SHRI DAVARA UNIVERSITY

NAYA RAIPUR (C.G.)

PROGRAMME CURRICULUM

FOR

BECHELOR IN LIFE SCIENCES

(PHYSICS, CHEMISTRY, AND BIOLOGY(PCB)

SEMESTER-III

AS PER NEW EDUCATION POLICY-2020

AND

NATIONAL EDUCATION POLICY-2025

FOUR YEAR UNDERGRADUATE PROGRAMME- 2024-25

(EFFECTIVE FROM THE SESSION-2024-2025)

Established under Chhattisgarh Private Universities (Establishment and Operation) Act, 2005

SEMESTER III

S.NO	COURSE CODE	COURSE TITLE	TEACHING HOURS PER WEEK				EXAMINATION SCHEME				
DISCIPLINE SPECIFIC COURSE (DSC)			L	T	P	C	THEORY		PRACTICAL		TOTAL MARKS
							EX	IN	EX	IN	
1.	CHSC-03T	INORGANIC AND PHYSICAL CHEMISTRY - I	3	0	0	3	70	30	-	-	100
2.	PHSC-O3T	HEAT AND THERMODYNAMICS	3	0	0	3	70	30	-	-	100
3.	ZOSC-03T	DIVERSITY OF INVERTEBRATES	3	0	0	3	70	30	-	-	100
DISCIPLINE GENERAL ELECTIVE COURSE (GE)/DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE)											
4.	SCGE-03	BASICS OF NUTRITION	3	1	0	4	70	30	-	-	100
5.	CHSE-01T (E-I)	BASIC ANALYTICAL CHEMISTRY	3	0	0	3	70	30	-	-	100
6.	PHSE-01T(E-II)	INTRODUCTION TO STATISTICAL MECHANICS	3	1	0	4	70	30	-	-	100
7.	ZOSE-01T(E-III)	PARASITOLOGY	3	0	0	3	70	30	-	-	100
ABILITY ENHANCEMENT COURSE (AEC)											
8.	AEC-02	ENVIRONMENTAL STUDIES	2	0	0	2	35	15	-	-	50
VALUE ADDITION COURSE (VAC)											
9.	VAC-02	DISASTER MANAGEMENT	1	1	0	2	35	15	-	-	50
PRACTICALS (LAB)											
10.	CHSC-03P	INORGANIC AND PHYSICAL CHEMISTRY – I LAB COURSE	0	0	2	1	-	-	35	15	50
11.	PHSC-32P	HEAT AND THERMODYNAMICS LAB COURSE	0	0	2	1	-	-	35	15	50
12.	ZOSC-03P	DIVERSITY OF INVERTEBRATES LAB COURSE	0	0	2	1	-	-	35	15	50
13.	CHSE-01P(E-I)	BASIC ANALYTICAL CHEMISTRY LAB COURSE	0	0	2	1	-	-	35	15	50
14.	ZOSE-01P(E-III)	PARASITOLOGY LAB COURSE	0	0	2	1	-	-	35	15	50
Total Contact hours Per Week:30		Total credit:				20	Total mark				650/ (700 WITH DSE)

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**CHSC-03T**		
Course Title	**INORGANIC AND PHYSICAL CHEMISTRY - I**		
Course Type	**Discipline Specific course (DSC)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to** ➢ **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**.		
Credit Value	**3 Credits**	**Credit =15 Hours-learning & Observation**	
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)	
I	**Chemistry of d & f-block elements** **A. d-block elements (f hrs.)** Chemistry of elements of first transition series: Characteristic properties of the elements of first transition series with reference to their: Electronics configuration, Atomic and ionic radii, Ionization potential, Variable oxidation states, Magnetic properties, Color, Complex formation tendency and catalytic activity. 1. Chemistry od 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. **B. F-block elements (6hrs.)** Chemistry of Lanthanide & Actinides: Electronic structure, oxidation states, ionic radii, magnetic, and spectral properties. Lanthanide contraction and its consequences, extraction and ion exchange method. General features **and** Chemistry of actinides, Transuranic elements, chemistry of separation of Mp, Pu and Am from Am from uranium, similarities between the later actinides and the later lanthanides.	12
II	**Oxidation and reduction (5 Hrs.)**	

	Various definitions of oxidation and reduction, Balancing of redox reaction by ion-electron method, Latimer diagram of Chlorine and Oxygen, Frost diagram of Mitogen and Oxygen and Pourbaix diagrams of Iron. Predicting disproportionation and comproportionating phenomena. **Coordination Chemistry (6 Hrs)** A. Coordination compounds: Distinction among simple salts, double salts, and coordination compounds. Terminology and nomenclature of Coordination 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. **B)** Isomerism in coordination compounds: structural isomerism and Stereoisomerism (Geometrical and optical) in coordination compounds with four and six coordination numbers.	11
III	**Thermodynamics-I: (5 Hrs.)** **A.** Basic concept of thermodynamics: System, surrounding, types of system (closed, open & isolated). Intensive & extensive properties. Thermodynamics processes: isothermal, adiabatic, isobaric, isochoric, isochoric, cyclic, reversible & irreversible. State fiction& 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. 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. **B. Thermochemistry (2 hrs.)** Standards. 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). **C. Thermodynamics II (4 hrs.)** Second law of thermodynamics: Limitations of first law and need for the second 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- Helmoholtzeqation. **D. Thirst law of thermodynamics (1hr)** **E.** Statements of third law, Nernst heat theorem, Absolute entropy of solids, liquids, and gases.	11
IV	**Electrochemistry-I** 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.	11

	Single electrode potential, standard electrode potential, electrochemical series and its applications. Concept of overvoltage. 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. Migration of ions: Transport nimbler-definition and determination by Hittorf method and moving boundary method. 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 AG, AH and AS for cell reaction, polarization, Over potential and hydrogen overvoltage.	
Keywords	***D & f-blocks elements, Coordination compounds, Werner's theory, VBT, Isomerism, Thermodynamics, thermochemistry, Electrical/electrolytical conductance, Transport number.***	
Signature of Convener & Members (CBoS)		

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

- Jauhar, S.P.(2010). Modern Approuch to Inorganic Chemistry: A Textbook for B.Sc. I Students. Modern publishers.
- Bajpai, D. N.(1992), Advanced book of physical chemistry. S. Chand publishing.
- Sharma, K.K. & Sharma, L.K. (2016), A Textbook of physical chemistry. Vikas publishing.
- Bhasin, K. K. (2018), Pradeep's Inorganic ChemistryVol. III. Pradeep publications.
- Puri, S. & Sharma, L. R. (20008), Kalia" Principles of Inorganic Chemistry."

Text Books Recommended-

1. Lee, J.D. (2008), Concise inorganic chemistry. John Wiley & Sons.
2. Cotton, F.A. Wilkinson,G. & Gaur, 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. McQureeie, D.A.& Simon, J.D. (2004), Molecular Thermodynamics Viva Books Pvt. Ltd: New Delhi.

Online Resources-

- e-books and e-learning portals
- https://bit.lv/3AvV3mZ
- https://bit.ly/30V85z
- https://bit.ly/3C9PXPS
- https://bit.ly/301p9rZ
- https://bit.ly/BPnwqe

Online Resources-
e-sources/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
End Semester Exam (ESE):	70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test/Quiz:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

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End Semester Exam (ESE):70	Two section A&B Section A: Q1 Objective 10∗1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-III**	**Session: 2024-2025**
Course Code	**CHSC-03P**		
Course Title	**Lab. Course -01 INORGANIC AND PHYSICAL CHEMISTRY - I**		
Course Type	**Laboratory course**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to-** ➢ **Understand the principle of determining transition temperature of hydrated or other allotropic salts.** ➢ **Employ the principle of determination of stability of a given salt at different temperature.** ➢ **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.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	**Transition Temperature :** (1) Transition temperature of a salt hydrate – determination of molecular weight . (2) Determination of the transition of the temperature of the given substance by thermometric / dilatometric method (e.g. SrBr2. 2H2O or MnCl2.4H2O). **Thermochemistry** A. Determination of solubility: (1) To determine the enthalpy of neutralization of hydrochloric acid (strong acid) by sodium hydroxide (strong base) solution. (2) (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. (b) To determine the enthalpy of neutralization of a weak base (ammonium hydroxide) verses strong acid (hydrochloric acid) and determine enthalpy of ionization of weak base. (3) To determine the enthalpy of solution of solid calcium chloride and calculate the lattice energy. **Conductometry** (1) Conductometry – Determination of limiting molar conductance of a strong Electrolyte (KCl). (2) To determine the strength of the given acid (HCl) or CH3COOH) conductometric ally using standard alkali (NaOH) solution.	30

	(3) To determine the strength of strong acid and a weak acid in the given mixture conductometric ally against a standard alkali mixture. (4) To determine the ionization constant of weak acid conductometric ally. Solubility Product (1) To determine the solubility and solubility product of a sparingly soluble salt conductometric ally. (2) Potentiometry – Determination of solubility product of a sparingly soluble substance.	
Keywords	**Solution , Acid , Alkali, Transition temperature Thermochemistry, Temperature , Enthalpy, Conductometric titration, Potentiometric titration, Solubility product.**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

- Vishwanathan, B.&.Raghavan, P.S. (2017), Practical Physical Chemistry.Viva books organals publishing.
- Yadav, J. B. (2006), Advanced Practical Physical Chemistry. Krishna Prakashan Media.
- Sahu, D. P. &Bapai, K. N. (2022), Unified practical chemistry. NavbodhPrakashan.

Reference Books Recommended-

- Moudgill, H.K. (2010), Textbook of physical chemistry. PHI Learning Pvt. Ltd.
- Adamson, A. (2012), A. Textbook of physical chemistry. Elsevier. Findlay. A. (1923), Practical Physical Chemistry.Langmaans, Green.

Online Resources-

- E-resources/e-books and e-learning portals
- http://www.swayam.ac.in
- http://www.ignou.ac.in
- www.egyankosh.ac.in
- www.litm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in

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

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/
- https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html

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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):3	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Performed the Task based on lab, work (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks

5	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**PHSC-3T**		
Course Title	**Heat and Thermodynamics**		
Course Type	**Discipline Specific course (DSC)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to** ➢ **Demonstrate a deep Comprehension of the fundamental principles of thermodynamics.** ➢ **Apply the law of thermodynamics to analyze and slow problems related with energy transfer, heat engines, refrigeration system and other thermodynamic processes.** ➢ **Analyze basic of kinetics theory and transport phenomenon in gases.**		
Credit Value	**3 Credits**	**Credit =45 Hours-learning & Observation**	
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)	
I	**Historical background:** A brief historical background of Thermodynamics and statistical Physics in the context of India and Indian culture, Contribution of S.N. Bose in statistical mechanics. **Law of Thermodynamics:** Thermodynamic Description of system, Zeroth Law of Thermodynamics & temperature. First law and internal energy, conversion of heat into work, various thermo dynamical Processes, Work done during Isothermal & adiabatic Processes, Second Law of Thermodynamics & Entropy, Third Law of Thermodynamics.	12
II	**Thermodynamic Potentials :** Internal Energy, Enthalpy, Helmholtz Free Energy & Gibbs function, Maxwell's relations & applications, Clausius- Clapeyron Equation, Thermodynamic energy equation-change in internal energy of an ideal and Vander Waals gas, Joule – Thompson effect, Cooling by adiabatic demagnetization.	11
III	**Kinetic Theory of Gases:** Maxwell an distribution of speeds in an ideal gas: distribution of speeds and velocities, Experimental verification, distinction between mean, rams and most probable speed values, Molecular Collision and Mean Free Path. **Transport Phenomena in gases:**	11

	Viscosity, Conduction and Diffusion, Law of equipartition of energy.	
IV	**Theory of Radiation:** Blackbody radiation, Spectral distribution, Concept of Energy Density, Stefan Boltzmann Law, Newton's law of cooling from Stefan Boltzmann's law. Wien's displacement law and Rayleigh-Jeans Law (Only qualitative). Planck's radiation Law, Deduction of Wien's distribution law and Rayleigh Jeans Law from Planck's law. Experimental verification of Planck's radiation law.	11
Keywords	**Zeroth and First Law of Thermodynamics, Second Law of Thermodynamics, Entropy, Thermodynamic Potentials, Maxwell's Thermodynamic Relations Kinetic Theory of Gases. Distribution of Velocitigs, Molecular Collisions, Real Gases, Laws of radiation**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

1. Heat and Thermodynamics: Singhal, Agrawal and SatyaPrakash, Pragati Prakashan 1984
2. Physics (Part-2): Editor, Prof. B.P.Chandra, M.P. Hindi Granth Academy
3. Unified Physics-II R.P.Goyal, Shivlal Agrawal& Sons
4. Unified Physics-II. Novbodh Prakashan

Text Books Recommended-

1. Thermodynamics, Kinetic theory & Statistical thermodynamics, F.W.Sears & G.L.Salinger. 1988,Narosa
2. Energy Science in Vedas: A Treatise on Vedic Thermodynamics and Free Energy (Exploring Lost Science and Technology in Vedas), Ramesh Kumar Mineria, Priya Veda Publications

Online Resources-

- e-books and e-learning portals
- http://www.swayam.ac.in
- http://www.ignou.ac.in
- http://www.egyankosh.ac.in
- http://www.itm.sc.in
- http://www.eskillindia.org
- http://www.eshiksha.mp.gov.in
- http://www.viah.co.in
- http://www.internshala.com

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

- https://www.pbs.org/video/botany-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

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End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks, Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-III**	**Session: 2024-2025**
Course Code	**PHSC-03P**		
Course Title	**Lab.Course-02 (Heat & Thermodynamics)**		
Course Type	**Laboratory course**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to** ➢ **Assemble required parts/devices and arrange them to perform experiments.** ➢ **Record/ observe data as required by the experimental objectives.** ➢ **Analyze recorded data and formulate it to get desired results.** ➢ **Interpret results and check for attainment of proposed objectives related to laws of mechanics and its applications.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	1.To determine the thermal conductivity of a non-conducting material by Lee's disc method. 2.To study the variation of thermo emf across two junctions of a thermocouple with Temperature. 3.To verify Newton's law of cooling. 4.To determine the temperature co-efficient of resistance by Platinum resistance Thermometer. 5.To determine the coefficient of thermal conductivity(k) of a rubber tube. 6.To study the heat efficiency of an electric kettle with varying voltage 7. To determine the ratio of specific heat at constant pressure and constant volume (y-Cp/Cv) of air Clement and Desorme's method. 8.To determine the coefficient of thermal conductivity of copper by Searle's Apparatus.	30

	9. To study the variation of thermos-Emf of thermos couple with Difference of Temperature of its Two Junctions. 10.To determine Mechanical Equivalent of Heat, J, by Callender and Bame's Constant Flow method. 11. Measurement of Planck's constant using black body radiation. 12.To determine Stefan's Constant.	
Keywords	**Thermal conductivity, Thermocouple, Newton's law of cooling. Temperature coefficient of resistance, Heat efficiency, Specific heat ratio, Mechanical equivalent of heat, Plank Constant.**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-C: Learning Resources

1. Advanced Practical Physics for students, B.L..Flint &H.T.Worsnop, 1971, Asia Publishing House.

2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

3. A Text Book of Practical Physics, InduPrakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.

4. A Laboratory Manual of Physics for Undergraduate Classes, D.P. Khandelwal, 1985, Vani Publication.

5. Unified Practical Physics B.Sc II: R P Goyal, Shivlal Agrawal & Sons Publications

Text Books Recommended-

1. Practical Physics by C.L..Arora
2. Practical Physics by S.L. Gupta and Vijay Kumar
3. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint.

Online Resources-

- E-resources/e-books and e-learning portals
- http://www.swayam.ac.in
- http://www.ignou.ac.in
- www.egyankosh.ac.in
- www.litm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in

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

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/
- https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html

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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks

(ESE):35	B: Sporting based on lab, work (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks
Signature of Convener & Members (CBoS)	

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**ZOSC-03T**		
Course Title	**Diversity of Invertebrates**		
Course Type	**Discipline Specific course (DSC)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **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 Arthropoda, Mollusca and Echinodermata.**		
Credit Value	**3 Credits**	**Credit =15 Hours-learning & Observation**	
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)	
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**: Paramecium, Protozoa and Disease. Porifera: General Characters and Classification of Phylum Porifera up to order. Type study: Sycon.	12
II	**General Characters, Classification and Type Study of Phylum Coelenterates, Helminthes and Annelida: coelenterates :-**General Characters and Classification of Phylum coelenterate 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. Molluse- General Characters and Classification of Phylum Mollusca up to order. **Type study:** Pila.	11
IV	**General Characters, Classification and Type Study of Phylum Echinodermata and Hemichordates:** General Characters and Classification of Phylum Echinodermata up to order.	11

	Type Study: Asterias (Starfish). General Characters and Classification of Phylum Hemichordata **Type Study:** Balanoglossus	
Keywords	**Taxonomy, Nomenclature, Canal System, Protozoa, Balanoglossus, Torsion**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

1. E. J. W. Barrington, Invertebrate structure and function, English Language Book Society UK.
2. Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan.
3. Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi.
4. Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, ATTBS Publishing and
Distributers, Delhi.
5. R.L. Kotpal, Modern Textbook of Zoology Invertebrates. Rastogi Publication, Gangotri, Shivaji Road, Meerut
6. V.K. Tiwari, Unified Zoology, Shivlal Agrawal and Company, Pustak Prakashak, Khajuri Bazar, Indore.
7. Dr. S.M. Saxsen, Zoology, Ist Year, by a, Ram Prasad and Sons, Aagra and Bhopal. N. Arumugam, M.G. Ragunathan, T. Murugan, B. Ramnathan, A Textbook of Invertebrates by Saras

Reference Books Recommended-

1. ProfR. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut.
2. EL. Jordan, Dr. P. S. Verma, Invertebrate Zoology, S. Chand Publications, New Delhi.
3. N. Arumugam, N. C. Nair S. - Invertebrate Zoology, Saras Publication..
4. Barrington E. J. W., Invertebrate Structure and Function, Nelson London.
5. Barnes, R. D., Invertebrate Zoology-Saunders Philadelphia.
6. R. L. Kotpal, Invertebrate, Rastogi Publications R. I.. Kotpal, Vertebrate, Rastogi Publications.
7. H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1-9, Anmol Publication.
8. S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi.
9. G. S. Sandhu, Harshwardhan Bhagskar-Advanced invertebrate zoology-Campus books international.
10. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
11. Boradale, L.A. and Potts, E.A.(1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
12. Bushbaum, R. (1964). Animals without Backbones. University of Chicago Press.
13. Hyman, L. H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.

Online Resources-

- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

Online Resources-

e-sources/e-books and e-learning portals

- https://www.pbs.org/video/botany-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

APART -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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-III**	**Session: 2024-2025**
Course Code	**BOSC-03P**		
Course Title	**Lab. Course -03 Diversity of Invertebrates**		
Course Type	**Laboratory course**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to -** ➢ **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.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	➢ 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, coelenterates (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 Pheretima to expose Alimentary canal and circus pharyngeal ganglia through Alternative methods of dissection. ➢ Dissection of Periplaneta to expose the digestive system, salivary glands and Mouth Parts through Alternative methods of dissection. Dissection of Prawn to expose	30

	appendages and statocyst through Alternative methods of dissection. ➢ Dissection of Pila 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.	
Keywords	**Museum specimens, Histological slides, Alternative of Dissection, Animal album**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended- 1. S.S. Lal, Practical Zoology, Invertebrate. 12 Edition Rastogi Publications, Meerut, New Delhi. 2. A manual of practical Zoology. Dr. P.S Verma, S. Reference Books Recommended- Chand Publication, New Delhi.		
Reference Books Recommended- 1. Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi . 2. Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AFTBS Publishing and Distributers, Delhi.		
Online Resources- ➢ E-resources/e-books and e-learning portals ➢ http://ndi.ätkgp.ac.in/he/document/swayamprabha/swayam ➢ http://www.swayam.ac.in ➢ http://www.ignou.ac.in ➢ www.egyankosh.ac.in ➢ www.litm.ac.in ➢ www.eskillindia.org ➢ www.eshiksha.mp.gov.in		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/ ➢ https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html		
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks	

Exam (ESE):35	B: Spotting frased on tools & technology (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF DIET AND NUTRITION

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**BNGE-03**		
Course Title	**Basics of Nutrition**		
Course Type	**Discipline General Elective course (GE)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able: -** ➢ **Ability to embrace moral/ethical theory of dietetics.** ➢ **Capable of demonstrating comprehensive knowledge of diet modification.** ➢ **Capability to apply analytic thought of therapeutic diet for disease condition.** ➢ **Ability to acquire knowledge and skills of immune system dysfunction and metabolic syndrome.** ➢ **Capable of demonstrating comprehensive knowledge and understanding of DM, obesity, underweight, drug interaction and their dietary treatment.**		
Credit Value	**4 Credits**	**Credit =60 Hours-learning & Observation**	
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)	
I	**Ancient Theory of Dietetics** History of Dietetics, Ancient cultures, ancient diet. Role of dietician: The hospital & community. Basic concepts of diet therapy. Therapeutic Diet: Principle of therapeutic diet, nutrition for changing needs.	15
II	**Nutrition Support:** Internal Nutrition and Parental Nutrition. Modification of diet (Symptoms, Causes, Classification, Dietary Treatment): Diet in Febrile conditions and infections. Diet in surgical conditions. Diet for Burn. Diet for Cancer.	15
III	**Diet for gastro** –intestinal disorders: constipation, diarrhea, peptic ulcer. **Diet for cardiovascular disease:** Hypertension, Atherosclerosis. (Risk factor, Etiology, Nutritional management)	15

	Diet for renal diseases-Nephritis, Nephrotic syndrome and renal failure, renal calculi. (Causes, Symptoms and Dietary management)	
IV	**Nutrition in Immune system dysfunction**, AIDS & Allergy. Nutrition support in **Metabolic disorders:** Maple syrup Urine Disease, PKU, Gaucher Disease. Nutrition -Addictive behavior in anorexia nervosa, bulimia & alcoholism. **Diet in Diabetes Mellitus:** Prevalence, types, Symptoms, Diagnosis, Treatment, Complications, Nutrition support during Diabetes. **Diet in Obesity and Underweight:** Obesity, A etiology, Theories, Assessment, Types, Dietary Treatment. Nutrient drug interaction.	15
Keywords	**Greek thought, Medieval thought, Modern age, Feminism**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF DIET AND NUTRITION

COURSE CURRICULUM

PART-C: Learning Resources
Text Books, Reference Books and Others
Text Books Recommended-
1. Manjula Shantaram, Biochemistry & Nutrition for B.Sc. Nursing, Jaypee Brothers Medical Publishers (P) Ltd. 2. Ruma Singh, Food and Nutrition for Nurses, Jaypee Brothers Medical Publishers (P)Ltd. 3. Y. K. Joshi, Basics of clinical nutrition, Jaypee Brothers Medical Publishers (P)Ltd. **Reference Books Recommended-** **1** B. Sileshi, Dietetics, New Age International Publishers. **2** T. Long Vah, R. Ananthan, K. Bhaskar Acharya, K. Venkaiah, Indian Food Composition Tables, NIN
Online Resources- ➢ e-books and e-learning portals ➢ https://www.coursera.org/lecture/emergence-of-life/-http://www.ignou.ac.in ➢ https://www.shiksha.com/online-courses/-http://www.itm.sc.in ➢ https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in ➢ https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.pbs.org/video/political-basics-iuu2bl/ ➢ https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf ➢ https://www.botanytoday.com/brunches-of-botany
ART -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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10∗1=10 Marks Q2 Short answer type-5∗4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**CHSE-03T**		
Course Title	**Basic Analytical Chemistry**		
Course Type	**Discipline Specific Elective Course (DSE)**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After completion of the course, the student shall be able to..** ➢ **To understand the sampling, procedure and treatment of sample** ➢ **To understand the analytical techniques for analysis in different types** ➢ **of chemical reactions** ➢ **To understand the volumetric analysis technique** ➢ **To understand the gravimetric analysis technique**		
Credit Value	**3Credits**	**Credit =45 Hours-learning & Observation**	
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)	
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. Statistica 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.Numerica 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 we aching, acid digestion, fusion processes and dissolution of organic samples. **Types of analysis:** Macro, semi-micro, micro, sub-micro and ultra micro. 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	11

	complexometric titrations. Calculations involving preparation of standard solutions Stoichiometric calculations in various types of titrations	
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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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended- ➢ Pandey,O.P.,Bajpai,D.N.,Giri,S.,Shrivastava,B.B.L.,&Mishra,A.(2010).Practical chemistry (Ist ed.).S.Chand &Company. ➢ Shrivastava,B.B.L.,&Mishra,A.([Year]).Fundamentals of analytical chemistry.		
Reference Books Recommended- ➢ Harris,D.C.(2000).Quantitative chemical analysis W.H.Freeman and Company ➢ Mikes,0.,&Chalmers,R.A.(2007).Laboratory handbook of chromatographic methods Elsevier ➢ Christian,G.D.,Dasgupta,P.K.,&Snyder,S.(2001).Concepts of instrumental analysis, Oxford University Press.		
Online Resources- ➢ e-books and e-learning portals ➢ https://www.coursera.org/lecture/emergence-of-life/-http://www.ignou.ac.in ➢ https://www.shiksha.com/online-courses/-http://www.itm.sc.in ➢ https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in ➢ https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.pbs.org/video/political-basics-iuu2bl/ ➢ https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf ➢ https://www.botanytoday.com/brunches-of-botany		
ART -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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A: Q1 Objective 10*1=10 Marks Q2 Short answer type- 5*4=20 Section B: Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-III**	**Session: 2024-2025**
Course Code	**CHSC-03P**		
Course Title	**BASIC ANALYTICAL CHEMISTRY LAB.COURSE**		
Course Type	**Laboratory course**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to -** ➢ **To make the student aware of Common analytical method** ➢ **To demonstrate the volumetric titration** ➢ **To demonstrate the students about gravimetric analysis** ➢ **To learn the testing of solubility of soil and water**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	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) 3.Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide 4.Determination of ionization of acetic acid 5.Determination of solubility of benzoic acid in water and determination of enthalpy of solubilization. 6.Analysis of soil: (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	**Museum specimens, Histological slides, Alternative of Dissection, Animal album**	

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended- ➢ Chatwal,G.R.,&Sharma,A.(2017).Instrumental methods of chemical analysis.Himalaya Publishing House ➢ Sharma,L.R.(2021).Practical inorganic chemistry ➢ .Fernelius,W.G.(2009).Experimental inorganic chemistry (Adapted by R.K.Sharma &G Panda).New Age International Publishers ➢ Yadava,T.F.(2010).A textbook of soil chemistry.Kalyani Publishers		
Reference Books Recommended- ➢ James,A.M.,&Prichard,F.E.(1981).Practical physical chemistry (3rd ed,repr).Longman Bassett,J.,Denney,R.C.,Jeffery,G.H.,&Mendham,J.(Eds.).(2000).Vogel's textbook of quantitative chemical analysis (6th ed.).Pearson Education India.(Original work by A.I.Vogel) ➢ Svehla,G.(Ed.).(1978).A textbook of quantitative inorganic analysis (by A.I.Vogel).ELBS Publishers and Distributors		
Online Resources- ➢ E-resources/e-books and e-learning portals ➢ http://ndi.ätkgp.ac.in/he/document/swayamprabha/swayam ➢ http://www.swayam.ac.in ➢ http://www.ignou.ac.in ➢ www.egyankosh.ac.in ➢ www.litm.ac.in ➢ www.eskillindia.org ➢ www.eshiksha.mp.gov.in		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/ ➢ https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html		
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Spotting framed on tools & technology (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**PHSE-01T**		
Course Title	**Introduction to Statistical Mechanics**		
Course Type	**Discipline Specific Elective Course (DSE)**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After completion of the course, the student shall be able to..** ➢ **Differentiate between microstate and microstate and calculate their numbers.** ➢ **Comprehend the concept of ensembles and its requirement in study of physical phenomenon** ➢ **Correlate and compare the classical and quantum statistical distribution laws..** ➢ **Apply concepts of statistical distribution laws for different physical systems.**		
Credit Value	**4Credits**	**Credit =60 Hours-learning & Observation**	
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)	
I	**Maxwellian Distribution of Speeds in an Ideal Gas** Distribution of speeds and velocity, experimental verification, distinction between mean, rms and most probable speeds, Doppler broadening of spectral lines, transport phenomena in gases: molecular collision, collision cross section, estimates of molecular diameter and mean free path, transport of masa, momentum and energy and inter-relationship, dependence on temperature and pressure. **Behaviors of Real Gases:** deviation from ideal gas equation, the Virial equation, Andrew's experiment on CO, gas, critical constants.	12
II	**Microstate & Microstate** Microstate, Microstate, Number of accessible microstates and Postulate of equal a priori. **Concept of Ensemble:** Concept of Gibb's ensemble, postulate of ensemble average, Micro Canonical, Canonical & Grand Canonical ensembles. Thermodynamic Probability, Postulate of Equilibrium and Boltzmann Entropy relation. Phase space, Phase trajectory, Volume element in phase space, Quantization of phase space and Survey number of accessible microstates for free particle in ID, free particle in 3D.	11
III	**Transition to quantum statistics:** h as a natural constant and its implications, cases of particle in ID and 1Dimensional harmonic oscillator, **Quantum Statistical Distribution Laws:** In-distinguishability of particles and its consequences, Bose-Einstein & Fermi Dirac statistics. Comparison of statistical	11

	distribution laws and their physical significance. Canonical Distribution Law: Boltzmann's Canonical Distribution Law, Boltzmann's Partition Function, Proof of Equipartition Theorem (Law of Equipartition of energy) and relation between Partition function and Thermodynamic potentials.	
IV	**Bose-Einstein Distribution Law and its Applications:** Bose-Einstein Statistics: Heat capacity, Bose Einstein condensation, Radiation as a photon gas, Quantum Theory of Radiation: Spectral Distribution of Black Body Radiation. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation: Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law, (4) Wien's Displacement law from Planck's law **Fermi-Dirac Distribution Law and its Applications:** Free electrons in a metal, Definition of Fermi energy, Determination of Fermi energy at absolute zero, Kinetic energy of Fermi gas at absolute zero and concept of Density of States, Specific Heat of Metals (Density of Orbitals),	11
Keywords	**Microstate & Microstate, ensemble, distribution laws, Bose-Einstein Statistics, Fermi-Dirac**	
Signature of Convener & Members (CBoS)		

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

1. Unified Physics-II, R P Goyal, Shivlal Agrawal & Sons Publication
2. Unified Physics-II, Yugbodh Prakashan
3. Unified Physics-II, Navbodh Prakashan

Reference Books Recommended-

1. F. Reif, "Statistical Physics (In SI Units): Berkeley Physics Course Vol 5", McGraw Hill, 2017
2. B.B. Laud, "Fundamentals of Statistical Mechanics", New Age International Private Limited, 2020
3. B.K. Agarwal, M. Eisner, "Statistical Mechanics", New Age International Private Limited, 2007

Online Resources-

- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

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

- https://www.pbs.org/video/political-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

ART -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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A: Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B: Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**ZOSE-01T**		
Course Title	**Parasitology**		
Course Type	**Discipline Specific Elective Course (DSE)**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After completion of the course, the student shall be able to..** ➢ **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.**		
Credit Value	**3Credits**	**Credit =45 Hours-learning & Observation**	
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)	
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 Streptococcus pneumonia, Salmonella typhi, Escherichia coli, Mycobacterium tuberculosis, Rickettsia, Spirochaetes **Fungal diseases:** Ringworm infection, Aspergillosis, candidiasis.	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: Entamoeba histolytic, Trypanosoma Gambians, Plasmodium vivex, Giardia.	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. Taenia solium, Schistosoma haematobium, Ascaris lumbricoides, Vuchereria, brannerite. Vector insects.	11
Keywords	**Micrology, pathogenic bacteria, Protozoan parasites, Helminth parasites, Toxicology, toxic against**	
Signature of Convener & Members (CBoS)		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

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

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- **Reference Books Recommended-**

- 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 BrothersMedical

- 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, CBSPublishers & 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)

- Online Resources-
- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

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

- https://www.pbs.org/video/political-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

ART -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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):70	Two section A&B Section A: Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B: Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-III**	**Session: 2024-2025**
Course Code	**ZOSE-01P**		
Course Title	**Parasitology Lab. Course**		
Course Type	**Discipline Specific Elective Course (DSE) Laboratory course**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **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.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	➢ Study of permanent slides and specimens of parasitic Protozoans and Helminthes. Pathological examination of sputum, blood, urine and stool. ➢ Blood: Erythrocyte Sedimentation Rate (ESR),	30

	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. ➢ Parasitic protozoa, helminth, ESR, Gram positive and Gram negative	
Keywords	**Parasitic protozoa, helminth, ESR, Gram positive and Gram negative**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

- 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 BrothersMedical
- Publishers (P) Ltd., New Delhi

Reference Books Recommended-

- 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, CBSPublishers & 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)

Online Resources-

- E-resources/e-books and e-learning portals
- http://ndi.ätkgp.ac.in/he/document/swayamprabha/swayam
- http://www.swayam.ac.in
- http://www.ignou.ac.in
- www.egyankosh.ac.in
- www.litm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in

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

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/
- https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html

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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Spotting framed on tools & technology (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ENVIRONMENTAL SCIENCES

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**AEC-03**		
Course Title	**Environmental Studies**		
Course Type	**Ability Enhancement Course**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After the completion of this course, the students will be able to-** ➢ **Relate The Basic Concept of the Environment** ➢ **Explain Environmental Alterations** ➢ **Develop Skills in Environmental Measurement** ➢ **Examine Correction Measures of the Environment**		
Credit Value	**2 Credits**	**Credit =30 Periods -learning & Observation**	
Total Marks	**Max. Marks:=50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of Teaching-learning Periods (45 Min. per period) -30 Periods		
Unit	Topics (Course contents)	
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	08
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, NO2, 03	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	07
Keywords	**Water analysis methods for pH, TDS, Turbidity, Salinity, and Alkalinity**	
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PART-C: Learning Resources

Text Books, Reference Books and Others

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, 1" Edition, S. V. S. Rana, Rastogi Publication, Meerut.

Text Books Recommended-

1. Fluency in English - Part 11, Oxford University Press, 2006.
2. Enrich Your English, OUP, SR Inthira and V. Saraswathi, CIEFL, 1997
3. Oxford A-Z of English Usage, ed. Jeremy Butterfield, OUP, 2007.

Online Resources-

- Applying Communication Theory for Professional Life: A Practical Introduction. Dainton and Zelley, http://taime.uz.ac.zw/claroline/backends/download.php?urf-L0ludHJvX3RvX2NvbW1lbmljYXRpb25f
- https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-http://www.ignou.ac.in
- https://web.sol.du.ac.in/my modules/type/cbcs-11-2/data/root/B.Com/Semester%202/ABILITY-ENHANCEMENT%20COMPULSORY%20COURSE-AECC/English%20Communication%20A-B-C/Unit%201-5.
  - pdf https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
  - https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com
  - https://archive.org/details/personality-development-book/mode/lup
  - https://www.coursera.org/articles/presentation-skills
  - https://www.cbs.de/en/blog/15-effective-presentation-tips-to-improve-presentation-skills/
  - https://benjaminball.com/blog/good-body-language-best-visual-aid-talks/
  -

Online Resources-

- e-sources/e-books and e-learning portals https://blog.moderngov.com/importance-of-body-language-in-presentations-good-bad-
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 1*5=5 Marks Q2 Short answer type-2*5=10 (I. Vocabulary, II Unseen passage Section B : Descriptive answer type qts 1 out of 2frm each- 5*4=20 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF DISASTER MANAGEMENT

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-III**	**Session: 2024-2025**
Course Code	**VAC-03**		
Course Title	**Disaster management**		
Course Type	**Value Addition Course (VAC)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After completing this course, the students will be able to –** ➢ **Explain Emergencies and controls, with examples of industrial disasters and their consequences.** ➢ **Describe the elements of emergency planning and preparedness.** ➢ **Summarize the causes of natural disasters, mitigation of their effects, rescue, relief and rehabilitation.** ➢ **Explain the disaster management mechanism and capacity building concepts .**		
Credit Value	**1 Credits**	**Credit =30 Periods -learning & Observation**	
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)		
Unit	Topics (Course contents)	No. of Period
I	**Definition and types of disaster** Hazards and Disasters, Risk and Vulnerability in Disasters, Natural and Man-made disasters, earthquakes, floods drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes. Man-made disasters: Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.	**7**
II	**Study of Important disasters** Earthquakes and its types, magnitude and intensity, seismic zones of India, major fault systems of India plate, flood types and its management, drought types and its management, landside and its managements case studies of disasters in Sikkim (e.g) Earthquakes, Landside). Social Economics and Environmental impact of disasters.	**7**
III	**Mitigation and Management techniques of Disaster** Basic principles of disasters management, Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warming Systems, Building design and construction in highly seismic zones, retrofitting of buildings.	**8**
IV	**Training, awareness program and project on disaster management** Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management, Mini	**8**

	project on disaster risk assessment and preparedness for disasters with reference to disasters in Sikkim and its surrounding areas.	
Keywords	Wastewater management, biodegradation, bioremediation, xenobiotics.	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF DISASTER MANAGEMENT

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012) 2. Damon, P. Copola, (2006) Introduction to International Disaster Management, Butterworth Heineman.		
Reference Books Recommended- ➢ Gupta A.K., Niar S.S and Chatterjee S. (2013) Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi. ➢ Murthy D.B.N. (2012) Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi. ➢ Modh S. (2010) Managing Natural Disasters, Mac Millan publishers India LTD.		
Online Resources- ➢ Introduction to Computer Fundamental from W3school: https://www.w3schools.blog/computer-fundamentals-tutorial ➢ Introduction to MS-Word from W3school: https://www.w3schools.blog/ms-word-tutorial ➢ Introduction to MS-Excel from W3school:https://www.w3schools.com/excel/excel_introduction.php ➢ ntroduction to MS-PowerPoint from W3school:https://www.w3schools.blog/powerpoint-tutorial Introduction to MS-Access from W3school: ➢ https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.rgycsm.org/uploads/books/MICROSOFT-OFFICE-BOOK.pdf ➢ https://www.youtube.com/watch?v=SH40YV5AJ6A ➢ https://www.youtube.com/watch?v=SH40YV5AJ6A ➢ https://hte.rajasthan.gov.in/dept/dte/board		
APART -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	Internal Test/Quiz:10+10	Better marks out of the two Tot Quiz + obtained

(By Course Teacher)	Assignment/ Semenar-10 Total Marks-15	marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):50	Two section A&B Section A :Q1 Objective 5*1=5 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 10*1=10 Marks	
Signature of Convener & Members (CBoS)		

SHRI DAVARA UNIVERSITY

NAYA RAIPUR (C.G.)

PROGRAMME CURRICULUM

FOR

BECHELOR IN SCIENCES

(CHEMISTRY, PHYSICS, AND BIOLOGY(PCB)

SEMESTER-IV

AS PER NEW EDUCATION POLICY-2020

AND

NATIONAL EDUCATION POLICY-2025

FOUR YEAR UNDERGRADUATE PROGRAMME- 2024-25

(EFFECTIVE FROM THE SESSION-2024-2025)

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SEMESTER IV

S.NO	COURSE CODE	COURSE TITLE	TEACHING HOURS PER WEEK				EXAMINATION SCHEME				
DISCIPLINE SPECIFIC COURSE (DSC)			L	T	P	C	THEORY		PRACTICAL		TOTAL MARKS
							EX	IN	EX	IN	
1.	CHSC-04T	ORGANIC AND PHYSICAL CHEMISTRY - I	3	0	0	3	70	30	-	-	100
2.	PHSC-O4T	WAVE & OPTICS	3	0	0	3	70	30	-	-	100
3.	ZOSC-04T	DIVERSITY OF CHORDATES AND COMPARATIVE ANATOMY	3	0	0	3	70	30	-	-	100
DISCIPLINE GENERAL ELECTIVE COURSE (GE)/DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE)											
4.	SCGE-04	HISTORY OF INDIA FROM BEGINNING TO 2ND CENTURY BC	3	1	0	4	70	30	-	-	100
5.	CHSE-02T	ENVIRONMENTAL CHEMISTRY	3	0	0	3	70	30	-	-	100
6.	PHSE-02T	Mathematical Physics-I	3	1	0	4	70	30	-	-	100
7.	ZOSE-2T	ECOLOGY AND WILD LIFE CONSERVATION AND MANAGEMENT	3	0	0	3	70	30	-	-	100
ABILITY ENHANCEMENT COURSE (AEC)											
8.	AEC-04	COMMUNICATIVE ENGLISH AND SOFT SKILLS	2	0	0	2	35	15	-	-	50
SKILLS ENHANCEMENT COURSE (SEC)											
9.	SEC-02	EQUINE STUDIES & HORSEMANSHIP	1	1	0	2	35	15	-	-	50
PRACTICALS (LAB)											

10.	CHSC-04P	ORGANIC AND PHYSICAL CHEMISTRY - I LAB COURSE	0	0	2	1	-	-	35	15	50
11.	PHSC-O4P	WAVE & OPTICS LAB COURSE	0	0	2	1	-	-	35	15	50
12.	ZOSC-04P	DIVERSITY OF CHORDATES AND COMPARATIVE ANATOMY LAB COURSE	0	0	2	1	-	-	35	15	50
13.	CHSE-02P	ENVIRONMENTAL CHEMISTRY LAB COURSE	0	0	2	1	-	-	35	15	50
14.	ZOSE-02P	ECOLOGY AND WILD LIFE CONSERVATION AND MANAGEMENT LAB COURSE	0	0	2	1	-	-	35	15	50
Total Contact hours Per Week:30		Total credit:				20	Total mark				650/700 WITH DSE

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-IV**	**Session: 2024-2025**
Course Code	**CHSC-04T**		
Course Title	**ORGANIC AND PHYSICAL CHEMISTRY - I**		
Course Type	**Discipline Specific course (DSC)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to** ➢ **Master the synthesis, properties, and reactivity of various functional groups and apply this knowledge to understand their significance in organic chemistry.** ➢ **Employ the principles of chemical/Ionic equilibria, their influencing factors and applications.** ➢ **Interpret phase diagrams for one and two –component system, determine degrees of freedom and identify the triple point.** ➢ **Master the principles and applications of liquid – liquid mixtures using Raoult's law, Henry's and Nernst Distribution law.**		
Credit Value	**3 Credits**	**Credit =45 Hours-learning & Observation**	
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)	
I	**A. Halides (5 hrs.)** **(i) Alkyl Halides:** Preparation: from alkenes and alcohols. Reactions: Nucleophilic substitution reactions of alkyl halides (alcohol, ester, nitrile &azonitrile formation, Williamson's ether synthesis), mechanism and stereochemistry of nucleophilic substitution reactions (SN1 and SN2), factors affecting SN1 and SN2 reactions. **(ii) Aryl Halides:** Chlorobenzene: Preparation by aromatic halogenation and Sandmeyer reaction. Aromatic nucleophilic substitution involving Benzyne	12

	Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$). Reactivity and Relative strength of C-Halogen bond in alkyl and aryl/ Vinyl halides. **B. Alcohols & Phenols (7 hrs.)** **(i) Alcohols** **(a)** Monohydric-nomenclature, methods of formation, Properties & chemical reactions distinction between primary, secondary & tertiary alcohols. **(b) Dihydric alcohols:** Nomenclature, methods of formation of ethylene glycol (from ethylene, epoxide, ethylene dibromide and ethylene diamine). Chemical reactions of vicinal glycols: with carbonyl compounds, dehydration, oxidative cleavage with Pb (OAc)4 and HIO4 and Pinacol-Pinacolone rearrangement (with mechanism). **(c) Trihydric alcohols:** Nomenclature and methods of formation (from Hydrolysis of fats and oils, propene and acrolein), chemical reactions of glycerol (with PCl5, HI, oxidation, and dehydration) and uses/applications. **(ii) Phenols** Nomenclature and methods of formation, physical properties, and acidic character. Resonance stabilization of phenoxide ion. Comparative acidic strength of alcohols and phenols. Electrophilic aromatic substitution, acetylation, and carboxylation. Mechanism of Fries rearrangement, Claisen rearrangement, and Reimer-Tiemann reaction.	
II	**Aldehydes/Ketones and acid/Its derivatives** **A. Aldehydes and Ketones (6hrs)** Nomenclature and structure of the carbonyl group, synthesis of aldehydes and ketones. Acidity of alpha hydrogens and formation of enolate, Concept of reactive methylene group, Keto-enol tautomerism in Acetoacetic ester. Oxidation of aldehydes by KMnO4, and Tollen's reagent, Reduction of aldehydes by $LiAlH_4$ and $NaBH_4$. Mechanism of nucleophilicadditons to carbonyl group with particular emphasis on aldol, Perkin, and Knoevenagel reactions. Wittig and Minnich reaction (without mechanism), Baeyer-Villager oxidation of Ketones (without mechanism), Cannizaro reaction (with mechanism), MPV, Clemmensen, and Wolf-Kushner reaction. **B. Acid & its derivatives (5 hrs)** **(i) Carboxylic Acids** Nomenclature, structure, physical properties, acidity of carboxylic acids, effect of substituent on acid strength, method of preparation and chemical reaction. Hell-Volhard-Zelinsky (HVZ) reaction, Reduction of carboxylic acids, Mechanism of Decarboxylation. Di carboxylic acids: - Methods of formation and chemical reactions, **(ii) Carboxylic Acid Derivatives** tructure, method of preparation & physical properties of acid chlorides, esters, amides	11

	(Urea) and acid anhydrides, Relative stability of acyl derivatives.	
III	**Equilibrium** **A. Chemical equilibria (3hrs)** Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mas action, equilibrium constants and their quantitative dependence on temperature, pressure, and concentration, factors affecting equilibrium –Le Chatelier's principle. **B. Ionic Equilibria (5 hrs)** Ionization of acids and bases, Strong and weak electrolytes, degree of ionization ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect and solubility product with illustrative examples), Salt hydrolysis-calculation of hydrolysis constant and degree of hydrolysis for salt of strong acid and weak base, Buffer solutions –Introduction, Henderson-Hasselbalch equations for acidic and basic buffer. **C. Phase Equilibrium (3 hrs)** **(A)** Hibbs phase (no derivation), phase, component and degree of freedom, Application of phase rule to one component system (water system and Sulphur systems), Reduced phase rule. Application of phase rule to two component systems: Pb-Ag system. Congruent-Ferric chloride system.	11
IV	**Photochemistry and Liquid-liquid mixtures** **(A) Photochemistry (8hrs)** Interaction of radiation with matter, difference between thermal and photochemical reactions, Laws governing absorption of light, laws of photochemistry, Jablonski diagram depicting various process quantum yield, determination of quantum yield of reactions, reasons various processes, quantum yield. Some examples of photochemical reactions (e.g. Photochemical decomposition of Hydrogen iodide, Photosynthesis of HBr from H_2 and Br_2 and photosynthesis of HCl from H_2 and Cl_2). Photosensitization and Quenching, Photosensitized reactions. **(B) Liquid-Liquid mixtures (3 hrs)** Ideal liquid mixtures, Raoult's law of ideal solutions, Henry's law and its applications, Nernst distribution law, limitations, and applications (association and dissociation – No derivation.)	11
Keywords	***Halides (alkyl & aryl halides), Alcohols, Phenols, Aldehydes & Ketones, Carboxylic acids & their derivatives, Equilibrium (Chemical, Ioic, and Phase equilibria), Photochemistry, Liquid-Liquid mixtures***	
Signature of Convener & Members (CBoS)		

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

- Boyd, R. N. & Morrison , R. T. (1983), Organic Chemistry (uden title), Allyn and Bacon.
- Physical Chemistry.
- Atkins, P. W. De Paula, J.& Keeler, J. (2023), Atkins Physical Chemistry, Oxford University Press.
- MeQuarrie, D.A. & Simon, J. D. (2004), Molecular Thermodynamics Viva Books Pvt. Ltd: New Delhi.

Text Books Recommended-

- Bahl, A. (2010),Advanced Organic chemistry S.Chand publishing.
- Singh, J. &Yadav, L. D. S. (2016), Advanced Organic chemistry. PragatiPrakashan Meerut.
- Puri, L.B. Sharma, L. R. &Pathania, M. S. (2013), Principles of physical chemistry, Vishal Publishing. Co.
- Kapoor, K.L. (2019), A. Textbook of Physical Chemistry. Thermodynamics and Chemical Equilibrium (SI Units) – Vol. 2. 6th Edition.

Online Resources-

- e-books and e-learning portals
- https://bit.lv/3AvV3mZ
- https://bit.ly/30V85z
- https://bit.ly/3C9PXPS
- https://bit.ly/301p9rZ
- https://bit.ly/BPnwqe

Online Resources-
e-sources/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
End Semester Exam (ESE):	70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test/Quiz:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-IV**	**Session: 2024-2025**
Course Code	**CHSC-04P**		
Course Title	**Lab. Course -01 ORGANIC AND PHYSICAL CHEMISTRY - I**		
Course Type	**Laboratory course**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**At the end of this course, the students will be able to-** ➢ **Understand the fundamentals of organic compounds analysis including preparation of sodium extract and detection of elements.** ➢ **Identify functional groups and prepare derivations.** ➢ **Determine the PH of various samples like water /acid/base/soil etc.** ➢ **Apply the concepts of phase equilibria to determine critical solution temperature and study concepts of Nernst distribution law and determine equilibrium constant of various reactions.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	**Organic Analysis:** Systematic Identification of organic compounds: (a) Test for aliphatic and aromatic nature of substances. (b) Test for saturation and unsaturation. (c) Detection of elements (N, S and halogens) in organic compounds. (d) Identification of functional groups: (i) Carboxylic acids (ii) Phenols (iii) Aldehydes (iv) Ketones (v) Esters (vi) Carbohydrates (vii) Amines (viii) Amides (ix) **Halogen compounds.** (e) Determination of melting and boiling points. (f) Preparation of solid derivatives. PH Determination	30

	(1) Determination of PH of soil, water. (2) To measure the PH of various solution using PH indicators and PH meter. (3) To prepare and study the properties of buffer solutions. Phase Equilibrium: (1) To determine the critical solution temperature of two partially miscible liquids (phenol-water systems). (2) To study the effect of solute such as (i) sodium chloride (NaCl) , (ii) succinic acid (HOOC-CH2- CH2-COOH) on the critical solution temperature of two partially miscible liquids (e.g. phenol-water system). (3) To construct the phase diagram of two compounds (e.g. diphenylamine-benzophenone system) by cooling method. Nernst Distribution Law (1) To determine the partition coefficient of Iodine between water and carbon tetrachloride / Kerosene. (2) To determine the partition coefficient of benzoic water and benzene. (3) To determine the equilibrium constant of the reactions, KI+I2=KI3 by distribution method.	
Keywords	**Organic analysis, Aromatic/Aliphatic compounds, Saturated /Unsaturated compounds, Element detection, Functional groups, Derivatives for Functional groups, PH, Phase equilibria, Nernst Distribution Law.**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended- ➢ Sahu, D. P. &Bapai, K. N. (2022), Unified practical chemistry. NavbodhPrakashan. ➢ Yadav, J. B. (2006), Advanced Practical Physical Chemistry. Krishna Prakashan Media. ➢ Pandey, O. P. &Bapai, D. N. (2010), practical chemistry. S. Chand Publisher		
Reference Books Recommended- 1. Moudgill, H.K. (2010), Textbook of physical chemistry. PHI Learning Pvt. Ltd. 2. Adamson, A. (2012), A. Textbook of physical chemistry. Elsevier. 3. Findlay. A. (1923), Practical Physical Chemistry.Langmaans, Green. 4. Learnard, J. Lygo, B. & Procter, G.(2013), Advanced Organic Chemistry.CRC Press. 5.		
Online Resources- ➢ E-resources/e-books and e-learning portals ➢ http://www.swayam.ac.in ➢ http://www.ignou.ac.in ➢ www.egyankosh.ac.in ➢ www.litm.ac.in ➢ www.eskillindia.org ➢ www.eshiksha.mp.gov.in ➢ www.vlab.co.in		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/ ➢ https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html		
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Performed the Task based on lab, work (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

<table>
<tr><td colspan="5">PART – A: Introduction</td></tr>
<tr><td colspan="3">Programme : Bachelor in Science
(Certificate/Diploma/Degree/Honors)</td><td>Semester - IV</td><td>Session: 2024-25</td></tr>
<tr><td>1</td><td>Course Code</td><td colspan="3">PHSC –04T</td></tr>
<tr><td>2</td><td>Course Title</td><td colspan="3">Wave and Optics</td></tr>
<tr><td>3</td><td>Course Type</td><td colspan="3">Discipline Specific Course</td></tr>
<tr><td>4</td><td>Pre-requisite (if, any)</td><td colspan="3">As per Program</td></tr>
<tr><td>5</td><td>Course Learning.
Outcomes (CLO)</td><td colspan="3">➢ Analyze the behavior of waves propagating through different mediums and predict how factors such as density, elasticity, and temperature affect wave propagation.
➢ Demonstrate an understanding of interference phenomena, including constructive and destructive interference, and apply this knowledge to solve problems involving wave superposition.
➢ Explain the concept of diffraction and its implications for wave propagation, including how waves bend around obstacles and spread out after passing through narrow openings.</td></tr>
<tr><td>6</td><td>Credit Value</td><td>3 Credits</td><td colspan="2">1Credit = 15 Hours – learning & Observation</td></tr>
<tr><td>7</td><td>Total Marks</td><td>Maximum Marks: 100</td><td colspan="2">Minimum Passing marks: 40</td></tr>
<tr><td colspan="5">PART – B: Content of the Course</td></tr>
<tr><td colspan="5">Total No. of teaching – learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</td></tr>
</table>

Unit	Topics (course contents)	No. Of Period
I	**Contribution of C. V. Raman: -** Brief biography of C. V. Raman with his contribution in field of acoustics and optics. **Waves in Medium: -** Speed of transverse waves on uniform string, Speed of longitudinal waves in a fluid, Energy density and energy transmission in waves. Group velocity and phase velocity and relationship between them. **Reflection, refraction and diffraction of sound: -** Acoustic impedance of a medium, percentage, reflection & refraction at a boundary, diffraction of sound , Principle of a Sonar system.	11
II	**Interference: -** Principle of superposition, Division of wavefront and division of amplitude, Young's Double Slit experiment. Fresnel's Biprism, Phase change on reflection, Stokes treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings, measurement of wavelength and refractive index. Michelson's Interferometer, Formation of fringes, Determination of wavelength, Wavelength difference.	12
III	**Diffraction:** Fresnel Diffraction; Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis. Fraunhofer diffraction; Single slit, Double slit. Multiple slits & Plane Diffraction Grating, Resolving power of Grating.	11
IV	**Polarization:-** Polarized light and its mathematical representation, Electromagnetic theory of double refraction, Nicol Prism, Double image prism, Polaroid, Phase retardation	11

	plates, Circular and elliptical polarization. Polarization by double refraction and Huygens's theory, Rotation of plane of polarization, Biquartz polar meter.	
Key words	Longitudinal and transverse waves, principle of superposition, Humdinger Fringes, Fresnel Diffraction, Fraunhofer diffraction, Polarization Signature of Convener & Members	

FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-C: Learning Resources:-
Text Books, Reference Books and Others
Text Books Recommended-
Text Books:- 1. Berkely Physics Course: Vol.-III, 'Waves and Oscillations" 2. Principles of Optics, B.K. Mathur, 1995, Gopal Printing 3. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, S. Chand Publication 4. Physical Optics, A.K. Ghatak 5. Unified Physics- II, R. P. Goyal, Shivlal Agrawal Publications 6. Unified Physics- II, Navbodh Publications. **Reference Books:-** 1. Concepts of Physics by H.C. Verma 2. Fundamentals of Physics by R. Shankar 3. Optics by Ajoy
Online Resources:- 1. Wave an introductionhttps://youtu.be/SuQE7eUEriU 2. Interference https://youtu.be/hvpYKPYT-vc 3. Diffraction https://youtu.be/3RZZQVEVIEA

4. Polarization https://youtu.be/nELYaf N528

5. Waves and Oscillations- https://archive.nptel.ac.in/courses/115/106/115106119/

6. Optics- https://archive.nptel.ac.in/courses/115/107/115107131/

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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-IV**	**Session: 2024-25**
Course Code	**PHSC-04P**		
Course Title	**Wave & Optics**		
Course Type	**Laboratory course**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After the completion of the course, Students are expected to understand working mechanism and laws of classical mechanics, The Students will be able to-** ➢ **Assemble required parts/devices and arrange them to perform experiments.** ➢ **Record/ observe data as required by the experimental objectives.** ➢ **Analyze recorded data and formulate it to get desired results.** ➢ **Interpret results and check for attainment of proposed objectives related to laws of mechanics and its applications.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	1. To determine the Frequency of AC mains with the help of Sonometer. 2. Determination of angle of prism using spectrometer. 3 .To determine the Refractive Index of the Material of a given Prism using Spectrometer. 4To determine Dispersive Power of the Material of a given Prism using Spectrometer 5To determine the value of Cauchy Constants of a material of a prism. 6To determine the Resolving Power of a Prism. 7To determine wavelength of sodium light using Fresnel Biprism. 8To determine wavelength of sodium light using Newton's Rings Method. 9To determine the wavelength of Laser light using Single Slit Diffraction. 10To determine wavelength of Sodium light by laser diffraction. 11To determine wavelength of spectrum of Mercury light using plane diffraction Grating and Spectrometer. 12 To determine the Resolving Power of a Plane Diffraction Grating. 13 To determine the thickness of a thin paper by measuring the width of the interference Fringes produced by a wedge-shaped Film.	30

	14Determination of resolving power telescope.	
Keywords	Waves Motion-General, Velocity of Waves, Wave Optics, Interference, Interferometer, Diffraction, Polarization, Spectrometer.	
Signature of Members (BoS)		

FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended-

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.

2. A Text Book of Practical Physics, J. Prakash & Ramakrishna, 11th Ed., 2011, KitabMahal

3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

4. A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

5. Practical Physics B.Sc II: RP Goyal, Shivlal Publications

Reference Books Recommended:-

1. Practical Physics by S.L. Gupta and V. Kumar

2. Advanced Practical Physics for Students by B.L. Worsnop and H.T. Flint

3. B.Sc. Practical Physics by C.L. Arora

4. Experimental Physics: Modern Methods by R.A. Dunlap

Online Resources:-

1. Link for e-Books for Physics: Physics Practical: https://egyankosh.ac.in/handle/123456789/82374:

https://www.lightandmatter.com/lab 223 pdf;

2. Virtual Lab: https://vlab.amrita.edu/index.php?sub=18&brch=281

3. https://www.compadre.org/books/?ID=70&FID-63273

4. https://www.edutech.com/category/higher-education/engineering-labs/virtual-labs-1

5. https://phet.colorado.edu/en/simulations/wave-interference 6. https://egyankosh.ac.in/handle/123456789/82374		
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Sporting based on lab, work (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks	
Signature of Members (BoS)		

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-IV**	**Session: 2024-2025**
Course Code	**ZOSC-04T**		
Course Title	**Diversity of Chordates and Comparative Anatomy**		
Course Type	**Discipline Specific course (DSC)**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **After successfully completing this course, the students will be able to: Develop understanding of the characters used to classify and differentiate** ➢ **the organisms belonging to different taxa and the evolutionary history and relationship between the different classes of chordates.** ➢ **Acquire knowledge and develop critical understanding of the comparative anatomy and functioning of complex systems of Pisces to Mammalia.** ➢ **Learn the comparative account of integument with its derivatives, digestive system and Skeletal and Muscular System.** ➢ **Understand the Digestive system and its anatomical specializations with respect to different diets and feeding habits and respiratory organs in vertebrates used in aquatic, terrestrial and aerial vertebrates.** ➢ **Understand the evolution of heart, aortic arches, and learn the evolution of brain, sense organs and urinogenital system.**		
Credit Value	**3 Credits**	**Credit =15 Hours-learning & Observation**	
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)		
I	**Diversity in Protochordates and Chordates:**		

	General characteristics & classification of Chordata up to orders with examples. Cephalochordates: Type study Amphioxus and its affinities, Agnatha: Comparative account of Petromyzon and Myxine	12
II	**Structure and function of integument and skeletal systems Alimentary canal:** Structure of integument from fishes to mammals with an account on epidermal and dermal derivatives and their functional significance, Anatomy of Axial skeleton from fishes to mammals. Comparative anatomy of appendicular skeleton: limbs and girdles from fishes to mammals. Comparative account with structure of alimentary canal and digestive glands in vertebrates.	11
III	**Comparative anatomy and functional Significance of, Respiratory organs, Heart Aortic Arches and Endocrine Glands:** Structure of Gills, Lungs, Air sacs and Swim bladder in Vertebrates, Structure and evolution of heart in vertebrates, Evolution of aortic arches and their significance in vertebrates. Endocrine Glands & their function. Disorders of Thyroid, Adrenal, Pancreas and Pituitary.	11
IV	**Comparative anatomy and functional Significance of Urinogenital System, Brain & Sense Organ:** Types and development of kidneys and their ducts in anamniotes and amniotes.Nephron- structure, types and their function, Comparative anatomy of Urinogenital system. Comparative anatomy of Brain of vertebrates, Structure of Ear and Eye.	11
Keywords	**Chordates, Protochordates, Petromyzon And Myxine, Comparative Anatomy, Integument Lungs, Air Sacs Aortic Arches, Kidney, Brain.**	
Signature of Convener & Members (CBoS)		

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

- Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition).
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modem Text Book of Zoology, Vertebrates, Rastogi Publication, Merut Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivlal Agarwal and Company, Indore
- Reference Books Recommended-
- Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

Text Books Recommended-

1. E. J. W. Barrington, Invertebrate structure and function, English Language Book Society UK.
2. Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan.
3. Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi.
4. Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, ATTBS Publishing and Distributers, Delhi.
5. R.L. Kotpal, Modern Textbook of Zoology Invertebrates. Rastogi Publication, Gangotri, Shivaji Road, Meerut
6. V.K. Tiwari, Unified Zoology, Shivlal Agrawal and Company, Pustak Prakashak, Khajuri Bazar, Indore.
7. Dr. S.M. Saxsen, Zoology, Ist Year, by a, Ram Prasad and Sons, Aagra and Bhopal. N. Arumugam, M.G. Ragunathan, T. Murugan, B. Ramnathan, A Textbook of Invertebrates by Saras

Reference Books Recommended-

1. ProfR. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut.
2. EL. Jordan, Dr. P. S. Verma, Invertebrate Zoology, S. Chand Publications, New Delhi.
3. N. Arumugam, N. C. Nair S. - Invertebrate Zoology, Saras Publication..
4. Barrington E. J. W., Invertebrate Structure and Function, Nelson London.
5. Barnes, R. D., Invertebrate Zoology-Saunders Philadelphia.
6. R. L. Kotpal, Invertebrate, Rastogi Publications R. I.. Kotpal, Vertebrate, Rastogi Publications.

7. H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1-9, Anmol Publication.
8. S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi.
9. G. S. Sandhu, Harshwardhan Bhagskar-Advanced invertebrate zoology-Campus books international.
10. Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition. E.L.B.S. and Nelson.
11. Boradale, L.A. and Potts, E.A.(1961) Invertebrates: A Manual for the use of Students. Asia Publishing Home.
12. Bushbaum, R. (1964). Animals without Backbones. University of Chicago Press.
13. Hyman, L. H. (1940-67). The Invertebrates, Vol. I-VI. McGraw-Hill, New York.

Online Resources-

- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

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

- https://www.pbs.org/video/botany-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-IV**	**Session: 2024-2025**
Course Code	**ZOSC-04P**		
Course Title	**Lab. Course -03 Diversity of Chordates and Comparative Anatomy**		
Course Type	**Laboratory course**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **Develop understanding on the diversity of life with regard to different classes of vertebrates.** ➢ **Gain knowledge to identify and classify the animals on the basis of their morphological characteristics.** ➢ **Acquire the detailed knowledge about evolutionary history and relationship between the different classes of vertebrates through salient features some important animals.** ➢ **Learn comparative account of various systems in all the classes of vertebrates.** **.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	➢ Study of animals through models, slides and museum specimens in the laboratory with details on their classification, biogeography and diagnostic features of different class of Vertebrate. ➢ Study of histological slides of different class of	30

	Vertebrate. ➢ Study of Axial skeleton of Amphibia, Reptilia, Aves and Mammals. Comparative study of Appendicular skeleton Girdles and limb bones) of Amphibia, Reptilia, Aves and Mammals. ➢ Comparative study of heart of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➢ Comparative study of Aortic Arches Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➢ Comparative study of brain of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➢ Comparative study of Urinogenital system of Fish, Amphibia, Reptilia, Aves and Mammals with the help of models and charts. ➢ Histological study of Endocrine tissue. ➢ Study of Vertebrate animals in nature during a survey of a National Park/ Forest area/College campus. ➢ **Group discussion/Viva or Seminar presentation on any one of above topics** ➢ 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.	
Keywords	**Museum specimens, Histological slides, Alternative of Dissection, Practical Record.**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended- 1. S.S. Lal, Practical Zoology, Invertebrate. 12 Edition Rastogi Publications, Meerut, New Delhi. 2. A manual of practical Zoology. Dr. P.S Verma, S. Reference Books Recommended- Chand Publication, New Delhi.		
Reference Books Recommended- 1. Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi . 2. Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AFTBS Publishing and Distributers, Delhi.		
Online Resources- ➢ E-resources/e-books and e-learning portals ➢ http://ndi.ätkgp.ac.in/he/document/swayamprabha/swayam ➢ http://www.swayam.ac.in ➢ http://www.ignou.ac.in ➢ www.egyankosh.ac.in ➢ www.litm.ac.in ➢ www.eskillindia.org ➢ www.eshiksha.mp.gov.in		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/ ➢ https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html		
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Spotting frased on tools & technology (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks
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श्री Davara University

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF HISTORY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-IV**	**Session: 2024-2025**
Course Code	**SCGE-04**		
Course Title	**History of India from beginning to 2nd century BC**		
Course Type	**Discipline General Elective course (GE)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After completion of the course, the student shall be able to.** ➢ **Understand about various sources of ancient Indian History.** ➢ **Understand various chrono logical Period of ancient Indian history.** ➢ **Become familiar with various aspects of political and cultural history of those periods.**		
Credit Value	**4 Credits**	**Credit =60 Hours-learning & Observation**	
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)	
I	**1.**Sources of ancient Indian history. 2.Literacy of sources brahman, Jain, Buddha and accounts of foreign Travelers 3.Archaeological sources: stone, tools, inscriptions, coins Architecture and sculptures	15
II	1.Vedic age 2.Mahajan padas 3.Flourishing of Magadh Empire	15
III	1.Achievements of Chandragupta Maurya and Ashoka and decline of Mauryan Empire 2.Indo Greeks 3.Sunga	15
IV	1.Satvahan 2.. Shaka Ksha trap and partiyon 3.kharvela	15
Keywords	**Source, Vaidik, Magadh, Shung, Karvelas**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF HISTORY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

1.उदयनारायण राय - गुप्त राजवंश तथा उसका इतिहास (नया संस्करण) 1988

2. श्री राम गोयल- भारत का राजनैतिक इतिहास भाग 2 एवं 3

3. श्री राम गोयल- गुप्त साम्राज्य का इतिहास

4. विशुद्धानंद पाठक- उत्तर भारत का राजनीतिक इतिहास

5 डी.सी. गांगुली - परमार राजवंश

. 6 .अवध बिहारी लाल अवस्थी- राजपूत राजवंश

7. भगवती प्रसाद पांथरी- गौखरी और पुष्यभूमि राजवंश

8. डॉ. बैजनाथ शर्मा- हर्षवर्धन

डॉ. के.ए. नीलकंठ शास्त्री- दक्षिण भारत का इतिहास

Text Books Recommended-

Reference Books Recommended-

1.Majumdar, Roy - An Advanced History of India Vol. I

2.. Ashvini Agrawal- Rise and Fall of the imperial Gupta

3. R.C. Majumdar & A.D. Pusalkar (Ed.) The Classicale Age "The age of Imperial

Online Resources-

- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in

- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

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

- https://www.pbs.org/video/political-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

ART -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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A: Q1 Objective 10∗1=10 Marks Q2 Short answer type-5∗4=20 Section B: Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-IV**	**Session: 2024-2025**
Course Code	**CHSE-02T**		
Course Title	**ENVIRONMENTAL CHEMISTRY**		
Course Type	**DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **To explore the environment through the lens of chemistry, examining** ➢ **interactions between the biosphere, lithosphere, hydrosphere, and atmosphere** ➢ **To delve into ecological principles, biogeochemical cycles, and the challenges of thermal and noise pollution** ➢ **To develop concept of water quality, water management, and the** ➢ **multifaceted issue of water pollution takes center stage** ➢ **> To investigate air pollution, soil composition, radiation chemistry, and** ➢ **potential solutions for environmental challenges**		
Credit Value	**3 Credits**	**Credit =45 Hours-learning & Observation**	
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)	
I	**Introduction to Environmental Chemistry** Biosphere, Lithosphere, Hydrosphere and Atmosphere, Ecological principles-aspects of ecology, classification, types of ecosystems. Biogeochemical cycles-carbon, nitrogen, phosphorous, oxygen, hydrogen. **Thermal pollution:** sources, harmful effects, and prevention of thermal pollution. Noise pollution: sources, effects, and control of noise pollution.	12
II	**Water** Origin, physio-chemical properties of water, sources of water, hydrological cycle, criteria of water quality, Water management-water shed management, rainwater harvesting, water pollution-sources, consequences and harmful effects of water pollution, strategies for water pollution control.	11
III	**Air** Major regions of the atmosphere, composition of the atmosphere, temperature	11

	inversion and air pollution episodes, photochemistry of the atmosphere, depletion of the stratospheric ozone, greenhouse effect, greenhouse gases, remedial measures for reversion of greenhouse effect, acid rain, photochemical smog, particulate matter	
IV	**Soil and radiation pollution** Chemical and mineralogical composition of soil, classification of soil, types of soil-saline and alkaline, physical properties-texture, bulk density, permeability, chemical properties—lon exchange capacity, soil pH and micro and macro nutrient availability Introduction to radiation chemistry, sources of radioactive pollution, effects of radioactive pollution, protection from radiation, control of radiation.	11
Keywords	**Environment,Chemistry,Atmosphere,Hydrosphere/Biosphere/lithosphere,Biogeochemical cycles, water, wafer management, Air, Acid rain, Photochemical smog, Greenhouse gases**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

1.Dara,S.S.(2002).Environmental chemistry.New Delhi:S Chand &Company Ltd.
2.De,A.K.(2003).Environmental chemistry.New Delhi:New Age International.
3.Mahajan,(2010).Environmental chemistry.New Delhi:S Chand &Company Ltd
4.Kudesia,V.P.(1985).Water pollution.Pragati Prakashan

Text Books Recommended-

1.Chiras,D.D.(1994).Environmental science (4th ed.).Jones &Bartlett Learning
2.Bockris,J.0.M.(1977).Environmental chemistry.Academic Press
3.Lodge,J.P.(1994).Methods of air sampling and analysis.Publications,Jaipur:
4.Moore,W,&Moore,J.(2010).Environmental chemistry.CRC Press

Reference Books Recommended-

- ProfR. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut.
- EL. Jordan, Dr. P. S. Verma, Invertebrate Zoology, S. Chand Publications, New Delhi.
- N. Arumugam, N. C. Nair S. - Invertebrate Zoology, Saras Publication..
- Barrington E. J. W., Invertebrate Structure and Function, Nelson London.
- Barnes, R. D., Invertebrate Zoology-Saunders Philadelphia.
- R. L. Kotpal, Invertebrate, Rastogi Publications R. I.. Kotpal, Vertebrate, Rastogi Publications.
- H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1-9, Anmol Publication.
- S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi.
- G. S. Sandhu, Harshwardhan Bhagskar-Advanced invertebrate zoology-Campus books international.
- 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-

- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

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

- https://www.pbs.org/video/botany-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-IV**	**Session: 2024-2025**
Course Code	**CHSE-02P**		
Course Title	**Lab. Course - Diversity of Chordates and Comparative Anatomy**		
Course Type	**Laboratory course**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **To know the basic idea on techniques of water analysis and acidity alkalinity** ➢ **To get experience with the calculations of BOD and COD** ➢ **To understand the basics of soil analysis viz. pH, Conductivity.** ➢ **To have an experience on the determination of heavy metals in soil and Colorimetric estimation of iron and manganese.** ➢ **To familiarize with interpretation of data**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	**Water Analysis** a.Alkalinity b,Acidity c.Temporary,Permanent and total hardness d.Sulphate e.Phosphorus **Water analysis** A .Nitrites B .Chlorides		30

	C. D.O,BOD and COD D Insecticides E. Pesticides Analysis of chemicals used in water and waste water treatment-Alum, bleaching powder, activated carbon. Determination and comparison of chlorine content in tap water, storage tank and swimming pool. **Soil Analysis** Determination of a.pH b.Conductivity c.Ca d.Mg e.Heavy metals like Cr,Pb,Cd,Zn **Miscellaneous** Analysis of nutrients-Nitrogen (total,ammonia,nitrite,and nitrate),Phosphate Determination ofN,P,K of sgil. Determination of macro and micro nutrients in soil Sampling of water-tap water, well water, overhead storage tank, water pond water and lake water. Physicochemical and organoleptic characteristics of the above water samples Statistical evaluation of the data obtained for optimization of results Determination of Total solids, Total dissolved solids and total suspended solids and its significance. Determination of noise pollution in a particular area with noise dosimeter Study of particulate matter. Study of atmospheric chemistry Air Monitoring Gas detection	
Keywords	**Sampling, Water, soil,N/P/K,pH, Conductivity, acidity &alkalinity, Heavy metals**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF CHEMISTRTY

COURSE CURRICULUM

PART-C: Learning Resources
Text Books, Reference Books and Others
Text Books Recommended-
➢ Dara,S.S.,&Asole,B.G.(2017).Environmental chemistry:Practical approach (2nd ed.).New ➢ Age International (India)Publishers ➢ Trivedi,R.K.,Goyal,P.,&Trisal,B.S.(2018).Manual of water and wastewater analysis (2nd ed.).ABD Publishers &Distributors ➢ Sehgal,H.S.(2010).A textbook of soil chemical analysis (2nd ed.).Kalyani
Reference Books Recommended- ➢ Vogel,A.I.(1955).A text-book of quantitative inorganic analysis:theory and practice.Longmans; ➢ Green and Company. ➢ Sandell,E.B.(1945).Colorimetric determination of traces of metals (Vol.59,No.6,p.481).LWW Boubel,R.W.,Vallero,D.,Fox,D.L.,Turner,B.,&Stern,A.C.(2013).Fundamentals of air ➢ pollution.Elsevier. ➢ Clesceri,L.S.(1998).Standard methods for examination of water and wastewater.American public ➢ health association,9 ➢ Rump,H.H.(1999).Laboratory manual for the examination of water,waste water and soil (No.Ed 3).Wiley-VCH Verlag GmbH
Online Resources- ➢ E-resources/e-books and e-learning portals ➢ http://ndi.ätkgp.ac.in/he/document/swayamprabha/swayam ➢ http://www.swayam.ac.in ➢ http://www.ignou.ac.in ➢ www.egyankosh.ac.in ➢ www.litm.ac.in ➢ www.eskillindia.org ➢ www.eshiksha.mp.gov.in
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/ ➢ https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Spotting frased on tools & technology (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-IV**	**Session: 2024-2025**
Course Code	**PHSE-02T**		
Course Title	**Mathematical Physics-I**		
Course Type	**Discipline Specific Elective Course (DSE)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **Revise and apply the knowledge of calculus, vectors, vecuir calculus, probability and probability distributions in various cases.** ➢ **Hlustrate proficiency in writing and solving Differential equation and solving them for a given physical system.** ➢ **Apply and interpret the curvilinear coordinates in problems with spherical and cylindrical symmetries.** ➢ **Use Dirac Delta function for various physical situation, especially in quantum mechanical approaches.**		
Credit Value	**4 Credits**	**Credit =60 Hours-learning & Observation**	
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)	
I	**Calculus** **Recapitulation:** Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions, Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (stationeries only). **Calculus of functions of more than one variable:** Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration Maximization using Lagrange Multiplied **Origin and Evolution of Mathematical concepts in Ancient India:** Inventor of Calculus: some examples on calculus	12
II	**First Order and Second Order Differential equations:** Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral.	11

	Orthogonal Curvilinear Coordinates: Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl Andi aplasia in Cartesian, Spherical and Cylindrical Coordinate Systema	
III	**Introduction to probability:** Independent random variables: Probability distribution functions, binomial, Gaussian, and Poisson, with examples. Mean and variance. Dependent events: Conditional Probability. Bayer Theorem and the idea of hypothesis testing.	11
IV	**Dirac Delta function and its properties:** Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta friction. Problems based on Dirac-delta function and its application.	11
Keywords	**Ker wand distribution, Dependent events, Dirac delta function Kerman Calculus, Lagrange Multipliers, Homogeneous Equations, Particular Integral, Probability**	
Signature of Convener & Members (CBoS)		

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF PHYSICS

COURSE CURRICULUM

PART-C: Learning Resources
Text Books, Reference Books and Others
1.Text Books Recommended- 1. Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier 2. An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learnin 3. Differential Equations, George F. Simmons, 2007, McGraw Hill. 4. Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.
Reference Books Recommended- 1. Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning 2. Mathematical Physics, Goswami, 1st edition, Cengage Learning 3. Engineering Mathematics, S. Pal and S.C. Bhunia, 2015, Oxford University Press 4. Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India. 5. Essential Mathematical Methods, K. F. Riley & M.P Hobson, 2011, Cambridge Univ. Press. 6. Mathematical Physics, H.K. Dass and R. Verma, S. Chand & Company
Online Resources- ➢ e-books and e-learning portals ➢ https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-http://www.ignou.ac.in ➢ https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-http://www.itm.sc.in ➢ https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in ➢ https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.pbs.org/video/botany-basics-iuu2bl/ ➢ https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf ➢ https://www.botanytoday.com/brunches-of-botany
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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):70	Two section A&B Section A: Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B: Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks	
Signature of Convener & Members (CBoS)		

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-A: Introduction			
Programme: Bachelor in Life Sciences (Certificate/Diploma/Degree Honors)		**Semester-IV**	**Session: 2024-2025**
Course Code	**ZOSE-02T**		
Course Title	**Ecology and Wild life Conservation and management**		
Course Type	**Discipline Specific Elective Course (DSE)**		
Pre-requisite (if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **After successfully completing this course, the students will be able to: Understand the concepts of fundamental ecological principles, including energy** ➢ **flow, nutrient cycling, and population dynamics.** ➢ **Apply the knowledge of ecology to understand equilibrium of nature.** ➢ **Analyze the strategies of Populations to survive and sustain. Evaluate the significance of biodiversity and its conservation.** ➢ **Create awareness about wildlife and nature.**		
Credit Value	**3 Credits**	**Credit =45 Hours-learning & Observation**	
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)	
I	**An overview of Ecology and Biomes:** Aims and scope of Ecology. Difference between Auto-ecology and Synecology. Abiotic & Biotic factors. Ecosystem and Ecological Pyramids. Bio-geo chemical cycles. Energy flow in ecosystem: Trophic levels. Food Chain, Food Web, Food chain in fresh water ecosystem. Laws of limiting factor: Leibig's Law of Minimum, Shelford Law of tolerance. Major Biomes of the world. Biogeographic zones of India.	12
II	**Population ecology:** Population characteristics: Density, Measurement of Population Density (Quadrate method and tagging method) Mortality, Natality, Age Pyramids, Migration and Dispersal. Life tables. Survivorship curves. Population Growth: Types of Population Growth, Growth Curves (S shaped & J shaped), Mathematical Expression of population growth: logistic & stochastic. R and K strategics. Carrying Capacity. Population Regulation: extrinsic & intrinsic factors.	11
III	**Biotic community and Environmental degradation:** Biotic community characteristics and attributes: Stratification; Dominance, diversity, species richness, abundance, Evenness, Similarity. Ecotone and edge effect. Ecological succession.	11

	Species interaction: Positive interactions: commensalism, proto-cooperation and mutualism. Negative interactions: parasitism. Competition: Interspecific and Intraspecific, Lotka Volterra Model, Gause's Principle. Prey-Predicator Model. Environmental degradation: Air, water and noise pollution and their control. Natural resources: Mineral, water and forest, their significance and conservation.	
IV	**Biodiversity & Wildlife management:** Biodiversity: Concept and characteristics. Levels of Biodiversity (Genetic Diversity, Species Diversity & Ecosystem Diversity), Hotspots of Biodiversity. Major National Parks of Chhattisgarh and their biodiversity. Endemic animal species of Chhattisgarh. IUCN red list categories and criteria. Conservation of Biodiversity (In Situ, & Ex Situ Conservation). Major international & national treaties, laws and regulations for conserving biodiversity. Important conservation projects undertaken in India: Project Tiger & Project Elephant. Tiger Census and Estimation (Techniques and Findings). Cheetah re-introduction plan. Captive breeding and Propagation: Founder population, rehabilitation, education, utilization, gene banks, GIS and other technologies in Forest & Wild life conservation.	11
Keywords	**Ecology, Biome, Abiotic, Botic factors, Nutrient Cycle, Population, Wildlife conservation, In Situ & Ex Situ**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources

Text Books, Reference Books and Others

- Jordan, E. L. and Verma, P. S. (2013) Chordate Zoology (14th edition).
- Saxena, R. K. and Saxena, S. (2015) Comparative Anatomy of Vertebrates (2nd edition).
- R.L. Kotpal, Modem Text Book of Zoology, Vertebrates, Rastogi Publication, Merut Tiwari, V.K. Unified Zoology, B.Sc. Part I, Shivlal Agarwal and Company, Indore
- Reference Books Recommended-
- Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

Text Books Recommended-

- Sharma, P.D. Ecology and Environment, Rastogi Publication.
- Kumar Pranav, Meena Usha. Fundamentals of Ecology and Environment.
- Mathur Reena. Wildlife Conservation and Management, Rastogi Publication.
- Singh S.K., Text book of Wildlife Management, CBC Publishers and Distributors
- J. W. Barrington, Invertebrate structure and function, English Language Book Society UK.
- Robert Barnes, Invertebrate Zoology, Robert Barnes IVth edition Holt Saunders International Edition Japan.
- Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi.
- R.L. Kotpal, Modern Textbook of Zoology Invertebrates. Rastogi Publication, Gangotri, Shivaji Road, Meerut
- V.K. Tiwari, Unified Zoology, Shivlal Agrawal and Company, Pustak Prakashak, Khajuri Bazar, Indore.
- Dr. S.M. Saxsen, Zoology, Ist Year, by a, Ram Prasad and Sons, Aagra and Bhopal. N. Arumugam, M.G. Ragunathan, T. Murugan, B. Ramnathan, A Textbook of Invertebrates by Saras
- **Reference Books Recommended-**
- ProfR. L. Kotpal, Protozoa to Echinodermata, Rastogi Publication Meerut.
- EL. Jordan, Dr. P. S. Verma, Invertebrate Zoology, S. Chand Publications, New Delhi.
- N. Arumugam, N. C. Nair S. - Invertebrate Zoology, Saras Publication..
- Barrington E. J. W., Invertebrate Structure and Function, Nelson London.
- Barnes, R. D., Invertebrate Zoology-Saunders Philadelphia.
- R. L. Kotpal, Invertebrate, Rastogi Publications R. I.. Kotpal, Vertebrate, Rastogi Publications.
- H. S. Bhampah, KavitaJuneja, Recent trends in vertebrates vol 1-9, Anmol Publication.
- S. N. Prasad, Life of invertebrates, Vikash Publication House Pvt Ltd New Delhi.
- G. S. Sandhu, Harshwardhan Bhagskar-Advanced invertebrate zoology-Campus books international.
- 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-

- e-books and e-learning portals
- https://www.coursera.org/lecture/emergence-of-life/4-5-invertebrates-successes-of-life-http://www.ignou.ac.in
- https://www.shiksha.com/online-courses/introduction-to-biology-biodiversity-course-http://www.itm.sc.in
- https://www.youtube.com/watch?v=uK-XYhttp://www.eshiksha.mp.gov.in
- https://www.youtube.com/watch?v=WxMSckEcio4http://www.internshala.com

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

- https://www.pbs.org/video/botany-basics-iuu2bl/
- https://efaidohmannibpcapcalclefindorkaj/https://www2.ca.uky.edu/apcom/pubs/ho/ho96/ho96.pdf
- https://www.botanytoday.com/brunches-of-botany

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:20+20 Assignment/ Semenar-10 Total Marks-30	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):70	Two section A&B Section A :Q1 Objective 10*1=10 Marks Q2 Short answer type-5*4=20 Section B : Descriptive answer type qts 1 out of 2frm each- 4*10=40 Marks

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART- A: Introduction			
Programme: Bachelor in Life Sciences **(Certificate/Diploma/Degree/Honors**		**Semester-IV**	**Session: 2024-2025**
Course Code	**ZOSE-02P**		
Course Title	**Lab. Course - Ecology and Wild life Conservation and management**		
Course Type	**Laboratory course**		
Pre-requisite(if any)	**As per program**		
Course Learning. Outcomes (CLO)	**After successfully completing this course, the students will be able to –** ➢ **Understand practical fieldwork skills, including sampling techniques, data collection and methods of analysis used in ecological research.** ➢ **Learn to design and implement ecological experiments.** ➢ **Understand soil profile and characteristics.** ➢ **Analyze chemical parameters of various water bodies.** ➢ **Create awareness about local fauna and evaluate biodiversity of an arca.**		
Credits Value	**1 Credits**	**Credit =30 Hours Laboratory or Field learning/Training**	
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 Content of Course	➢ Study of biodegradable and non-biodegradable pollutants in the locality. ➢ Study of a representative type of ecosystem. ➢ Determination of pH of water samples from various water bodies. ➢ To determine the transparency of water of Pond ecosystem by Secchi disc. ➢ To study the profile of soil in the field/ Soil sampling by V- cut method. ➢ To study the zooplankton communities in a fresh water		30

	ecosystem. ➢ To prepare a checklist of birds/Insects in and around college campus. ➢ Estimation of ecological density, diversity and frequency of college premises by quadrate method. ➢ Estimation of Shannon Weiner index of a given area. ➢ Estimation of Simpson-biodiversity index of a given area. ➢ Study of strategy for preventing and managing human-wildlife conflicts. ➢ Project Work/Quiz/Poster/Model preparation/Viva. ➢ Practical Record	
Keywords	**Density, Diversity, Frequency, Biodegradable, Non-biodegradable, Pollutants, Sechhi disc,**	
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ZOOLOGY

COURSE CURRICULUM

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended- 3. S.S. Lal, Practical Zoology, Invertebrate. 12 Edition Rastogi Publications, Meerut, New Delhi. 4. A manual of practical Zoology. Dr. P.S Verma, S. Reference Books Recommended- Chand Publication, New Delhi.		
Reference Books Recommended- 3. Park Haswell, Marshall and Williams, A textbook on Zoology Invertebrate, AITBS Publishing and Distributers, Delhi . 4. Park Haswell, Marshall and Williams, A textbook on Zoology Vertebrate, AFTBS Publishing and Distributers, Delhi.		
Online Resources- ➢ E-resources/e-books and e-learning portals ➢ http://ndi.ätkgp.ac.in/he/document/swayamprabha/swayam ➢ http://www.swayam.ac.in ➢ http://www.ignou.ac.in ➢ www.egyankosh.ac.in ➢ www.litm.ac.in ➢ www.eskillindia.org ➢ www.eshiksha.mp.gov.in		
Online Resources- e-sources/e-books and e-learning portals ➢ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5871155/ ➢ https://cms.botany.org/home/careers-jobs/careers-in-botany/arcas-of-specialization- in-botany.html		
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:10+10 Assignment/ Semenar-05 Total Marks-15	Better marks out of the two Tot Quiz + obtained marks in Assignment shall be considered against 15 Marks

End Semester Exam (ESE):35	Laboratory/Field Skill Performance: On spot Assessment Section A : Performed the Task based on lab, work 20*1=20 Marks B: Spotting frased on tools & technology (written) 10*1=10Marks Section B : Viva-voce (based on principle/technology) - 5*1=05 Marks
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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-28)

DEPARTMENT OF ENGLISH

COURSE CURRICULUM

PART-A:Introduction			
PROGRAMME: Bachelor in Computer Application (Certificate/Diploma/Degree/Honors)		**Semester-IV**	**Session: 2024-2028**
Course Code	**AEC- 04**		
Course Title	**Communicative English and Soft Skills**		
Course Type	**Ability Enhancement Course (AEC)**		
Prerequisite	**As per PROGRAMME**		
Course Learning Outcomes (CLO)	**At the end of this course, the students will be able** • Learn deviant use of English both in written and spoken forms. • Understand the importance of communication n English. • Apply the ability to improve competence in using English language. • Analyze the importance of reading skills, • Develop language for speaking with confidence		
Credit Value	**2 Credits**	**1 Credit-15 Hours - Learning & Observation**	
Total Marks	**Max. Marks: 50**	**Min marks -20**	

PART -B: Content of the Course

Total No. of Teaching-Learning Periods (45 min. per period)-30 Periods

Unit	Topics(Course Content)	No. of Period
I	**What is communication?** • Purpose of Communication. • Types of Communication (Verbal and Non- Verbal), • The motivating factors (lntrinsic and Extrinsic) • Barriers of Communication (Internal and External).	**07**
II	**Building Vocabulary** i. Use of Dictionary, ii. Building vocabulary through synonyms and antonyms, iii. Use of Phrasal Verbs, Idioms and Phrases iv. Unseen passage	**07**
III	**Conversation in English** (Performance Based) **A) Reading:** Very short stories (Gif of Magi, Cinderella, The Selfish Giant, Stories	**08**

	from Panchatantra), Newspaper reports / Fact-based articles, Diction and tone, Identifying topic sentences, Reading aloud: Reading an article/report. **B) Spoken English for the Real world and Situational Dialogues (any four)** • Call Center: Talking to service Providers, Professional Enquiries, Talking with peers/ seniors. • Bank: for opening an account (seeking information on loans/FDs/other schemes. • Office: (seeking information regarding job vacancy) • Market (asking for price of an object, discount etc), • Restaurant: (asking for the special dish, offerings in the menu and ordering for food) • At the Railway Station / Bus Station enquiry: (Arrival and departure of buses/ trains) • Hotel: Booking a room, asking tariff rate • Travel agency:-(Asking to book tickets fares, finding vacancies in hotels) C) **Greetings and Common Etiquettes:** Introducing oneself Invitation; Making Requests; Expressing Gratitude; Complimenting and Congratulating; Expressing Sympathy; Apologizing; Complaining and Expressing Regret	
IV	**Applied Riding Practice and Ethics** i. Introduction to trail riding or arena riding ii. Group riding etiquette and communication iii. Intro to jumping and dressage (optional for advanced learners) iv. Ethical treatment and welfare of horses v. Assessment through practical demonstrations and logbook maintenance **Presentation skills** (Performance Based): Effective oral presentation, Characteristics of good oral presentation. Use of quotations and anecdotes. Ways of Oral Presentation (Seminar, Viva -voce, Interview, Power Point etc.) Gestures/ Mannerism during oral presentation. Media methods used for effective oral presentation, Body Language, Attire.	**08**
Keywords	Communication, Vocabulary, Conversation, Reading, Presentation.	

Name and Signature of Convener & Members of CBS

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Fluency in English - Part II, Oxford University Press, 2006.
- Enrich Your English, OUP, SR Inthira and V. Saraswathi, CIEFL,1997
- Oxford A-Z of English Usage, ed. Jeremy Butterfield, OUP, 2007.
- Longman Dictionary of Common Errors, N.D. Turton and J.B. Heaton, Longman, 1998
- Contemporary Communicative English, S Chand
- Malhotra Prerna, Deb Dulal Halder,(2019) Communication Skills: Theory and Practice, Eighth Edition,
- BookAge Publications, New Delhi.

Online Resources:

- Applying Communication Theory for Professional Life: A Practical Introduction. Dainton andZelley, http://tsime.uz.ac.zw/claroline/backends/download.php/url-L0ludHJvX3RvX2NvbWl1bmliYXRpb2Sf
- https://web.sol.du.ac.in/my_modules/type/cbcs-4l=2ldata/root/B.Com/Semester%20ABILITY-ENHANCEMENT 20COMPU_ SORY%20COURSE-AECC/English%20Communication%20A-B-C/Unit%201-5.pdf
- https:/larchive.ore/details/personality-development-book/mode/1up
- https://www.coursera.org/articles/presentation-skills
- https://eniaminball.com/blogleood-body-lanzuage-best-visual-aid-falks/
- https://www.cbs.de/en/blog/15-effective-presentation-tips-to-improve-presentation-skills/
- https://blow.moderngeoy.com/importance-of-body-language-in-presentations-good-bad-examples

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-:10 & 10 Assignment /seminar-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 marks: Q2. Short answer type-5x2=10 marks ction B: Descriptive answer type question, 1 out of 2 from each unit-4x5=20 marks otal = 35 marks**	

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FOUR YEAR UNDERGRADUATE PROGRAMME (2024-2028)

EQUINE STUDIES & HORSEMANSHIP

COURSE CURRICULUM

PART-A: Introduction			
Programme: Common to All the UGs		**Semester-IV**	**Session: 2024-2025**
Course Code	**DUSECHS-T&P**		
Course Title	**Equine Studies & Horsemanship**		
Course Type	**Skill Enhancement Course (SEC)**		
Pre-requisite (if any)	**As per Programme**		
Course Learning Outcomes (CLO)	**At the end of this course, the students will be able:** **i. to develop riding proficiency and demonstrate basic riding skills and control at various gaits.** **ii. to understand equine behavior and care by gaining knowledge of horse behavior and basic care practices.** **iii. to enhance physical fitness and coordination by improving fitness, balance, and coordination through riding practice.** **iv. to learn riding techniques and styles by exploring different riding techniques and disciplines for specialization.** **v. to promote safety and risk management by applying safety protocols and risk management strategies in equestrian activities.**		
Credit Value	**02 Credits**	**1 Credit =15 Hours-learning & Observation**	
Total Marks	**Max. Marks:50**	**Min Passing Marks: 20**	
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (45 min. per period) -30 Periods			

Unit	Topics (Course Contents)	
I	**Introduction to Horse-Riding and Equine Basics** ➢ History and evolution of horse-riding in sport and culture ➢ Introduction to equine anatomy and physiology ➢ Types of horse breeds and their characteristics ➢ Equipment and tack: saddle, bridle, stirrups, reins, riding attire ➢ Basic grooming and horse care	**07**
II	**Groundwork and Safety Protocols** Approaching, haltering, and leading a horse Stable management and horse behaviour basics Feeding, hydration, and routine checks Safety guidelines for riders and handlers Risk management and emergency procedures	**07**
III	**Basic Riding Techniques** Mounting and dismounting techniques Correct rider posture and balance Use of reins, legs, and seat for communication Walking, halting, and changing directions Basic trot and control exercises	**08**
IV	**Applied Riding Practice and Ethics** Introduction to trail riding or arena riding Group riding etiquette and communication Intro to jumping and dressage (optional for advanced learners) Ethical treatment and welfare of horses Assessment through practical demonstrations and logbook maintenance	**08**

PART-C: Learning Resources

i. https://www.coursera.org/learn/equine

ii. https://www.coursera.org/learn/equine-welfare

iii. https://www.edx.org/learn/animal-behavior

iv. https://www.youtube.com/user/EquestrianCoach

v. https://www.riding-instructor.com/

vi. https://horseandrider.com/

vii. https://equestrian.ca/

viii. https://www.bhs.org.uk/

ix. https://www.udemy.com/courses/search/?q=horse%20riding

x. https://equineinstitute.org/

PAPART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

- **Practical (riding techniques, horse care demonstration, logbook):15 marks**
- **End Sem. Exam. (Theory): 35**

Signature of Convener & Members (CBoS)