

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Diploma/Degree/Honors)		Semester - III	Session: 2024-2025
1	Course Code	CHSC-03T	
2	Course Title	INORGANIC AND PHYSICAL CHEMISTRY-I	
3	Course Type	DSC	
4	Pre-requisite(if,any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Understand fundamental chemical concepts of transition elements and their applications. ➤ Master the principles of coordination chemistry. ➤ Grasp the core principles of thermodynamics and apply them to various phenomena. ➤ Explore the world of electrochemistry and its applications. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max.Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics(Course contents)		No. of Periods
I	<p>Chemistry of d & f-block elements</p> <p>A. d-block elements (5 hrs.)</p> <p>(i) Chemistry of elements of first transition series: Characteristic properties of the elements of first transition series with reference to their: Electronic configuration, Atomic and ionic radii, Ionization potential, Variable oxidation states, Magnetic properties, Color, Complex formation tendency and catalytic activity.</p> <p>(ii) Chemistry of elements of second and third transition series: Electronic configuration of 4d and 5d transition series. Comparative treatment with their 3d-analogous (Group Cr- Mo-W, Co-Rh-Ir) in respect of oxidation states and magnetic behavior.</p> <p>B. f-block elements (6 hrs.)</p> <p>Chemistry of Lanthanide & Actinides: Electronic structure, oxidation states, ionic radii, magnetic, and spectral properties. Lanthanide contraction and its consequences, complex formation, occurrence and isolation, Separation of lanthanides: solvent extraction and ion exchange method. General features and chemistry of actinides, Transuranic elements, chemistry of separation of Np, Pu and Am from uranium, similarities between the later actinides and the later lanthanides.</p>		12
II	<p>Oxidation and reduction (5 hrs)</p> <p>Various definitions of oxidation and reduction, Balancing of redox reaction by ion-electron method, Latimer diagram of Chlorine and Oxygen, Frost diagram of Nitrogen and Oxygen, and Pourbaix diagrams of Iron. Predicting disproportionation and comproportionation phenomena.</p> <p>Coordination Chemistry (6 hrs)</p> <p>A. Coordination compounds:Distinction among simple salts, double salts, and coordination compounds. Terminology and nomenclature of Coordination</p>		11

	<p>compounds. Types of ligands based on denticity. Werner's Coordination theory and its experimental verification. Sidgwick's electronic interpretation, EAN rule with examples. Electroneutrality principle, Valence Bond Theory of transition metal complexes. Determination of structures and magnetic properties of complexes based on VBT. Chelates: Classification and their application.</p> <p>B) Isomerism in coordination compounds: Structural isomerism and Stereoisomerism (Geometrical and optical) in coordination compounds with four and six coordination numbers.</p>	
III	<p>Thermodynamics-I: (5 hrs)</p> <p>A. Basic concept of thermodynamics: System, surrounding, types of system (closed, open & isolated). Intensive & extensive properties. Thermodynamic processes: isothermal, adiabatic, isobaric, isochoric, cyclic, reversible & irreversible. State function & path functions and their differentiation, concept of heat & work. Zeroth law of thermodynamics, First law of thermodynamics. Definition of internal energy & enthalpy. Concept of heat capacity, heat capacity at constant volume & at constant pressure, and their relationship.</p> <p>Joule-Thomson experiment, Joule-Thomson coefficient (no derivation) & inversion temperature. Calculations of w, q, E & H for expansion of gases for isothermal & adiabatic conditions for reversible process.</p> <p>B. Thermochemistry(2 hrs.)</p> <p>Standard states, Heat of reaction, enthalpy of formation, enthalpy of combustion, enthalpy of solution, enthalpy of neutralization, Hess's law of constant heat of summation & its applications. Variation of enthalpy change of reaction with temperature (Kirchoff's equation).</p> <p>C. Thermodynamics II (4 hrs.)</p> <p>Second law of thermodynamics: Limitations of first law and need for the second law. Statements of second law. Carnot cycle & Efficiency of heat engine. Thermodynamic principle of working of a refrigerator (Carnot theorem). Concept of entropy: entropy change in a reversible and irreversible process; entropy change in isothermal reversible expansion of an ideal gas. Physical significance of entropy. Gibbs free energy, Gibbs-Helmholtz equation.</p> <p>D. Third law of thermodynamics (1 hr)</p> <p>Statement of third law, Nernst heat theorem, Absolute entropy of solids, liquids, and gases.</p>	12
IV	<p>Electrochemistry-1</p> <p>Electrolyte conductance: specific and equivalent conductance, measurement of equivalent conductance, effect of dilution on conductance, Kohlrausch law, application of Kohlrausch law in determination of dissociation constant of weak electrolyte, solubility of sparingly soluble electrolyte, absolute velocity of ions, ionic product of water, conductometric titrations.</p> <p>Single electrode potential, standard electrode potential, electrochemical series and its applications. Concept of overvoltage.</p> <p>Theory of strong electrolyte: limitation of Ostwald's dilution law weak and strong electrolyte, Debye-Huckel-Onsager's (DHO) equation for strong electrolytes, relaxation, and electrophoretic effect.</p> <p>Migration of ions: Transport number-definition and determination by Hittorf method and moving boundary method.</p> <p>Electrochemical cells or Galvanic cells: reversible and irreversible cells, conventional Representation of electrochemical cells. EMF of a cell, effect of temperature on EMF of cell, Nernst equation calculation of ΔG, ΔH and ΔS for cell reaction, polarization, Over potential and hydrogen overvoltage.</p>	11
Keywords	<p><i>D & f-block elements, Coordination compounds, Werner's theory, VBT, Isomerism, Thermodynamics, Thermochemistry, Electrical/electrolytical conductance, Transport number.</i></p>	

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Jauhar, S. P. (2010). *Modern Approach to Inorganic Chemistry: A Textbook for B. Sc. I Students*. Modern publishers
2. Bajpai, D. N. (1992). *Advanced book of physical chemistry*. S Chand publishing.
3. Sharma, K. K. & Sharma, L. K. (2016). *A textbook of physical chemistry*. Vikas publishing.
4. Bhasin, K. K. (2018). *Pradeep's Inorganic Chemistry Vol.III*. Pradeep publications.
5. Puri, S., & Sharma, L. R. (2008). *Kalia "Principles of Inorganic Chemistry"*.

Reference Books recommended-

Inorganic Chemistry

1. Lee, J. D. (2008). *Concise inorganic chemistry*. John Wiley & Sons.
2. Cotton, F. A., Wilkinson, G., & Gaus, P. L. (1995). *Basic inorganic chemistry*. John Wiley & Sons.
3. Huheey, J. E., Keiter, E. A., Keiter, R. L., & Medhi, O. K. (2006). *Inorganic chemistry: principles of structure and reactivity*. Pearson Education India.
4. Douglas, B. E., McDaniel, D. H., & Alexander, J. J. (1994). *Concepts and models of inorganic chemistry*, John Wiley & Sons

Physical Chemistry

1. Puri, L. B., Sharma, L. R., & Pathania, M. S. (2013). *Principles of physical chemistry*. Vishal Publishing Co.
2. Atkins, P. W., De Paula, J., & Keeler, J. (2023). *Atkins' physical chemistry*. Oxford university press.
3. McQuarrie, D. A., & Simon, J. D. (2004). *Molecular Thermodynamics* Viva Books Pvt. Ltd.: New Delhi.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://www.geeksforgeeks.org/d-block-elements/>
- <https://www.vedantu.com/evs/lanthanides-vs-actinides>
- <https://www.livescience.com/50776-thermodynamics.html>
- <https://byjus.com/jee/electrochemistry/>

Online Resources–

- e-Resources / e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

EndSemester Exam(ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 / 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - III	Session: 2024-2025
1	CourseCode	CHSC-03P	
2	CourseTitle	CHEMISTRY LAB. COURSE-III	
3	CourseType	DSC	
4	Pre-requisite(if,any)	-	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Understand the principle of determining transition temperature of hydrated or other allotropic salts. ➤ Employ the principle of determination of solubility of a given salt at different temperatures. ➤ Apply Born-Haber cycle to determine enthalpy and lattice energy. ➤ Determine strength of an acid, ionization constant of weak acid and solubility product by conductometric or potentiometric titrations. 	
6	CreditValue	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	TotalMarks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No. of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics(Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<p>Transition Temperature</p> <p>1) Transition temperature of a salt hydrate – determination of molecular weight.</p> <p>2) Determination of the transition temperature of the given substance by thermometric /dialometric method (e.g. SrBr₂.2H₂O or MnCl₂.4H₂O).</p> <p>Thermochemistry</p> <p>A. Determination of solubility:</p> <p>1) To determine the solubility of benzoic acid at different temperatures and to determine ΔH of the dissolution processes.</p> <p>B. Calorimetry:</p> <p>1) To determine the enthalpy of neutralization of hydrochloric acid (strong acid) by sodium hydroxide (strong base) solution.</p> <p>2)</p> <p>(a) To determine the enthalpy of neutralization of a weak acid (acetic acid) versus strong base (sodium hydroxide) and determine enthalpy of ionization of weak acid.</p> <p>(b) To determine the enthalpy of neutralization of a weak base (ammonium hydroxide) versus strong acid (hydrochloric acid) and determine enthalpy of ionization of weak base.</p> <p>3) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy.</p> <p>Conductometry</p> <p>1) Conductometry – Determination of limiting molar conductance of a strong Electrolyte (KCl).</p> <p>2) To determine the strength of the given acid (HCl or CH₃COOH)conductometrically</p>		30

	using standard alkali (NaOH) solution. 3) To determine the strength of strong acid and a weak acid in the given mixture conductometrically against a standard alkali solution. 4) To determine the ionization constant of weak acid conductometrically. Solubility Product 1) To determine the solubility and solubility product of a sparingly soluble salt conductometrically. 2) Potentiometry – Determination of solubility product of a sparingly soluble substance.	
Keywords	<i>Solution, Acid, Alkali. Transition temperature, Thermochemistry, Temperature, Enthalpy, Conductometric titrations, Potentiometric titrations, Solubility product.</i>	

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended –		
<ol style="list-style-type: none"> 1. Vishwanathan, B. & Raghavan, P. S. (2017). <i>Practical Physical Chemistry</i>. Viva books originals publishing. 2. Yadav, J. B. (2006). <i>Advanced Practical Physical Chemistry</i>. Krishna Prakashan Media. 3. Sahu, D. P. & Bapat, K. N. (2022) <i>Unified practical chemistry</i>, Navbodh Prakashan. 		
Reference Books recommended:		
<ol style="list-style-type: none"> 1. Moudgil, H. K. (2010). <i>Textbook of physical chemistry</i>. PHI Learning Pvt. Ltd. 2. Adamson, A. (2012). <i>A textbook of physical chemistry</i>. Elsevier. 3. Findlay, A. (1923). <i>Practical physical chemistry</i>. Longmans, Green. 		
Online Resources–		
<ul style="list-style-type: none"> ➤ e-Resources / e-books and e-learning portals ➤ https://tech.chemistrydocs.com/Books/Physical/Advanced-Physical-Chemistry-Experiments-by-J-N-Gurtu-&Amit-Gurtu.pdf ➤ https://byjus.com/chemistry/conductometric-titration/ ➤ https://chem.libretexts.org/Courses/University_of_California_Davis/Chem_4B_Lab%3A_General_Chemistry_for_Majors_II/1%3A_Thermochemistry_(Experiment) ➤ https://www.ulm.edu/chemistry/courses/manuals/chem1010/experiment_10.pdf 		
Online Resources–		
<ul style="list-style-type: none"> ➤ e-Resources / e-books and e-learning portals 		
PART -D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 50 Marks		
Continuous Internal Assessment(CIA): 15 Marks		
End Semester Exam(ESE): 35 Marks		
Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz +obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment G. Performed the Task based on lab. work - 20 Marks H. Spotting based on tools & technology (written) – 10 Marks I. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction

Program: Bachelor in Science <i>(Diploma / Degree/Honors)</i>		Semester - III	Session: 2024-2025
1	Course Code	CHSE-01T	
2	Course Title	BASIC ANALYTICAL CHEMISTRY	
3	Course Type	DSE	
4	Pre-requisite(if,any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ <i>To understand the sampling, procedure and treatment of sample.</i> ➤ <i>To understand the analytical techniques for analysis in different types of chemical reactions.</i> ➤ <i>To understand the volumetric analysis technique.</i> ➤ <i>To understand the gravimetric analysis technique.</i> 	
6	Credit Value	3 Credits	<i>Credit = 15 Hours -learning & Observation</i>
7	Total Marks	Max.Marks: 100	Min Passing Marks:40

PART -B: Content of the Course

Total No. of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics(Course contents)	No. of Period
I	Qualitative and quantitative aspects of analysis Classification of analytical Techniques, Qualitative and quantitative analysis. Classical and instrumental methods. Factors affecting choice of analytical method. Errors in chemical analysis. Types of errors: Systematic and random, Absolute and relative, Additive and proportional. Normal distribution of indeterminate errors. Statistical parameters for data evaluation: Mean, median, average deviation, standard deviation, coefficient of variation, relative standard deviation. Accuracy and precision of results. Comparison of data using F and t-test, rejection of data using Q test. Numerical problems.	12
II	Sampling and sample treatment Criteria for representative sample. Bulk, gross, incremental and analysis sample. Sampling statistics. Techniques of sampling of ambient air, water and soil samples. Methods of sample size reduction: Coning and quartering, rolling and quartering. Hazards in sampling. Sample dissolution methods for elemental analysis: Dry and wet washing, acid digestion, fusion processes and dissolution of organic samples. Types of analysis: Macro, semi-micro, micro, sub-micro and ultramicro. Major, minor and trace constituents of a sample.	11
III	Volumetric analysis General principle. Criteria for reactions used in titrimetric analysis. Primary standards and secondary standards. Concepts of equivalent weight and molecular weight, normality, molarity and various methods of expressing concentrations. Internal and external indicators. Theories of indicators in acid-base, precipitation, redox and complexometric titrations. Calculations involving preparation of standard solutions. Stoichiometric calculations in various types of titrations.	11
IV	Gravimetric analysis General principles and conditions of precipitation. Concepts of solubility, solubility product and precipitation equilibrium. Numerical problems based on solubility and solubility product. Purity of precipitate: Co-precipitation and post-precipitation. Super saturation and peptization. Criteria of selection of wash liquids. Steps involved in gravimetric analysis of barium as barium sulphate.	11

Keywords	Qualitative and quantitative analysis; errors; Accuracy; Sampling; titrimetric analysis; indicators; Gravimetric analysis
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Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Pandey, O. P., Bajpai, D. N., Giri, S., Shrivastava, B. B. L., & Mishra, A. (2010). *Practical chemistry (1st ed.)*. S. Chand & Company.
2. Shrivastava, B. B. L., & Mishra, A. ([Year]). *Fundamentals of analytical chemistry*.

Reference books Recommended:

1. Harris, D. C. (2000). *Quantitative chemical analysis* W. H. Freeman and Company.
2. Mikes, O., & Chalmers, R. A. (2007). *Laboratory handbook of chromatographic methods* Elsevier.
3. Christian, G. D., Dasgupta, P. K., & Snyder, S. (2001). *Concepts of instrumental analysis*, Oxford University Press.

Online Resources:

- <https://edu.rsc.org/resources/analysis>
- <https://guides.loc.gov/chemistry-resources/print-materials/analytical>
- <https://www.classcentral.com/course/swayam-analytical-techniques-13896>
- <https://www.technic.com/analytical-controls/capabilities/volumetric-analysis>
- [https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_Experiments/07%3A_Gravimetric_Analysis_\(Experiment\)](https://chem.libretexts.org/Ancillary_Materials/Laboratory_Experiments/Wet_Lab_Experiments/General_Chemistry_Labs/Online_Chemistry_Lab_Manual/Chem_11_Experiments/07%3A_Gravimetric_Analysis_(Experiment))

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

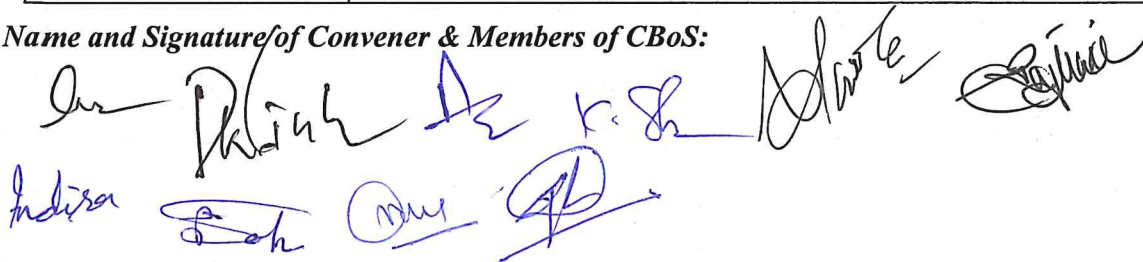
Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20 Assignment/Seminar- 10 Total Marks -30	Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit- 4x10=40Marks	

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

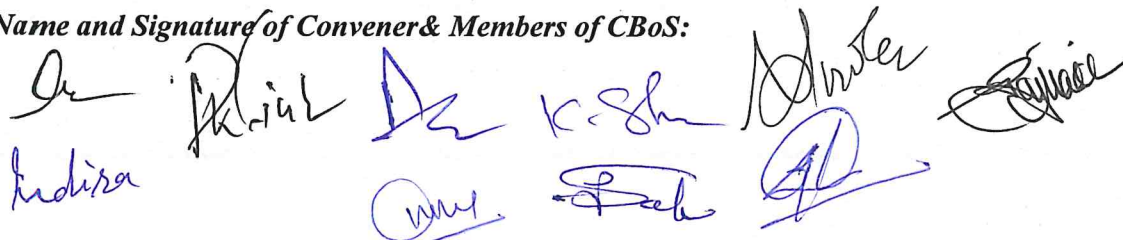
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science <i>(Diploma / Degree/Honors)</i>		Semester- III	Session: 2024-2025
1	Course Code	CHSE-01P	
2	Course Title	BASIC ANALYTICAL CHEMISTRY LAB. COURSE	
3	Course Type	DSE	
4	Pre-requisite(if,any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ <i>To make the student aware of Common analytical method.</i> ➤ <i>To demonstrate the volumetric titration.</i> ➤ <i>To demonstrate the students about gravimetric analysis.</i> ➤ <i>To learn the testing of solubility, pH of soil and water.</i> 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	TotalMarks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods:30 Periods (30 Hours)			
Module	Topics (Course contents)	No. of Period	
Lab./Field Training/ Experiment Contents of Course	<ol style="list-style-type: none"> 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture by volumetric titration. 2. Estimation of oxalic acid by titrating it with KMnO_4 (potassium permanganate) by volumetric titration. 3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO_4 (potassium permanganate). 4. Estimation of Fe(II) ions by titrating it with $\text{K}_2\text{Cr}_2\text{O}_7$ (potassium dichromate) using an internal indicator. 5. Estimation of Cu(II) ions iodometrically using $\text{Na}_2\text{S}_2\text{O}_3$ (sodium thiosulfate). 6. Determination of heat capacity of a calorimeter for different volumes. 7. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 8. Determination of ionization of acetic acid. 9. Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. 10. Analysis of soil: <ol style="list-style-type: none"> (a) Determination of pH of soil. (b) Determination of total soluble salts. (c) Determination of carbonate and bicarbonate. (d) Determination of calcium, magnesium, and iron. 	30	
Keywords	<i>Volumetric analysis, gravimetric analysis, water testing, soil testing.</i>		

Signature of Convener & Members (CBoS):

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended:		
<ol style="list-style-type: none"> 1. Chatwal, G. R., & Sharma, A. (2017). <i>Instrumental methods of chemical analysis</i>. Himalaya Publishing House. 2. Sharma, L. R. (2021). <i>Practical inorganic chemistry</i>. 3. Fernelius, W. G. (2009). <i>Experimental inorganic chemistry (Adapted by R. K. Sharma & G. Panda)</i>. New Age International Publishers. 4. Yadava, T. F. (2010). <i>A textbook of soil chemistry</i>. Kalyani Publishers. 		
Reference Books Recommended:		
<ol style="list-style-type: none"> 1. James, A. M., & Prichard, F. E. (1981). <i>Practical physical chemistry (3rd ed, repr)</i>. Longman. Bassett, J., Denney, R. C., Jeffery, G. H., & Mendham, J. (Eds.). (2000). <i>Vogel's textbook of quantitative chemical analysis (6th ed.)</i>. Pearson Education India. (Original work by A. I. Vogel) 2. Svehla, G. (Ed.). (1978). <i>A textbook of quantitative inorganic analysis (by A. I. Vogel)</i>. ELBS Publishers and Distributors. 		
Online Resources:		
<ul style="list-style-type: none"> ➤ https://swayam.gov.in/explorer ➤ https://in.indeed.com/career-advice/career-development/analytical-skills ➤ https://chemcollective.org/labtech 		
PART-D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 50 Marks		
Continuous Internal Assessment (CIA): 15 Marks		
End Semester Exam (ESE): 35 Marks		
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar + Attendance- 05 Total Marks -15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) - 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:



FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Sciences (Diploma / Degree/Honors)		Semester - III	Session: 2024-2025
1	Course Code	BOSC-03 T	
2	Course Title	Archegoniate and Fossils	
3	Course Type	Discipline Specific course (DSC)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➤ students will be familiar with amphibians and reptiles plants ➤ progressive evolution in plants ➤ relics of past plants ➤ diversity in plants ➤ development of seeds. 	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course
 Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	Bryophyta: Morphology, structure, reproduction and life history, distribution, classification, evolution of gametophytes and sterilization of sporogenous tissue. General account of Riccia, Marchantia, Anthoceros and Funaria , Economic and ecological importance of bryophytes.	12
II	Pteridophytes: Morphology, anatomy and reproduction, classification, evolution of stele, heterospory, telome theory and origin of seed habit, general account and life history of of Psilotum, Lycopodium, Sellaginella, Equisetum Pteris, Marsilea	11
III	Gymnosperm : Characteristics of Gymnosperms, the vessel - less & fruitless seed plants, Classification of Gymnosperm; Polyembryony in Gymnosperms and its role; Distribution of Gymnosperm in India; Economic importance of Gymnosperm. General account of Cycas, Pinus, Gnetum Concepts of living fossil (Cycas & Ginkgo); Angiospermic characters of Gnetum.	11
IV	Fossil: Fossil and fossilization, types of fossils Geological time table Brief account of the families of Pteridospermales –Rhynia, Calamites. General Account and Affinities - Cycadeoidales Pentoxylales and Cordaitales	11

Keywords Archegonia, seedless, heterospory, fossils

Signature of Convener & Members (CBoS) :

- ① R. Sivas
- ② S. Sundar
- ③ M. S. Anand
- ④ M. S. Anand
- ⑤ S. S. S. S.
- ⑥ S. S. S. S.
- ⑦ K. K.

⑧ S. S. S. S.

⑨ S. S. S. S.

⑩ S. S. S. S.

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Puri, P. (1980) Bryophytes, Atma Ram and Sons, Delhi.
2. Vashishtha, B. R. (2005) Pteridophytes S. Chand and Co., Delhi.
3. Bhatnagar, S. P., Moitra, A. (1996) Gymnosperms, New Age International Pvt. Ltd., New Delhi.

Text Books Recommended –

4. Sporne, K. K. (1991) The Morphology of Gymnosperm. B. I. Publishing Pvt. Ltd., Bombay.
5. Stewart, W. N. and Ruthwell, G. W. (1993) Paleobotany and the Evolution of Plants. Cambridge Univ. Press, UK.
6. Singh, H. (1978) Embryology of Gymnosperms; Encyclopedia of Plant Anatomy X. Gebruder Bortraeger, Berlin.

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

e-Resources / e-books and e-learning portals

- <https://study.com/learn/lesson/bryophytes-characteristics-examples.html>
- [https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3AGeneral_Biology_\(Boundless\)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3AGeneral_Biology_(Boundless)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms)
- https://www.google.com/search?q=fossils&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09ytizqRGwbydx-p0sOZFXGRnmfw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuvqAg&og=fossils&gs_l=EGxnd3Mtd216LXNlcniAiB2Zvc3NpbHMqAggAMg0QABiABbixAxhDGloFMgoQLhiABbhdGloFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABbhdGloFMgUQABiABDIFEAAyGAQvBRAAGIAEMgUQABiABEihKIAAWPIUCAB4AJABAjgBgwKgAYcLqgEFMC41LjK4AQHIAOD4AQGYAggAukLwgIKECMYgAOYJxiKBclCBBajGCTCAhEQLhiABbixAxjRaxiDARjHAclCCBAAGIAEGLEDwglKEAAyGAOYFBIHAggDAJIHBTauMv40oAfsWw&scient=gws-wiz-serp
- https://www.google.com/search?q=fossils&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn09ytizqRGwbydx-p0sOZFXGRnmfw%3A1713546819943&ei=Q6YiZvefOde5vr0PtMuvqAg&og=fossils&gs_l=EGxnd3Mtd216LXNlcniAiB2Zvc3NpbHMqAggAMg0QABiABbixAxhDGloFMgoQLhiABbhdGloFMgUQABiABDIFEAAyGAQvBRAAGIAEMgoQABiABbhdGloFMgUQABiABDIFEAAyGAQvBRAAGIAEMgUQABiABEihKIAAWPIUCAB4AJABAjgBgwKgAYcLqgEFMC41LjK4AQHIAOD4AQGYAggAukLwgIKECMYgAOYJxiKBclCBBajGCTCAhEQLhiABbixAxjRaxiDARjHAclCCBAAGIAEGLEDwglKEAAyGAOYFBIHAggDAJIHBTauMv40oAfsWw&scient=gws-wiz-serp
- https://www.google.com/search?q=pteridophytes&scasv=09379ecd0b6efd91&rlz=1C1CHBD_enIN1091IN1093&sxsrf=ACQVn0-V0lp75QZG3sbfrKrfitXB0GPdZvA%3A1713546628592&ei=hKUiZuvFI9q-juMPkr-DkAY&og=pter&gs_l=EGxnd3Mtd216LXNlcniAiBbH0ZXIqAggAMg0QABiABbixAxhDGloFMgoQABiABbhdGloFMgUQABiABDIFEAAyGAOYQxiKBTINEC4YgAOYsQMYQxiKBTIFEC4YgAOvChAAGIAEGEMYigUyChAAGIAEGEMYigVIihQAFixCnAAeACQAQCyaIQBoAGIBqoBBTAMi4yuAEBvAEA-AEBmAIeOALgBsiCChAjGIAEGCcYigXCAgQQIXgnwgIKEC4YgAOYQxiKBZgDAJIHBTauMi4voAfOSg&scient=gws-wiz-serp
- [https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3AGeneral_Biology_\(Boundless\)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3AGeneral_Biology_(Boundless)/26%3A_Seed_Plants/26.02%3A_Gymnosperms/26.2A%3A_Characteristics_of_Gymnosperms)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

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② Sunde
③ Anshu
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FOUR-YEAR UNDERGRADUATE PROGRAM (2024 – 28)

**DEPARTMENT OF BOTANY
COURSE CURRICULUM**

PART- A: Introduction			
Program: Bachelor in Life Sciences <i>(Diploma / Degree/Honors)</i>		Semester - III	Session: 2024-2025
1	Course Code	BOSC-03	
2	Course Title	Lab. Course-03 (Archegoniate and Fossils)	
3	Course Type	Laboratory course	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of the course students will be familiar > with amphibians and reptiles plants > progressive evolution in plants > relics of past plants > diversity in plants > Development of seeds.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	Bryophyta: Comparative study of the anatomy of vegetative and reproductive parts of <i>Marchantia, Pellia, Anthoceros, Notothylus, Funaria, Polytrichum.</i> Pteridophyta: Comparative study of the anatomy of vegetative and reproductive parts of <i>Psilotum, Lycopodium, Selaginella, Equisetum, Gleichenia, Pteris, Ophioglossum, Isoetes.</i> Gymnosperms: Comparative study of the anatomy of vegetative and reproductive parts of <i>Cycas, Ginkgo, Cedrus, Abies, Picea, Cupressus, Araucaria, Cryptomeria, Taxodium, Podocarpus, Agathis, Taxus, Ephedra</i> and <i>Gnetum.</i> <ul style="list-style-type: none"> ▪ Collection of various gymnospermic plant materials. ▪ Field work – as far practicable conveniently. Fossil: Study of important fossil gymnosperms from prepared photographs, slides and specimens.		30
Keywords	Archegonia, venter, bryophytes, pteridophytes		

Signature of Convener & Members (CBoS) :

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- ② *hunda*
- ③ *Arshin*
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- ⑤ *Arora*
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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. The Practical Fossil Finder (Practical Handbook) Hardcover – 1 October 1991 by Steve Parker (Author) Publishers Facts On File Inc
2. Practical Botany (Part I) ISBN #:81-301-0008-8 Sunil D Purohit, Gotam K Kukda & Anamika Singhvi Edition:2013 Apex Publishing House Durga Nursery Road, Udaipur, Rajasthan (bilingual).
3. Pandey S.K. (2012). Quick Concept of Botany. Publisher LAP LAMBERT Academic Publishing GmbH & Co. KG, Germany (ISBN: 978-3-8484-3104-5).
4. Dubey, R. C. and Maheshwari. D.K. 2012. Practical Microbiology, S. Chand & Company, Pvt. Ltd., New Delhi.
5. Pandey. B.P. 2014 Modern Practical Botany, (Vol-I) S. Chand and Company Pvt. Ltd., New Delhi.

Reference Books Recommended –

1. Principles of Paleontology Edition 3 Paperback–1 January 2006 by Arnold Miller, Michael Foote Publishers - W.H.Freeman & Co Lt

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- e-Resources / e-books and e-learning portals
1. <https://efaidnbmnnnibpcajpcgclefindmkaj/https://egyankosh.ac.in/bitstream/123456789/69611/1/Unit-9.pdf>
 2. <https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/fossil-and-fossilization>
 3. <https://palaeobotany.org>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05 Total Marks - 15	
End Semester Exam (ESE): 30	Laboratory / Field Skill Performance: On spot Assessment	Managed by Course teacher as per lab. status
	A. Performed the Task based on lab. work - 20 Marks	
	B. Spotting based on tools & technology (written) – 10 Marks	
	C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

① R. Purohit
 ② Devi
 ③ Madhu
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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

**DEPARTMENT OF BOTANY
COURSE CURRICULUM**

PART- A: Introduction			
Program: Bachelor in Life Science <i>(Diploma / Degree/Honors)</i>		Semester - III	Session: 2024-2025
1	Course Code	BOSE- 01 T	
2	Course Title	Natural resources and management	
3	Course Type	Discipline specific Elective (DSE)	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to > Understand natural resources and their sustainable utilization. > Knowledge on land, water, energy, and forest resources. > Students will learn about the practices of natural resource management. > Knowledge on the international and national efforts of natural resource management.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Natural resources > Definition and types. > Natural resources' conservation Role of an individual in conservation of natural resources, Significance, > Sustainable utilization of resources' : Concept, approaches economic, ecological, and socio-cultural activities.		12
II	Land and freshwater resources > Land as a resource > Soil erosion and desertification > Soil degradation and management. > Forest resources use and over exploitation, deforestation > Water resources, use and overutilization of surface and ground water > Fresh Marine and estuarine ecosystems; > Wetlands threats and management strategies		11
III	Biological Resources > Biodiversity-definition and types > Value of biodiversity > Biodiversity at global, national an regional levels > Threats; Management strategies; > Bioprospecting. IPR; CBD; National Biodiversity Action Plan). > Forests: Cover and its significance (with special reference to India); > Major and minor Forest products; > Renewable and non-renewable sources of energy.		11
IV	Contemporary practices in resource management > National and international efforts in resource management and conservation. > Waste management practices > Natural resource Accounting > Environmental impact assesement EIA > Geographical information System GIS > Participatory Appraisal of naturl Resource > Ecological Footprint with emphasis on carbon footprint,		11
Keywords	Resources, Biodiversity, Resources management, IPR, CBD.		

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 4. L. L. L.
 5. A. A. A.
 6. B. B. B.

7. S. S. S.
 8. T. T. T.
 9. H. H. H.
 10. W. W. W.

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Vasudevan, N. (2006). Essentials of Environmental Science. Narosa Publishing House, New Delhi.
2. Singh, J. S., Singh, S.P. and Gupta, S. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications, New Delhi.

Reference Books Recommended –

- 1, Rogers, P.P., Jalal, K.F. and Boyd, J.A. (2008). An Introduction to Sustainable Development. Prentice Hall of India Private Limited, New Delhi.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://www.sciencedirect.com/topics/social-sciences/natural-resource>
- <https://efaidnbmnnnibpcajpcglclefindmkaj/https://egyankosh.ac.in/bitstream/123456789/66166/2/Unit4.pdf>
- https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ers.usda.gov/webdocs/publications/41964/30289_biological.pdf?v=0#:~:text=16-What%20Are%20Biological%20Resources%3F,forests%2C%20and%20other%20natural%20lands.
- <http://surl.li/spcdd>
- <https://shorturl.at/ewyIP>
- <https://shorturl.at/cimof>

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBOs:

① R. S. ...
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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF BOTANY

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree/ Honors)		Semester - III	Session: 2024-2025
1	Course Code	BOSE -01 P	
2	Course Title	Lab course -01 (Natural resources and management)	
3	Course Type	Laboratory course	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	at the end of then of the sesn ○ To understand natural resources and their sustainable utilization. ○ Acquire knowledge on land, water, energy, and forest resources. ○ Students will learn about the practices of natural resource management. ○ Acquire knowledge on the international and national efforts of natural resource management.	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	1) To compare protected and unprotected grassland stands using community coefficients 2) To estimate IVI of the species in a woodland using point centered quarter method. 3) To find out important grassland species using chi square test. 4) Scientific visits to a protected area, a wet land, a mangrove, NBPGR, BSI, CSIR, ICAR labs and a recognized botanical gardens or a museum. 5) To determine diversity indices (Shannon Wiener, concentration of dominance, species richness, equability and B diversity. 6) Field survey of a part of town or city to make the students aware of the diversity of plants in urban ecosystems. 7) Estimation of solid waste generated by a domestic system (biodegradable and non biodegradable) and its impact on land degradation. 8) Collection of data on forest covers of specific area. 9) Measurement of dominance of woody species by DBH (diameter at breast height) method. 10) Calculation and analysis of ecological footprint. 11) Ecological modeling.		30
Keywords	Community coefficient, IVI, diversity indices		
Signature of Convener & Members (CBoS) :			

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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. A Handbook of Human Resource Management Practice
2. Environmental and Natural Resource Economics_ A Contemporary Approach
3. Sustainable Management of Natural Resources_ Mathematical Models and Methods (Environmental Science and Engineering Environmental Science)

Online Resources–

➤ e-Resources / e-books and e-learning portals

- 1) <https://shorturl.at/uIMTW>
- 2) <https://shorturl.at/yFJM3>

Online Resources–

➤ e-Resources / e-books and e-learning portals

- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks





Continuous Internal Assessment (CIA): 15 Marks





End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	

End Semester Exam (ESE): 35	Laboratory / Field Skill Performance: On spot Assessment	Managed by Course teacher as per lab. status
	A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree/ Honors)		Semester - III	Session: 2024-2025
1	Course Code	ZOSC-03T	
2	Course Title	Diversity of Invertebrates	
3	Course Type	Discipline Specific Course	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p>After successfully completing this course, the students will be able to -</p> <ul style="list-style-type: none"> ➤ Develop understanding on Invertebrate Animals on the basis of classification and Nomenclature. ➤ Develop understanding how simple/unicellular animals changed into multicellular and diploblastic forms through their anatomy and physiology. ➤ Gain Knowledge of key processes like formation of triploblastic animals (simple to complex form of body plan). ➤ Develop understanding on parasitic adaptations and life cycle of Helminthes. ➤ Develop understanding on the diversity in Artropoda, Mollusca and Echinodermata. 	
6	Credit Value	3 Credits	<i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	General Characters, Classification up to order and Type Study of Phylum Protozoa and Porifera with some special features: Protozoa: General Characters and Classification of Phylum Protozoa up to order. Type study: Paramoecium, Protozoa and Disease. Porifera: General Characters and Classification of Phylum Porifera up to order. Type study: Sycon.		11
II	General Characters, Classification and Type Study of Phylum Coelenterata, Helminthes and Annelida: Coelenterata - General Characters and Classification of Phylum Coelenterata up to order. Type Study: Obelia. Helminthes - Classification of Phylum Helminthes up to order. Type study: Fasciola. Annelida- Classification of Phylum Annelida up to order. Type study: Pheretima (Earthworm).		11
III	General Characters, Classification and Type Study of Phylum Arthropoda and Mollusca: Arthropoda - General Characters and Classification of Phylum Arthropoda up to order. Type study: Prawn. Mollusc- General Characters and Classification of Phylum Mollusca up to order. Type study: Pila.		12
IV	General Characters, Classification and Type Study of Phylum Echinodermata and Hemichordata: General Characters and Classification of Phylum Echinodermata up to order. Type Study: Asterias (Starfish). General Characters and Classification of Phylum Hemichordata Type Study: Balanoglossus		11
Keywords	Taxonomy, Nomenclature, Canal System, Protozoa, Balanoglossus, Torsion		
Signature of Convener & Members (CBoS) :			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- R.L. Kotpal, Modern Textbook of Zoology Invertebrates. Rastogi Publication, Gangotri, Shivaji Road, Meerut
- V.K. Tiwari, Unified Zoology, Shival Agrawal and Company, Pustak Prakashak, Khajuri Bazar, Indore.
- Dr. S.M. Saxsen, Zoology, Ist Year, by a, Ram Prasad and Sons, Agra and Bhopal.
- N. Arumugam, M.G. Ragnathan, T. Murugan, B. Ramnathan, A Textbook of Invertebrates by Saras Publication

Reference Books Recommended –

- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Boradale, L.A. and Potts, E.A.(1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
- Bushbaum, R. (1964). Animals without Backbones. University of Chicago Press.
- Hyman, L.H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.
-

Online Resources–

- [http://ndl.iitkgp.ac.in/he document/inflibnet eggp/inflibnet eggp/IN I e P P 1 Z 512 96 P 0 B o p 51542 M 1 M L c P D a P o E P 1 51562 51563?e=9|*||](http://ndl.iitkgp.ac.in/he%20document/inflibnet%20eggp/inflibnet%20eggp/IN%20I%20e%20P%20P%201%20Z%20512%2096%20P%200%20B%20o%20p%2051542%20M%201%20M%20L%20c%20P%20D%20a%20P%20o%20E%20P%201%2051562%2051563?e=9|*||)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10	
	Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:









FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in life Science <i>(Diploma / Degree/ Honors)</i>		Semester - III	Session: 2024-2025
1	Course Code	ZOSC-03P	
2	Course Title	Diversity of Invertebrates	
3	Course Type	Discipline Specific Lab Course	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<p>After successfully completing lab course the students will be able to-</p> <ul style="list-style-type: none"> ➤ Develop understanding on the diversity of life with regard nonchordates. ➤ Gain Knowledge of grouping of animals on the basis of their morphological characteristics. ➤ Develop critical understanding how animals have changed from simple form to complex body plan. ➤ Acquired the detailed knowledge to think and interpret different animal species individually. 	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<p style="text-align: center;">List of labs to be conducted</p> <ul style="list-style-type: none"> • Study of different non-chordate taxa animals through models, slides and museum specimens in the laboratory. Emphasising classification, biogeography and diagnostic features of: Protozoa, Porifera, Coelenterata (also with special reference to Corals of Cnidarians), Helminthes, Annelida, Arthropoda, Mollusca and Echinodermata. • Histological slides of different Non chordate Taxa, slides of various larval forms of Helminthes, Crustacea and Echinodermata • Dissection of <i>Pheretima</i> to expose Alimentary canal and circum pharyngeal ganglia through Alternative methods of dissection. • Dissection of <i>Periplaneta</i> to expose the digestive system, salivary glands and Mouth Parts through Alternative methods of dissection. • Dissection of Prawn to expose appendages and statocyst through Alternative methods of dissection • Dissection of <i>Pila</i> to expose Nervous System through Alternative methods of dissection. • Study of Invertebrate animals in nature during a survey of a National Park/ Forest area/College campus. • Group discussion/Viva or Seminar presentation on two related topics: Polymorphism, Parasitic adaptations, Freshwater sponges, Biodiversity and climate change, Tree of Life, Marine zooplanktons and their ecological importance including oxygen evolution. • An “animal album or Practical Record” containing sketches, photographs, cut outs, with appropriate write up about the above mentioned taxa. • Study of some videos to develop understanding on the animals of different taxa. 		30
Keywords	<i>Museum specimens, Histological slides, Alternative of Dissection, Animal album</i>		
Signature of Convener & Members (CBoS) :			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- S.S. Lal, Practical Zoology, Invertebrate. 12th Edition Rastogi Publications, Meerut, New Delhi.
- A manual of practical Zoology. Dr. P.S Verma, S. Chand Publication, New Delhi

Reference Books Recommended-

- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
- Hyman, L H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.

Online Resources–

- <https://www.youtube.com/watch?v=GC5Ua6m873I>
- <https://www.youtube.com/watch?v=-qyM2Hskj84>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance - 05 Total Marks - 15	
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment	
	A. Performed the Task based on lab. work - 20 Marks	Managed by Course teacher as per lab. status
	B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

S. K. Bahadur

[Signature]

[Signature]

[Signature]

[Signature]

[Signature]

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science <i>(Diploma / Degree/Honors)</i>		Semester - III	Session: 2024-2025
1	Course Code	ZOSE- 01T	
2	Course Title	Parasitology	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➤ Students should comprehend the life cycles of various parasites, including their modes of transmission, intermediate hosts, and definitive hosts. ➤ Gain insights into the interactions between parasites and their hosts; including mechanisms of host invasion, evasion of host defenses, and pathogenesis. ➤ Develop the ability to recognize clinical manifestations associated with parasitic infections ➤ Understand the epidemiology of parasitic diseases ➤ Communicate effectively about parasitic diseases, including educating the public. 	
6	Credit Value	3 Credits	<i>Credit = 15 Hours - learning & Observation</i>
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Viral diseases: General characters, Structure and Classification of virus, A brief account of pathogenic viruses. Brief history of microbiology: germ theory of disease, Host pathogen interaction: invasion, antigenic heterogeneity, toxins and enzymes secretions. Viral diseases: hepatitis, influenza, AIDS, Covid -19 with emphasis on their causative agents, pathogenesis, diagnosis, prophylaxis and chemotherapy.		12
II	Bacterial & Fungal diseases: General characters, Structure and Classification of bacteria. Bacterial Diseases: A brief account of pathogenic bacteria, discovery of penicillin, diseases caused by <i>Streptococcus pneumonia</i> , <i>Salmonella typhi</i> , <i>Escherichia coli</i> , <i>Mycobacterium tuberculosis</i> , <i>Rickettsia</i> , <i>Spirochaetes</i> Fungal diseases: Ringworm infection, <i>Aspergillosis</i> , <i>candidiasis</i> .		11
III	Protozoan parasites: An overview of protozoa & disease. Introduction to parasites and parasitic diseases. Mode of transmission, portals of entry and implications of parasitism. Parasitic adaptations. Concept of zoonotic diseases. Protozoan diseases of medical importance: Brief account of life History, pathogenicity of the following Protozoa with reference to Man, prophylaxis and treatment: <i>Entamoeba histolitica</i> , <i>Trypanosoma gambiens</i> , <i>Plasmodium vivex</i> , <i>Giardia</i> .		11
IV	Helminth parasites: An overview of Helminthic diseases. Brief account of life History, pathogenicity of the following Helminths with reference to Man, prophylaxis and treatment. <i>Taenia solium</i> , <i>Schistosoma haematobium</i> , <i>Ascaris lumbricoides</i> , <i>Wuchereria branrofti</i> . Vector insects.		11
Keywords	<i>Micrology, pathogenic bacteria, Protozoan parasites, Helminth parasites, Toxicology, toxic againts</i>		
Signature of Convener & Members (CBoS) :			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Agrawal Anju Principles of Toxicology
- Parija, S. C. (2013) Textbook of Medical Parasitology, Protozoology & Helminthology (Text and colour Atlas), IV Edition, All India Publishers & Distributers, New Delhi.
- Ichhpujani, R.L. and Bhatia, R. (2009) Medical Parasitology. III Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi
- Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group.
- Chatterjee, K. D. (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.
- Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors
- Chatterjee, K.D (2015) Parasitology (13th edition)

Reference Books Recommended –

- Jawetz, M. and Adelberg (2015) Medical Microbiology (27th edition)
- Noble, E.R. and Noble, G.A. (1989) Parasitology: The Biology of Animal Parasites. VI Edition, Lea and Febiger

Online Resources–

- http://ndl.iitkgp.ac.in/he document/inflibnet epgp/inflibnet epgp/IN I e P P 1 Z 512 96 P 0 B o p 51542 M 1 M L c P D a P o E P 1 51562 51563?e=9|*||
- http://ndl.iitkgp.ac.in/he document/inflibnet epgp/inflibnet epgp/IN I e P P 1 Z 512 96 P 0 B o p 51542 M 2 P d a p o w b 51594 51595?e=3|*||

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

(Handwritten signatures in blue ink)

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Science (Diploma / Degree/ Honors)		Semester - III	Session: 2024-2025
1	Course Code	ZOSE- 01P	
2	Course Title	Parasitology	
3	Course Type	Discipline Specific Elective Lab Course	
4	Pre-requisite (if, any)	<i>As per Program</i>	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able - ➤ Identify common parasitic Protozoa and Helminth. ➤ Learn techniques for studying growth of bacteria and its staining. ➤ Learn the techniques for examine Sputum, Blood, Urine and Stool samples for pathology	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> ➤ Study of permanent slides and specimens of parasitic Protozoans and Helminthes. ➤ Pathological examination of sputum, blood, urine and stool. ➤ Blood: Erythrocyte Sedimentation Rate (ESR), Haematocrit. ➤ Staining and identification of Gram positive and Gram negative bacteria. ➤ Preparation of thin and thick blood films to diagnose Plasmodium infections/ or permanent slides. ➤ Preparation of temporary and permanent slides of faecal matter by saline preparation and concentration techniques to identify cysts of parasitic Protozoans and Helminthes eggs /or parmanant slides studies. ➤ Study Kinetics of bacterial growth and staining techniques. ➤ Group discussion or Seminar presentation on one or two related topics ➤ Group discussion/quiz/seminar on topics related to theory. ➤ Preparation of practical record or Album of parasites. 		30
Keywords	<i>Parasitic protozoa, helminth, ESR, Gram positive and Gram negative</i>		
Signature of Convener & Members (CBoS) :			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Ghosh Saugala, Panikar's Text book of Parasitology. Jaipye Brothers
- Ananthanarayan and Paniker's Textbook of Microbiology, Twelfth Edition, Universities press

Reference Books Recommended –

- K.D. Chattarjee, Parasitology . CBS Publisher

Online Resources–

- http://ndl.iitkgp.ac.in/he document/swayam ugc moocs/swayam ugc moocs/IN S U M 1 U C 17 A D 4127 M L h o A L w P A o A L 34326 34327?e=7*|||
- http://ndl.iitkgp.ac.in/he document/swayam ugc moocs/swayam ugc moocs/IN S U M 1 U C 17 A D 4127 M L h o T s a F h 10250 10251?e=8*|||

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work - 20 Marks B. Spotting based on tools & technology (written) – 10 Marks C. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener & Members of CBoS:

S. Sahalkar *Dr. ...* *Prof. ...* *...* *...*

Dr. ... *...*

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF MICROBIOLOGY

COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Diploma/Degree)		Semester - III/IV	
Session: 2024-25			
1	Course Code	MBVAC-01	
2	Course Title	Microbes and Human Health	
3	Course Type	Value Added Course (VAC)	
4	Prerequisite (If Any)	As per Program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to – <ul style="list-style-type: none"> ➤ define the basic concept of Infection and disease ➤ explain various serological tests ➤ illustrate the basic knowledge of Immune status of human body ➤ identify various infectious diseases 	
6	Credit Value	02 Credits	Credit = 15 Hours - Learning & Observation
7	Total Marks	Max. Marks: 50	Minimum Pass marks: 20
PART – B: Content of the Course			
Total No. of Teaching-Learning Periods: (01 Hr. per Period) - 30 Periods (30 Hours)			
Unit	Topics (Course contents)		No. of Periods
I	Infection & Disease: Difference between infection and disease, Important terminologies along with suitable examples; primary infection, secondary infection, contagious infection, nosocomial infections, clinical infection, subclinical infection, zoonoses, vector borne infection. Epidemic, endemic and pandemic diseases.		08
II	Routes of entry and transmission of disease: Portal of entry, Portal of exit, Reservoir, susceptible host. Direct contact, indirect contact, Airborne, vector borne, blood borne, non-contact vehicle transmission. Exposure, risk and standard precautions, expanded precautions. Control of routes of transmission.		08
III	Serological reactions: Basic concept of serological reactions, blood cell counting, Agglutination, precipitation. Blood group determination, Widal test, VDRL test. Total RBC count, Total leucocyte count, Platelet count, Differential count, Estimation of haemoglobin.		07
IV	Viral and Bacterial infection: Common water borne infections, air borne infections; their causes, sign & symptoms, pathogenesis, diagnosis, treatment and prevention.		07
Key Words	Infection, Disease, Virulence, Pathogenesis		

Name and Signature of Convener and Members of CBoS

Dank
10/6/24

Shilpa
10/6/24

Sunil
10.6.24

Rashmi
10.6.24

Dr. N. K. P. Choudhary
10.6.24

Dr. N. K. P. Choudhary
Dr. N. K. P. Choudhary

Dr. N. K. P. Choudhary
(Dr. S. Nagu)

PART – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. A Text Book of Microbiology; Dubey & Maheshwari.
2. General Microbiology; Vol I & II, Powar C.B. and Dagainawala H.I., Himalayn Pub. House, Bombay.
3. Text book of Microbiology; Ananthanarayan R. and Paniker C.K.J. (2009). 8th edition, University Press Publication
4. A Text Book of Microbiology; P. Chakraborty, 3rd Edn, New Central book Agency (P) Ltd, Kolkata, India 2005.

Reference Books:

1. Preventive and Social Medicine, Park and Park

- https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBMA1302.pdf
- <https://www.news-medical.net/health/Modes-of-Transmission.aspx>
- <https://courses.lumenlearning.com/suny-microbiology/chapter/how-pathogens-cause-disease/>

PART – D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/ Quiz – (2): 10 & 10 Assignment/ Seminar + Attendance: 05 Total Marks: 15	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 15 Marks
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End Semester Exam (ESE):	Two Section – A & B Section A: Q1. Objective 05 X 1 = 05 Mark; Q2. Short answer type – 5X2 = 10 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit – 4X05 = 20 Marks
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Name and Signature of Convener and Members of CBoS

Plab
10/6/24

Sum
10.6.24

Roshmi
10.6.24

Dr. Nelson xers
10.6.24

Dr. Swetha Nagar
10/6/24

Dr. V. Shanthi
10/6/24

Sadhana
10-6-24

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor (Certificate / Diploma / Degree)		Semester – I/III/V	Session: 2024-2025
1	Course Code	ZOVAC-01	
2	Course Title	Public Health and Hygiene	
3	Course Type	Value Added Course	
4	Pre-requisite(if, any)	<i>As per Program</i>	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Understand the importance of hygiene. ➤ Identify current national and global public health problems. ➤ Aware about the issues of food safety, water safety, vaccination, and obesity. ➤ Create general medical awareness in daily life. ➤ Analyze the measures to live a healthy life. 	
6	Credit Value	2 Credits	<i>Credit = 15 Hours -learning & Observation</i>
7	Total Marks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 30 Periods (30 Hours)			
Unit	Topics (Course Contents)	No. of Period	
I	Maintenance of personal hygiene: Introduction to public health and hygiene: determinants and factors. Pollution and health hazards: Water and air borne diseases. Radiation hazards: Network Towers and electronic gadgets (recommended levels, effects and precaution). Personal hygiene: Oral hygiene, Menstrual Hygiene, Ideal hand washing methods, Ideal food keeping methods.	07	
II	Nutrition and Health: Classification of food into micro and macro nutrients. Balanced diet. Importance of dietary fibres. Significance of breast feeding. Malnutrition anomalies: Anaemia (Iron and B12 deficiency), Kwashiorkar, Marasmus, Rickets, Goiter (cause, symptoms, precaution and cure).	07	
III	Communicable/Contagious and Non-Communicable Diseases: Communicable viral diseases: measles, chicken pox, swine flu (their causal agents, symptoms and prevention). Communicable bacterial diseases: tuberculosis, typhoid, cholera (their causal agents, symptoms and prevention). Sexually transmitted diseases: AIDS, Syphilis (their causal agents, symptoms and prevention). Non-communicable diseases: hypertension, arthritis, Diabetes, peptic ulcer, obesity, depression and anxiety (their causal agents, symptoms and prevention).	09	
IV	Public Health Management & General Medical Awareness: Vaccination, Benefits of institutional deliveries, Deworming drive: Use of Albendazole. First Aid: Electrocutation, Road Accident, Burn, Lightning Strike, Envenomation. Importance of Cardiopulmonary resuscitation (CPR). Blood Donation: Eligibility, Health Screening. Road Safety: Good Samaritan, General safety precautions on Road and Motion Sickness. Fire Safety: Fire Control and Fire Extinguisher Categories.	07	
Keywords	Health, Hygiene, Nutrition, Disorders, Vaccination, Safety, Fire, Blood, Medication.		
Signature of Convener & Members (CBoS):			

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Mary Jane Schneider (2011) Introduction to Public Health.
- Muthu, V.K. (2014) A Short Book of Public Health.

Reference Books Recommended

- Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
- Gibney, M.J. (2013) Public Health Nutrition.
- Wong, K.V. (2017) Nutrition, Health and Disease.

Online Resources–

- <https://www.fda.gov/drugs/investigational-new-drug-ind-application/general-drug-categories>
- <https://www.nfpa.org/news-blogs-and-articles/blogs/2023/08/01/fire-extinguisher-types>
- <https://www.redcross.org/take-a-class/cpr/performing-cpr/what-is-cpr#:~:text=What%20Is%20the%20Purpose%20of,healthcare%20workers%20and%20emergency%20responders.>
- <https://unesdoc.unesco.org/ark:/48223/pf0000226792>

Online Resources–

- https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S001827/P001833/M029447/ET/15245666876.21Q1.pdf
- https://www.nhm.gov.in/images/pdf/programmes/mhs/Training_Materials/PDF_English/reading_material.pdf

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA):
(By Course Teacher)

Internal Test / Quiz-(2): 10 & 10
Assignment/Seminar + Attendance- 05
Total Marks -15

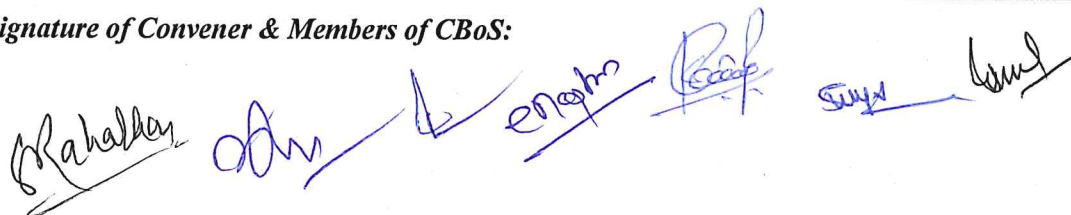
Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):

Two section – A & B

Section A: Q1. Objective – 05 x 1 = 05 Mark; Q2. Short answer type- 5 x 2 = 10 Marks
Section B: Descriptive answer type qts., 1 out of 2 from each unit- 4 x 05 = 20 Marks

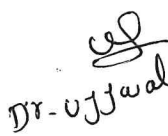
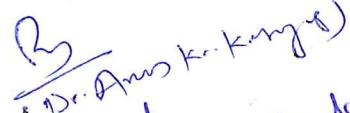
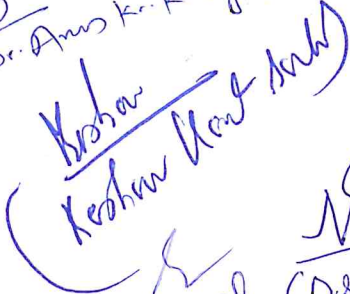
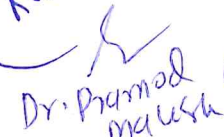
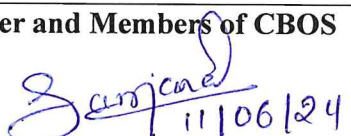
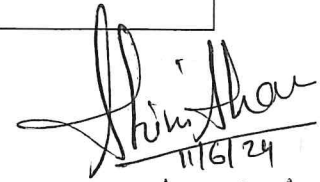
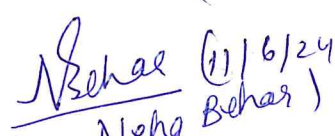
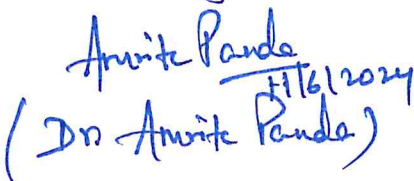
Name and Signature of Convener & Members of CBoS:



**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
COURSE CURRICULUM**

PART A: INTRODUCTION		
Program: Certificate Course		Semester- I Sem
		Session: 2024-25
1	Course Code	AEC 01
2	Course Title	Environmental Studies
3	Course Type	Ability Enhancement Course (AEC)
4	Prerequisite (If Any)	As per requirement
5	Course Outcome (CO)	At the end of this course, students will be able to – CO 01: relate the basic concept of the environment CO 02: explain environmental alterations CO 03: develop skills in environmental measurement CO 04: examine correction measures of the environment
6	Credit Value	02 C 01 Credit = 15 Hrs. Teaching-Learning
7	Total Marks	Max. Marks: 50 Minimum Pass marks: 20
PART: B CONTENT OF THE COURSE		
Total No. of Teaching-Learning Periods: 30Hours/ 30Periods		
UNIT	TOPIC (Course Contents)	No. of Hours
I	Basic Composition: 1. Abiotic and Biotic components of the environment 2. Biodiversity—Concept, types, and measures about its protection 3. Basic concept of Bio-Geo Chemical Cycle 4. Energy Flow in an ecosystem	07
II	Alterations in Environment: 1. Concept and components of the pond ecosystem 2. Air pollution and measures for its control 3. Water pollution and measures for its control 4. Global warming, Climate change, and possible measures	07
III	Measurements of Environmental Components 1. Soil composition and methods of its analysis 2. Water analysis methods for DO, BOD, COD 3. Water analysis methods for pH, TDS, Turbidity, Salinity, and Alkalinity 4. Information about environmental factors—PM-10, PM-2.5, NO ₂ , O ₃	08
IV	Application Measures 1. Useful microbes to control water pollution 2. Useful microbes to control soil pollution 3. Concept of Biodegradation 4. Concept of Phytoremediation	08
Key Words	Ecosystem, Pollution, Climate Change, Biodegradation	

Name and Signature of Convener and Members of CBOS

 Dr. Ujjwal Sagar
 Dr. Anurag K. Kung'u
 Keshav Khatwani
 Dr. Pramod Malush
 Dr. Sanjana Bhagat
 Dr. Shirani Shrivastava
 Dr. Neha Behar
 Dr. Anvite Panda

PART-C: Learning Resources

Text Books, Reference Books, and Others

Text Books Recommended –

1. Ecology and Environment, 8th Edition, P.D.Sharma, Rastogi Publication, Meerut.
2. Environmental Biology, 2nd Edition, P.D.Sharma, Rastogi Publication, Meerut.
3. Environmental Biology and Toxicology, 2nd Edition, P.D.Sharma, Rastogi Publication, Meerut.
4. Environmental Studies, 1st Edition, S.V.S.Rana, Rastogi Publication, Meerut.
5. Environmental Biotechnology, 1st Edition, S. V. S. Rana, Rastogi Publication, Meerut.

Online Resources–

- e-Resources / e-books and e-learning portals

Online Resources–

- e-Resources / e-books and e-learning portals

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks


Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

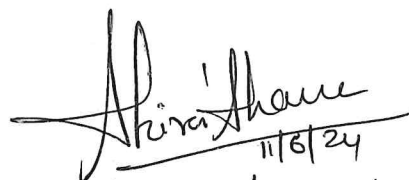
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2):	10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar +Attendance -	05	
	Total Marks -	15	

End Semester Exam (ESE):	Two sections – A & B Section A: Q1. Objective – 05 x1= 05 Mark; Q2. Short answer type- 5x2 =10 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit- 4x05 =20 Marks
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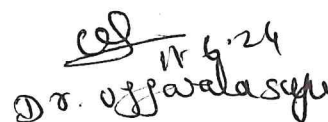
Name and Signature of Convener & Members of CBoS:


11/06/24

(Dr. Sanjani Bhagat)

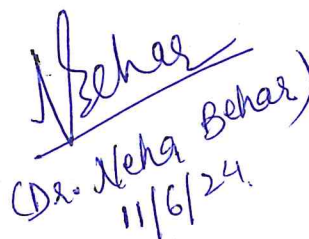

11/6/24

(Dr. Shivani Sharma)

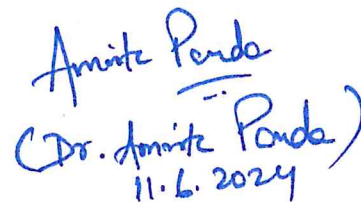

11/6/24
Dr. Ujjwal Singh

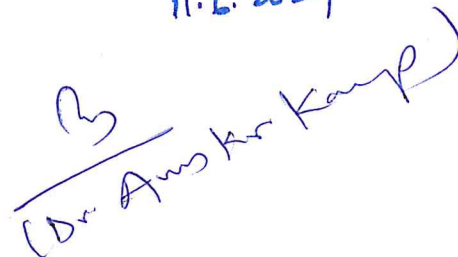

11/06/24


(Dr. Shubha Diwan)


11/6/24
Dr. Neha Behar

(Dr. Neha Behar)


11.6.2024
Dr. Amite Pande


Dr. Anurag Kaur


Dr. Pramod Kumar Mahesh