methods of preparation of alkanes, alkenes and alkynes. Different reactions of alkanes, alkenes and alkynes.To gain knowledge about origin of surface tension. To determine surface tension. To get idea regarding viscosity. To determine viscosity. To familiar with the Inorganic Qualitative Analysis. To understand the basic principles behind the group precipitation of basic radicals like solubility product and common ion effect. To understand the role of some compounds in qualitative analysis viz. Use of Cobalt nitrate, Sodium carbonate, Hydrogen sulphide and Ammonium chloride in detection of basic radicals. To focus on systematic separation and detection of ions in aqueous solutions.

SY B Sc Course Outcomes from 2016-17 to 2018-19

Student will Understand Chemical Thermodynamics:SolutionsColligative PropertiesElectrochemistryChemistry of Transition ElementsThe Metallic BondThe Metallurgy of Aluminium (Electrometallurgy)Chemistry of Lanthanoids ElementsChemistry of Actinoids ElementsMolecular Orbital Theory (MOT)StereoisomerismAminesOrganometallic compoundsChemistry of Heterocyclic Compounds.Synthetic ReagentsElimination ReactionsIntroduction to Analytical ChemistryVolumetric (Titrimetric) AnalysisGravimetric analysisChromatographyPhysical Chemistry ExperimentsVolumetric AnalysisChromatographyOrganic PreparationsInorganic Preparations

S Y B Sc Course Outcomes from 2019-20 to 2022-23

Student will Understand SolutionsColligativePropertiesThe d-block elementsStereoisomerism(L-12, M-24 / 36Projection formulae,Optical isomerismGeometrical isomerismConformational isomerismStereochemistry of CyclohexaneHeterocyclic and polycyclic aromatic compounds, ElectrochemistryChemical ThermodynamicsBasic concepts of coordination chemistrySynthetic ReagentsOrganometallic compoundsMolecular Orbital Theory (MOT)Acid base titrationsPrecipitation titrationsChromatographyRedox titrationsComplexometric titrationsGravimetric analysisPhysical Chemistry ExperimentsVolumetric AnalysisChromatography

T Y B Sc Course Outcomes from 2017-18 to 2019-20

Student will Understand Electrochemical Cell and its Applications.PhotochemistryPhase RuleRadioactivity and its ApplicationsInvestigation of Molecular Structure.Chemical kineticsSolid StateElementary Quantum MechanicsBasic concepts of coordination

ChemistryWerner’s coordination theoryModern Theories of M-L Bonds: V.B.T.Modern Theories of M-L Bonds: C.F.T.Modern Theories of M-L Bond - M.O.T.The Copper group Coinage MetalsSolvents, Solutions, Acids and Bases.Corrosion and passivityStructure and Reactivity of Molecules.Some Transition and Inner Transition Elements.Structural EffectsNucleophilic Substitution at Saturated CarbonElectrophilic Addition to C=CNucleophilic Addition to C=OAromatic SubstitutionRearrangement reactionsSpectroscopyUltraviolet spectroscopyInfrared SpectroscopyNMR SpectroscopyProblems based on UV, IR and NMR SpectroscopyDesigning Organic SynthesisNatural productsSolvent ExtractionIon Exchange ChromatographySize Exclusion ChromatographyGas chromatographyHigh-performance Liquid ChromatographyElectrophoresis-SpectrometryEmission SpectrometryAtomic Absorption SpectrophotometryNephelometry and TurbidimetryThermal MethodsGeneral Aspects of industrial ChemistrySugar Industry.Fermentation Industry.Fertilizers.Small Scale IndustriesPetroleum Industry.Industrial Organic Synthesis from PetroleumSoaps and Detergents:Drugs and Pharmaceuticals:Dyes, Pigments and paintsCarbohydratesAmino Acids and ProteinsEnzymesLipidsNucleic AcidsEnergy rich compounds(L6, M6)Metabolism (L12, M12)Environmental ChemistryPolymer Chemistry, Chemistry in Everyday Life

T Y B Sc Course Outcomes from 2020-21 to 2022-23

After successful completion of this course, students are expected to: • Understand the significance of wave function and postulates of quantum mechanics. • Deduce rate equations and half-life equations for first and second order reactions • Draw and explain the one and two component system phase diagrams. • Explain the principles of electrode processes and apply them during Practical’s.Analyse the rotational spectra of diatomic molecules and determine the bond length. • Explain and apply the radioactivity principles for various chemical and biological investigations. • Describe the mechanism of fluorescence, phosphorescence and photochemical reactions. • Analyse the given crystal structure and determine the indices of planes, interplaner distances and type of crystal structure.Learn about the VSEPR theory and how it can be used to explain molecular shapes. • Learn about the VBT to describe the formation of covalent bonds in terms of atomic orbital overlap. • Learn about stability of complexes using CFSE. • Learn about MOT to draw energy diagrams and to predict bond order.Learn about basic principles and synthesis of nanomaterials. • Learn about classification, composition and processing of cement. • Learn about classification and composition of alloys. • Learn about types manufacture and applications of fertilizers.Students will learn organic reactions like nucleophilic substitution, electrophilic substitution, nucleophilic addition, electrophilic addition and elimination. • Students will be able to write/ explain mechanisms of those types of reactions. • Students will understand how a reaction takes place in one or more steps. • Students will understand the types of intermediates formed in different reactions. • Students will learn how reagent attacks the substrate molecule and accordingly how bonds break and formed. • Students will learn how change in structure of substrate, reagent and solvent changes the product formed and its

stereochemistry. • Students will be able to predict the products and to suggest the mechanisms.Students will learn interaction of radiations with matter. They will understand different regions of electromagnetic radiations. They will know different wave parameters. • Students will learn principle of mass spectroscopy, its instrumentation and nature of mass spectrum. • Students will understand principle of UV spectroscopy and nature of UV spectrum. They will learn types of electronic excitations. • Students will be able to calculate maximum wavelength for any conjugated system. And from the value of λ-max they will be able to find out extent of conjugation in the compound. • Students will understand principle of IR spectroscopy, types of vibrations and the nature of IR spectrum.

Rural Foundation Nandurbar Sanchalit Senior Science College NGC-2002 NMV 1 2002 MS-3 Date 15-07-02 Akkalkuwa Dist. Nandurbar

Head
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