

Plant Tissue Culture

Course Objective:

This course aims to understand the basic principles of plant tissue culture and its application biotechnology. Course provides insight knowledge of to enable the students to

1. Understand the basic principles of plant tissue culture
2. Understand the methods in biotechnology
3. Get an insight into Recombinant DNA technology and Methods of gene transfer.
4. Appreciate the applications of Biotechnology recombinant DNA technology and methods of gene transfer.

Unit I:

History of plant tissue culture research - basic principles of plant tissue callus culture, meristem culture, organ culture, Totipotency of cells, differentiation and dedifferentiation. Methodology - sterilization (physical and chemical methods), culture media, Murashige and Skoog's (MS medium), phytohormones, medium for micro-propagation/clonal propagation of ornamental and horticulturally important plants. 3. Callus subculture maintenance, growth measurements, morphogenesis in callus culture – organogenesis, somatic embryogenesis.

Unit II:

Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique. Production of secondary metabolites. Cryopreservation; Germ plasm conservation.

Unit III:

Recombinant DNA technology 1. Restriction Endonucleases (history, types I-IV, biological role and application); concepts of restriction mapping. Cloning Vectors: Prokaryotic (pUC 18, pBR322, Ti plasmid and Lambda phage, Eukaryotic Vectors (YAC and briefly PAC). Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning). Construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by complementation technique, colony hybridization.

Unit IV:

Methods of gene transfer: Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

Text Book:

- ✓ *Botany-Plant tissue culture and its Biotechnological applications, by B. R. C. Murthy & V. S. T. Sai, Venkateswara Publications, Guntur, 2017*

Reference Books

- ✓ *Pullaiah. T. and M.V.Subba Rao. 2009. Plant Tissue culture. Scientific Publishers, New Delhi.*
- ✓ *Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands*

Learning Outcome:

To enable the students to

- Understand the basic principles of plant tissue culture
- Understand the methods in biotechnology
- Get an insight into Recombinant DNA technology and Methods of gene transfer.
- Appreciate the applications of Biotechnology in plant tissue culture

Marine Biotechnology

Course Objective:

This course aims to grow competent, innovative and productive marine biologist who can pursue their research in this area. It will also provide information about microbes available in aquatic environment and their role and interaction with marine environment.

Unit I

Marine Biotechnology - An Introduction, Marine Ecosystem and its Functions, Chemical Oceanography, Sedimentation, Marine microbiology, Values of Marine Biodiversity, Importance of coastal aquaculture, Mariculture, Induced Breeding in Fish, Culture of Shrimps and Marine Macroalgae – Seaweeds, Culture of Live Feed Organisms, Bio-floc technology, aquaponics

Unit II

Classification of marine environment. Diseases of Fish and Shrimp, Diagnosis of Diseases of Fish and Shrimp, Chromosomal Manipulation in Fish, Transgenic Fish, Aquatic Vaccines, Probiotics in Aquaculture, Fish feed technology.

Unit III

Bio-communication in oceans, Microbe-microbe interaction, Quorum sensing, Marine biomass and productivity, Biogeochemical processes- Nutrient Cycling, Carbon, Sulphur, Phosphorus and Iron nitrogen cycle, marine pollution

Unit IV

Cryopreservation in Fishery Sciences, Biofouling, Marine Bioremediation, Marine By-products, Marine Pharmaceuticals, Marine Natural Products and their Applications, Marine Protein, Food preservation and processing, Packing.

Text Book:

- ✓ *Aquaculture –Principles and Practices, 1990 – TVR Pillay, Fishing Nets Books.*
- ✓ *Aquaculture Biotechnology, First edition, 2012, Eds. Garth L. Fletcher and Mathew L Rise, Wiley-Blackwell publication*
- ✓ *Aquaculture Biotechnology, V. Ramachandran, 2013, Black Prints 4. Marine Biology – An ecological approach, 1988 – James W. Nybken, Harper Collins publication*

Learning Outcome:

- This course explores the marine ecosystems and microbial diversity of ocean. Give detailed knowledge of about the physiological capability and biogeochemical roles of marine microbes. Explains fundamental principles of aquaculture biotechnology.

Computational Biology

Course Objective:

This course aims to develop analytical and mathematical modelling of biological systems. This course introduces students to rapidly evolving field of bioinformatics. It also gives idea about different databases available and their advantages over traditional file system.

Unit I

Primary and secondary data base, Genbank, EMBL, Swissprot, DDBJ, PIR, TIGR, Protein and Nucleic acid sequences. Computational complexities, analysis of merits and demerits, sequence pattern database, PROSITE, BLAST and FASTA algorithm, Needleman-Wusch & Smith-Waterman algorithms.

Unit II

Representation of molecular structures, external and internal co-ordinates, concept of free energy of molecules, Monte Carlo and molecular dynamics simulation, Phylogeny analysis.

Unit III

Molecular structure determination, X-ray crystallography and NMR spectroscopy analysis, 2D protein data bank, Nucleic acid data bank, storage and dissemination of molecular structures, Ligand database. Exploration and analysis of data obtained from above techniques using computational platform.

Unit IV

Homology modelling, threading and structure prediction, structure-structure comparison of macromolecules, Docking, Drug Design

Text Book:

- ✓ Ghosh Z. and Bibekanand M. (2008) *Bioinformatics: Principles and Applications*. Oxford University Press.
- ✓ Wünschiers, R. (2004). *Computational Biology: Unix/Linux, data processing and programming*. Springer.

Reference Books:

- ✓ Zvelebil, M. J., & Baum, J. O. (2008). *Understanding bioinformatics*. Garland Science.
- ✓ David W Mount (2004). *Bioinformatics: Sequence and Genome analysis 2nd edition*, CSHL press.

- ✓ *A. Baxevanis and FBF Ouellette (2001), Bioinformatics: a practical guide to the analysis of genes and proteins, 2nd Edition, John Wiley.*
- ✓ *Jonathan Pevsner (2003), Bioinformatics and functional genomics. 1st Edition, Wiley-Liss.*

Learning Outcome:

- To understand the basic Bioinformatics and algorithms used in Computational Biology
- Prediction of secondary and tertiary protein structures
- Evolutionary identification of different species through phylogeny analysis
- Deep knowledge regarding drug designing and its use to address different diseases

Geology

Mapping & Surveying

Course Objectives

- Introduce the principles of mapping and Surveying
- Introduce field measurement methods using various instruments
- Explain the concepts of satellite positioning

Learning Outcomes

- Make measurements of the field
- Elaborate the methods of satellite positioning and their accuracy
- Interpret aerial photographs
- Create topographic and thematic maps.

Unit I: Topographical Surveying for Geological work

Topographic maps, Preparation for survey work; chain and compass survey. Plane table survey. Theodolite and miners dial survey. Tacheometry survey. Triangulation survey and bore hole survey method.

Unit II: Photogrammetry and air photo interpretation

Types of aerial photographs ; Vertical aerial photographs, Oblique aerial photographs, Taking vertical photographs. Stereo pair photographs. Photographic scale. Relief displacement and image parallax. Airphoto interpretation. Airphoto interpretation elements. Application of air photo interpretation in mineral exploration, ground water exploration and geomorphology.

Unit III: Mapping & Cartography

Geometric operations; Elementary image distortions ;Two-dimensional approaches (Georeferencing and Geocoding). Three-dimensional approaches ;Orientation , Monoplotting, Orthoimage production, Stereo restitution. RADAR; Principles of imaging radar, Geometric properties of radar. Cartographic maps and types of Maps (Topographic Maps, ThematicMaps), GIS Cartography.

Practical:

- ✓ *Chain and compass survey instrument and procedure.*
- ✓ *Numerical problems of coordinate transformation*
- ✓ *GIS Cartography and thematic maps.*

Textbook

- ✓ *Tiberius, Marel, Reudink and Leijen (2022) Surveying & Mapping, TU Delft Open (<https://textbooks.open.tudelft.nl/textbooks/catalog/view/46/150/382>)*

Suggested Books :

- ✓ *Courses in mining geology by R. N. P. Arogyaswamy · 1968*
- ✓ *Lillesand, T.M., R.W. Kiefer and J.W. Chipman, 2004, Remote Sensing and Image Interpretation, 4th Edition, John Wiley and Son, New York.*
- ✓ *Chandra, A.M. (2005) Surveying, New Age International Publishers*
- ✓ *ESRI (2000) Understanding map projections, ESRI, USA (http://downloads2.esri.com/support/documentation/ao_/710Understanding_Map_Projections.pdf)*
- ✓ *Harvey, F. (2008) A primer of GIS: Fundamental Geographic and Cartographic Concepts, The Guilford Press*

Digital Cartography

Course Objectives

- To know the basics, importance, and methods of Cartography
- To study the various maps projection and co-ordinate systems.
- To study the different aspects of design in cartography.
- To learn the Generalization and designing aspects of cartography
- To learn the different techniques of Map production and Reproduction\

Learning Outcome:

- Able to define and justify the purpose of each cartographic element
- Use digital tools for generating cartographic products
- Evaluate digital maps for their thematic appropriateness
- Generate maps with a scale and requisite projection

Unit I: Introduction

History and evolution of Cartography. Definition, scope and concepts of cartography. Characteristics of Map. Categories of maps. Methods of mapping, relief maps, thematic maps. Trends in Cartography.

Unit II: Cartographic (Map) Elements

Geoid & Spheroid, Map projection & Transformation, Map Scale and Coordinate system. Plane co-ordinates in UTM system, projection used in Survey of India topographic sheets.

Unit III: Cartographic Representation & Visualization

Digital Data types, Data sources (Survey and positioning, Remote sensing, Census and sampling), Data Visualization of different data types, Labels and Symbols, Visualizing discrete and continuous data. Map design and generation.

Practical:

- Analyzing Toposheets and Geological Maps
- Digital cartographic Data Sources (vector and Raster data)
- Projection and Transformation
- Map design and cartographic output

Textbook:

- ✓ *Cromley .R.G, "Digital Cartography", Prentice-Hall of India, New Delhi, 1992.*

Suggested Readings:

- ✓ *Robinson .A. H, Morrison .J. L, Muehrcke .A. C, Kimerling .A. J and Guptill .S. C, "Elements of Cartography", 6th Edition, John Wiley and Sons, 1995.*
- ✓ *Dent .B. D, "Cartography – Thematic Map Design", 5th Edition, W C B McGraw-Hill, Boston, 1999.*
- ✓ *Anson .R.W and Ormeling .F.J, "Basic Cartography for students and Technicians", Vol., I, II and III Elsevier Applied Science publishers 2nd Edition, 1995.*

Economics

Data Analytics I

Course description

This paper helps students to learn the fundamental elements of Data Analytics and to gain proficiency in working with SPSS. Upon Completing the Course, students will be able to identify advanced techniques of data analytics using Statistical Package for Social Sciences (SPSS), use Exploratory data analysis to visualize the data, analyses survey and other data sets using statistical methods

Course Outcomes:

1. This course is designed to help students learn fundamental elements of Data Analytics and to gain proficiency in working with SPSS.
2. Upon Completing the Course, students will be able to identify advanced techniques of data analytics using Statistical Package for Social Sciences (SPSS) software.
3. They will be exposed to exploratory data analysis techniques.
4. This course shall enable them to use statistical tools to visualize and analyze surveys and other data sets.

Module I: Introduction to Data Analytics

Concept of data analytics; Role of data analyst; Classification of Data- Structured, Semi-Structured, Unstructured data; Scale of measurement of data; Various Data sources, Modern Data collection Methods

LO: This module shall help the students to understand the basics of data analytics and identify, understand, and dealwith different types of data sets.

Module II: Data Visualisation and Basic Statistics

Data presentation and visualization, Types of Diagrams; Descriptive statistics like measure of central tendency, Dispersion, Skewness, Correlation etc.; Univariate, Bivariate, Multivariate

analysis

LO: Students shall develop proficiency in data visualization to identify patterns, trends, and outliers in data sets; and be able to understand applied statistics to develop suitable concepts and methods that will help to analyse data and solve research problems in this module.

Module III: Introduction to SPSS

Different Menu's in SPSS, creating a data file, opening excel files, variables and labels, selecting cases by filtering, recoding of data, merging of files, Sorting of Cases and Variable, SPSS Output and its transfer to excel and word.

LO: This module shall enable the students to calculate/recode variables and prepare data for analysis using SPSS.

Module IV: Exploratory Data Analysis using SPSS

Data visualization using frequency tables and charts, descriptive statistics, cross tabulations, Compare-Means, ANOVA, Independent Sample t-test, Paired Sample t-test, One-way ANOVA, chi square tests. Simple and Partial correlation; General Linear Model

LO: Upon completion of this module, the learners shall be able to carry out exploratory data analysis using SPSS that can test hypotheses.

Text Books

- ✓ *Brian C. Cronk (2018), How to use SPSS: A Step-By-Step Guide to Analysis and Interpretation, Tenth edition, Routledge.*
- ✓ *Nancy L. Leech et. al. (2005), SPSS for Intermediate Statistics: Use and Interpretation, Second edition, Lawrence Erlbaum Associates, Inc.*

Additional Reading

- ✓ *William E. Wagner (2015), Using IBM SPSS statistics for research methods and social science statistics, Fifth edition, SAGE Publications, Inc.*
- ✓ *IBM 2016, IBM Knowledge Center: SPSS Statistics, IBM, viewed 18 May 2016, <https://www.ibm.com/support/knowledgecenter/SSLVMB/welcome/2>.*

Data Analytics II

Course Description

This course introduces R and Python, which are popular statistical programming languages. The course covers data reading and its manipulation using R and Python, which is widely used for data analysis internationally. Loading, installing and building packages are covered in the syllabus.

Course Outcomes:

1. To develop Problem-solving and programming capabilities.
2. Getting introduced to R and Python, which are popular statistical programming languages, and use them to read data and manipulate it.
3. Developing an R script and execute it, understand working with Python language, install, load, and deploy the required packages, and build new packages for sharing and reusability,
4. To visualize and summarize the data, and design an application with database connectivity for data analysis.

Module I: Introduction to R Programming

R Installation, loading and using packages; data types, data structure-Vectors, Matrix, Lists, Factors; Data Frames, conditional statements, loop statements, custom function, the apply family; Reading and getting data into R (External Data): using CSV files, Web Data, Excel files etc. Finding of Invalid values and Outliers, Descriptive Statistics, data visualization using scatter plot, line plot, bar chart, histogram, box plot etc.; Linear Regression using R.

LO: This module shall enable the students to explore and understand how to use the R documentation including R-packages and create simple programs using R.

Module II: Python Basics

Installation of Python software; keywords, identifiers, comments in Python, python indentation,

python statement; Data Structure and Data types; String operations in Python; Input-Output and formatting; operators and control flow; Functions in Python;

LO: This module shall educate the students to understand and use Python- Syntax, Libraries, and Functions.

Module III: Data Analysis with Python

Introduction to Data Science: NumPy and Pandas; Data Visualization in Python; Exploratory data analysis with Python.

LO: This module shall impart the ability among the learners to create simple programs using Python and conduct exploratory data analysis to uncover the underlying structure in the data sets.

Module IV: Capstone in Business Analytics

Find an industry or business problem, collect data, develop a solution, create a business case, and present it to industry leaders and faculties in the department

LO: Upon completion of this module, students can carry out a Business Analytics Capstone Project to apply data analytics for data-driven decisions to handle a real business problem.

Text Book

- ✓ Cotton, R., *Learning R: A step-by-step function guide to data analysis. 1st edition.* O'Reilly Media Inc.
- ✓ Suresh Kumar Mukhiya and Usman Ahmed: *Hands-On Exploratory Data Analysis with Python: Perform EDA techniques to understand, summarize, and investigate your data*

Additional Readings

- ✓ Gardener, M. (2017). *Beginning R: The statistical programming language*, Wiley.
- ✓ Lawrence, M., & Verzani, J. (2016). *Programming Graphical User Interfaces in R*. CRC Press. (ebook)
- ✓ Paul Barry (2016): *Head-First Python, 2nd edition*, O'Reilly
- ✓ Avinash Navlani, Armando Fandango, Ivan Idris (2021) *Python Data Analysis: Perform data collection, data processing, wrangling, visualization, and model building using Python*

Psychology

Understanding And Managing Self

Introduction:

Student life is a critical period for their personal and professional development. Their success is determined not only through their academic competencies but also through their soft skills. This course is designed to help students exploring their self and develop insight into it. They will also learn new skills and increase their competency to manage self for personal and professional success.

Course Outcomes:

- To learn the basic concepts of self and increasing self-awareness skills.
- To understand the importance of Emotional Intelligence and the importance to personal success.
- To manage self through stress management, time management
- To manage anger and being assertive with people.
- To improve interpersonal skills through transactional analysis

Unit I: Understanding and Exploring Self

- (i) **Definition of Self**; Dimensions of Self; Importance of Self-Awareness, Exploring self through Johari-Window & SWOC Analysis
- (ii) **Emotional Intelligence**: Meaning and Definition, Need for Emotional Intelligence, Competencies of Emotional Intelligence; Skills to develop emotional Intelligence
- (iii) **Activities**: Psychometric Test (Johari– Window), SWOC Analysis of self

Learning Outcomes

- Understand the basic concepts of self and enhance their self-Awareness skills.
- Gain understanding of emotional intelligence and its importance to personal success.

Unit II: Managing Self

- (i) Stress Management: What is Stress? Sources of Stress; Effect of Stress, Managing Stress: Relaxation Exercise, Yoga and Meditation; Time Management: Principles and Techniques; Being Assertive, Saying ‘No’
- (ii) Improving interpersonal relationships through ‘Transactional Analysis’: Understanding Ego states, Transactions, Life Positions

Learning Outcomes

- Manage their stress effectively, manage time better and be assertive with people.
- Improve their interpersonal skills and communicate better.

Activities: Progressive Muscles Relaxation Exercise, In-basket Exercises for time management, Psychometric Test (Transactional Analysis)

Text Books:

- ✓ *Soft Skills: An Integrated Approach to Maximize Personality*, Gajendra S. Chauhan, Sangeeta Sharma, Wiley India
- ✓ *Personality Development and Soft Skills*, Barun K. Mitra, Oxford Press

Reference Books:

- ✓ Trevor J. Powell, *Mental Health Handbook* (2017), 3rd Edition, Routledge
- ✓ David A. Whetten, Kim. S. Cameron, *Developing Management Skills* (2011), 8th Edition, PHI Learning Private Limited

- ✓ *Daniel Goleman (1996) Emotional Intelligence. Why it can matter more than IQ. Bantam Doubleday Dell Publishing Group.*
- ✓ *Harris T. A. (1969), I'm OK, You're Ok: A Practical Guide to Transactional Analysis, New York, Harper & Row*

Psychological First Aid

Course Outcomes:

- This course is aimed at increasing the learners' abilities in managing psychological crisis situations.

Unit I:

- How do crisis events affect people, Introduction to Psychological First Aid (PFA), Concept and Development of PFA; PFA: Who, when and where; How to help responsibly (respect safety, dignity and rights of the people); Core Competencies of PFA

Learning Outcomes:

- Increase their abilities to discuss key concepts related to PFA and Listen reflectively
- Manage psychological crisis reactions, learn and apply psychological first aid and Practice self-care

Unit II:

- Psychological Consequences of Trauma (Posttraumatic Stress Disorder, Depression, Generalized Anxiety, Panic Disorder, Substance abuse)
- Psychological consequences of Disaster (Natural Disasters, Technological Disasters, Human-Made Disasters: riots, war; Accident)

Learning Outcomes:

- Recognize the potential risk factors and warning signs for a range of mental health problems, including: depression, anxiety/trauma, substance use disorders, and self-injury.

Unit III:

- Practicing the Art of PFA (RAPID Model): Rapport and Reflective Listening, Assessment of Needs, Prioritization, Intervention, Disposition

Learning Outcomes

- Increase their abilities to discuss key concepts related to PFA and Listen reflectively
- Use a 5-step action plan to help an individual in crisis connect with appropriate professional help.

Text Books:

- ✓ *George, S. Everly, Jr. (2017). The Johns Hopkins guide to psychological first aid. Johns Hopkins University Press.*
- ✓ *National Disaster Management Training Module (1-4) Psychosocial First Aid. (2023). NIMHANS, Bengaluru; NDMA, New Delhi.*

Reference:

- ✓ *World Health Organization, War Trauma Foundation and World Vision International (2011). Psychological first aid: Guide for field workers. WHO: Geneva.*
- ✓ *Baker, E. K. (2003). Caring for ourselves as psychologists. The Register Report, 28, 7–10. <http://www.nationalregister.org/trr.html>.*
- ✓ *Dieltjens, T., Moonens, I., Van Praet, K., De Buck, E., & Vandekerckhove, P. (2014). A*

systematic literature search on psychological first aid: lack of evidence to develop guidelines. *PloS one*, 9(12), e114714. <https://doi.org/10.1371/journal.pone.0114714>

- ✓ Everly, G. S., Jr. (1999). *Toward a model of psychological triage. International Journal of Emergency Mental Health*, 1, 151–154.
- 5. Everly, G. S., Jr., & Lating, J. M. (2013). *A clinical guide to the treatment of the human stress response (3rd ed.)*. New York, NY: Springer.
- ✓ Weiten, W. (2013). *Psychology: Themes and variations (9th ed.)*. Belmont, CA: Wadsworth Cengage Learning.
- ✓ Choudhary, V., Sharma, P., Dhingra, A. (2016). *Be Equipped Psychologically: The Psychological First Aid. The International Journal of Indian Psychology*, 4(1), 311-320.

Sanskrit

Computer Application

Unit I and II: Fundamentals of Computer Application: *MS Office Word, Excel, Email, Important Sanskrit websites (Sodha Ganga, E-Pathasala & E- Sanskrit Books), Find & Replace*

Unit III and IV: DTP, Page maker & Power Point

Core Readings:

1. Computer Fundamentals and Applications, Ashok Arora, Vikas Publishing, 2015
2. DTP, Ranu Banik, Friends Publisher, Cuttack, 2006

Suggested Readings:

- ✓ *Computer Fundamentals, Priti Sinha, Pradeep K., Sinha, BPB Publications; 6th edition, 2004*
- ✓ *Computer Fundamentals (1St Edition), RS Salaria, Khanna Publishing House, 2017*
- ✓ *Fundamentals of Computers, E Balagurusamy, McGraw Hill Education (India) Private Limited, 2009*

Ayurveda and Vrksayurveda

Unit I and II: Ayurveda: Caraka Samhita (*Sutrasthana, Dirghamjivitiyaadhyaya- verses 41-135. From the verse – hitahitamsukhamdukha- till the verse rogebhyo yah pramocayet.*)

Unit III and IV: Vrksayurveda: Brhatsamhita – Adhyaya 54.

Core Readings:

- ✓ *Carakasamhita, Purushottama Kar Sharma, Dharma Grantha Store, Cuttack, 2011*
- ✓ *Carakasamhita, Brahmananda Tripathy, Chawkhamba Surabharati Prakasan, Varanasi.*
- ✓ *Brhatsamhita of Barahmihira, Ed. Sudhakar Dwivedi, Sampurnanda Samskrita Viswavidyalaya, Varanasi*
- ✓ *Vrksayurveda, Ed. Dr. Narayana Prasad Dash, Vidyapuri, Cuttack.*

Suggested Readings:

- ✓ *Samskrita Vanmaya ka brhata itihās (Vol.17) Ayurved ka itihās Uttarpradesh Samskrit Sansthan, Lukhnow, 2006*
- ✓ *Ayurved ka Brhat Itihās, Atridev Vidyalkar, Chawkhamba, Delhi*

Philosophy

Yoga In Everyday Life

Introduction:

This course on "Yoga in Everyday Life" would aim to integrate the principles and practices of yoga into students' daily lives, promoting physical, mental, and emotional well-being. Students will have a holistic understanding of yoga and its practical applications for everyday life. They would be equipped with the knowledge and skills needed to cultivate health, happiness, and inner peace through the practice of yoga.

Course Outcomes:

1. Understanding of the importance of yoga for a balanced life.
2. Understanding of the physical, mental, and spiritual dimensions of yoga.
3. Realization of the instrumentality of yoga for a spiritual transformation.

Learning Outcome:

Unit I: In a simple sense, Yoga is practical instead of theoretical speculation. By practicing yoga, one should keep his body healthy & restrain himself from all kinds of desires. the yogic practices only can lead the yogin from a lower stage to a higher & also help him to become a Sadhaka.

Unit II: Yoga philosophy gives the eight-fold path of discipline to control the body, senses & mind. After practicing it, one should achieve perfection & highest means to realize the kaivalya.

Unit III: Karma, jnana & Bhakti are the three important aspects of Bhagvad Gītā. the practice of the three yogas is a continuously evolving journey that takes us to what is considered to be the highest practice of yoga in Bhagvad Gītā.

Unit IV: In Buddhism, the four Brahma vihara are powerful aids for resolving conflict, evoking loving-kindness & goodwill & creating social harmony. & Also, Astangika marga releases a person from the cycle of rebirth. It is the way to end suffering.

Unit I: Introduction to Yoga Philosophy; the Divine, World, Man and his Destiny according to Patanjali's Yoga; Meaning and Types of Yoga; Spiritual instructions and disciplines for Yoga; Yoga for Health and Realization, Yogic Life, Courses of Sādhanā.

Unit II: *Yama* and *Niyamas*, *Āsana*, *Prāṇāyāma*, *Pratyāhāra*, *Dhāraṇā*, *Dhyāna*, and *Samādhi* in the context of Patañjali Yoga;

Unit III: *Karma*, *Jñāna*, *Raja*, *Bhakti Yoga*, *Triguna* and *Triguṇātīta Yoga* in the context of the Bhagavad Gītā; Integral Yoga of Sri Aurobindo.

Unit IV: *Aṣṭāṅga Mārga*, and *Vipaśyanā*, *Six Pāramitās*, *Four Brahma Vihāras* of the Buddhism...

Prescribed Books: -

- ✓ Aditya Kumar Mohanty, *Yoga- Concept and Practice*, CAS in Philosophy, Utkal University, Bhubaneswar
- ✓ S.N. Dasgupta, *Yoga Philosophy*, University of Calcutta,
<https://archive.org/details/in.gov.ignca.7294>
- ✓ Swami Jnanananda, *the Philosophy of Yoga*,
https://ia904703.us.archive.org/20/items/in.ernet.dli.2015.203895/2015.203895.The-Philosophy_text.pdf

Reference Books: -

- ✓ B.K.S. Iyengar, *Light on Yoga*, Schocken Books, New York,
https://mantrayogameditation.org/wp-content/uploads/2019/12/Light-on-Yoga_-The-Bible-of-Modern-Yoga-PDFDrive.com-.pdf
- ✓ Sri Swami Sivananda, *Yoga In Daily Life*, A Divine Life Society Publication, Uttar Pradesh,
<https://www.dlshq.org/download2/yogadaily.pdf>

E- Recourses:

- ✓ https://en.wikipedia.org/wiki/Yoga_Sutras_of_Patanjali
- ✓ <https://youtu.be/uWZuUBmCF1Q?si=6qW8ktXUsiIxODTq>
- ✓ <https://youtu.be/ju-rSR3BOH4?si=0y8ytUg-ELAsm7hv>
- ✓ <https://en.wikipedia.org/wiki/Brahmavihara>
- ✓ https://youtu.be/el-f7Z_tSQ?si=NpUvRlhmN3PrsOnl

Sample Questions: 1 for Part- I Objective; Part- II Very Short Type (in 50 Words); Par-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);

Unit I

1. What is the meaning of “Yoga” in Yoga philosophy?
2. Yoga philosophy is divided into how many parts that are explained briefly.
3. What is the significance of Yoga in present life?
4. Elaborate the Divine, World, Man, and his Destiny according to Patanjali’s Yog.

Unit II

1. What is Kumbhaka?
2. What are the antaranga Samadhi? What are they?
3. What is the difference between Samprajnata & Asamprajnata Samadhi?
4. What is the purpose of Aṣṭāṅga yoga?

Unit III

1. How many ways through which we can get liberation?
2. What are three kinds of mental states according to Sri Aurobindo, discuss briefly.
3. What is Triguna and how it is related to Trigunātīta yoga in Bhagvat Gītā?

4. What is the Integral Yoga of Sri Aurobindo?

Unit IV

1. the concept of Bramha Vihara is Given by which System?
2. What are the Six *Pāramitās*?
3. What is Vipassana? and what are the 5 rules of Vipassana?
4. What are the Aṣṭāṅga Mārgas? Elaborate its essence in practical life.

Philosophical Counselling

Introduction:

This course on philosophical counseling would equip students with the skills and knowledge necessary to provide guidance and support to individuals facing philosophical questions and existential dilemmas. Students would be equipped with the theoretical knowledge, practical skills, and ethical understanding needed to provide philosophical counseling to individuals seeking guidance and support in navigating life's existential and philosophical challenges.

Course Outcomes :

1. Understanding the dialectics of life.
2. Developing a sense of flexibility in considering the available opinions and alternatives.
3. Resolving life problems and dilemmatic situations through proper counseling.
Developing self-awareness and responsibility and taking recourse to fair reason

Learning Outcome:

Unit I

Define philosophy as the systematic study of fundamental questions about existence, knowledge, ethics, and reality. While the practice of philosophical counseling as a distinct discipline emerged in the latter half of the 20th century, its roots can be traced back to ancient philosophical traditions. Philosophers such as Socrates, Plato, and the Stoics engaged in dialogues aimed at fostering self-awareness, critical thinking, and ethical reflection, which laid the groundwork for philosophical counseling practices.

Unit II

Philosophical counseling employs philosophical methods and insights to help individuals address existential, ethical, and life-related concerns. While there is no single philosophical method of counseling, practitioners draw on a variety of philosophical approaches and techniques to engage clients in reflective dialogue and exploration. Here are some key philosophical methods commonly used in philosophical counseling:

Unit III

Logic-Based Therapy (LBT) is a form of counseling that integrates principles of logic and reasoning into therapeutic practice. It draws on insights from philosophy, cognitive psychology, and formal logic to help individuals identify and challenge irrational beliefs, develop more rational thought patterns, and make better decisions.

Unit IV

Existentialism-based therapy (EBT) is an approach to counseling and psychotherapy that draws on existential philosophy to help individuals confront the fundamental questions and challenges of human existence. Rooted in the existentialist tradition, EBT emphasizes themes such as freedom, responsibility, meaninglessness, and the search for authenticity.

Unit I: Introduction to Philosophical Methods: Socratic method, Cartesian Method, Ockham's razor; History of Philosophical counseling, Difference between psychological and philosophical counseling. General Counselling, Defining and Meaning, Basic Assumptions, Forms of Counselling, Steps in Counselling Procedure, Personal qualities of a Counsellor, Characteristics of Effective Counselling.

Unit II: Philosophical methods of counseling: Greek Stoicism - Apatheia, Epicureanism - long-term pleasure. Dialectical Method: the Salient Features of the Method of Dialectic: Question and Answer Form. Phenomenological Method- Bracketing and reduction, subjectivity and observing essence,

Unit III: Logic-Based Therapy, Meaning, scope, LBT fallacies, antidotes, Cognitive Behavior Therapy- View of Emotional Disturbance, Therapeutic Process, Rational Emotive Behavior Therapy, Cognitive Methods, Behavioral Techniques; Person-centered Therapy- Functional Role, Reflection of Feelings, Crisis intervention, Creativity and Stimulating Experiences.

Unit IV: Existentialism Therapy, Narrative construction therapy, Authentic life, Existential Therapy- Capacity for Self-awareness, Freedom and Responsibility, Personal Identity, Anxiety as a Condition, Awareness of Death; Reality Therapy- Choice Theory, Characteristics of Reality Therapy.

Prescribed Books: -

1. *Richard Nelson-Jones, Theory and Practice of Counselling and Therapy, Fifth Edition, SAGE Publications India Ltd.*
2. *Richard Sharf, S., Theories of Psychotherapy and Counselling Concepts and Case, Brooks/Cole, Australia.*
3. *Alex Howard, Philosophy for Counselling and Psychotherapy; Pythagoras to Postmodernism, Palgrave Macmillan.*
4. *Elliot D Cohen, and Samuel Zinaich, eds. Philosophy, Counseling, and Psychotherapy, Cambridge Scholars Publishing.*
5. *Elliot D Cohen, Logic-based therapy and everyday emotions: A case-based approach, Lexington Books*
6. *Chhaya Rai, Studies in Philosophical Methods, University of Jabalpur.*

Reference Books: -

1. [*Lou Marinoff, Philosophical Practice, Academic Press, UK.*](#)
2. [*Ran Lahav, Maria da Venza Tillmanns \(ed.\), Essays on Philosophical Counselling, University Press of America*](#)
3. [*Timothy Williamson, Philosophical Method: A Very Short Introduction, OUP Oxford.*](#)
4. [*Chris Daly, An Introduction to Philosophical Methods, Broadview Press.*](#)
5. *Richard E Creel, Thinking Philosophically, Blackwell Publishers, USA 2.*

Sample Questions: 1 for Part- I Objective; Part- II Very Short Type (in 50 Words); Part-III Short Type (in 250 Words); Par-IV Long Type (in 800 Words);

Unit I

1. Which method is adopted by Socrates?
2. Difference between psychological and philosophical counseling.
3. What personal skills does a counselor need?
4. Explain Forms of Counselling, Steps in Counselling Procedure & Characteristics of Effective Counselling.

Unit II

1. Who is the advocator of Stoicism?
2. Difference between hedonism and rationalism.
3. What is the Bracketing method?
4. Discuss the Salient Features of the Method of Dialectic.

Unit III

1. LBT stands for ____.
2. What do you mean by Therapy?
3. Discuss the Person centered Therapy.
4. Why therapy is required in philosophical methods and Counselling? Define different kinds of therapy

Unit IV

1. Existentialism Based _____, Narrative construction_____.
2. Write down two examples of Existential-based therapy.
3. Why does narrative construction therapy work?
4. Explain the Characteristics of reality therapy and how it is related to present life.

Public Administration

Personality Development

Unit I Personality Development, Decision Making and Communication: Personality Development - Concept; Skills and Value orientation of personality development; stages of personality development; factors affecting personality development; personality traits; Concepts - Creativity: Attitudes and Etiquettes.

Unit II Managing Self - Mind and Motivation, Managing Self - Mind, Body and Soul;. Conflict - meaning, reasons and consequences. Conflict Resolution: Need and various approaches and institutions

Text Books:

- ✓ *Adair, John (2009); Effective Communication (Revised Edition), Pan MacMillan: London*
- ✓ *Ajmani, J C (2012); Good English: Getting it Right, Rupa Publications: New Delhi*
- ✓ *Andrews, Sudhir (1988); How to Succeed at Interviews (21st Reprint), Tata McGraw Hill: New Delhi*
- ✓ *Becker, Ethan F. and Wortmann, Jon (2009); Mastering Communication at Work: How to Lead, Manage, and Influence? McGraw Hill: New Delhi*

Reference Books:

- ✓ *Heller, Robert (2002); Effective Leadership, D K Publishing: New Delhi*
- ✓ *Hurlock, E. B. (2006); Personality Development (28th Reprint), Tata McGraw Hill: New Delhi*
- ✓ *Khan, S R (2014); Personality Development, Ramesh Publishing House: Delhi*
- ✓ *Mile, D. J. (2004); Power of Positive Thinking, Rohan Book Company: Delhi*
- ✓ *Prasad, H. M. (2001); How to Prepare for Group Discussion and Interview, Tata McGraw Hill: New Delhi*

Secretarial Practice

Course Outcomes:

- Developing an understanding of the basic concepts of office management.
- Acquiring quality skills and competencies in office management, official correspondence and time management.
- To discuss the basic concepts of office management.
- To study the skills and competencies in official correspondence.

Unit I

Secretary: Meaning, Types, Importance; Professional and Personal Qualities of a Secretary, Duties and Responsibilities of a Personal Secretary; Scheduling Appointments. Planning for Travel Arrangements for Officers on official duty; Organizing Meetings – Notice, Agenda,

Quorum, Minutes; Handling of Mail; Use of Ready Reckoner, Office Manuals & Emergency Services

Unit II Time Management: Definition, Importance of Time, Setting priorities. Correspondence: Business Correspondence, Enquiry Letter, Quotation, Order, Tender, Complaint letter, Adjustment Letter and their formats, Banking Correspondence; Government Correspondence; Un-official Notes

Text Books:

- ✓ *Bist, G D (2017) Officer Secretarial Practice. Shorthand House: New Delhi*
- ✓ *De Vires, Mary A (1995) Professional Secretary's Handbook: Guide to the Electronic and Conventional Office (3rd Edition). American Heritage: USA*
- ✓ *Debnath, B K (2001) A Guide to Secretarial Practice & Office Procedure. New Central Book Agency : Delhi*

Reference Books:

- ✓ *France, Sue (2015) The Definitive Personal Assistant & Secretarial Handbook. Kegan Page: Delhi*
- ✓ *Kuchhal, M C (2008) Secretarial Practice (18th Edition). Vikas Publication : New Delhi*

Sociology

Sociology Of Disaster Resilience and Recovery

The coming effects and implication of disaster whether it is of natural or of man-made create an intense speculation worldwide. With increasing disaster risks and consequent social disruptions, the relief, resettlement and rehabilitation of disaster victims are getting intensified and magnified worldwide. In this context, the sociology of disaster provides a unique perspective on disaster, disaster resilience and disaster recovery in a promising action.

Course Outcomes:

- Students can visualize the extents of disaster induced socio-economic and cultural impacts
- Will come to know exactly how to manage any crisis of disasters
- Visualise disasters prediction systems- rescue, relief, rehabilitation and reconstruction before and aftermath of disasters incidents.

Unit-I: Introduction to the concepts of Disaster, Disaster Resilience and Recovery

- 1.1 Natural Disaster: Types
- 1.2 Man-made Disaster: Types
- 1.3 Disaster and Recovery
- 1.4 Disaster vulnerability, Risk and Resilience

Learning Outcomes:

- Students will be able to increase the knowledge and understanding of the disaster phenomenon, its different contextual aspects, impacts and consequences.

Unit-II: Impacts of Disaster

- 2.1 Social Consequences
- 2.2 Economic Consequences
- 2.3 Cultural consequences
- 2.4 Destruction of Ecosystem

Learning Outcomes:

- After studying this unit, students can understand the several consequences of disaster.
- Analyse different factors influencing vulnerabilities and capacities to face disasters.

Pedagogy:

- The students can be asked to visit disaster affected area and documents the consequences from the victims through recall methods.

Unit-III: Disaster Preparedness and Role of Agencies

- 3.1 Meaning of Disaster Preparedness, Risk perception, Evacuation, Rehabilitation
- 3.2 Agency role for Rehabilitation: Educational Institutions, Media, Government Organizations
- 3.3 Disaster Rehabilitation: Local Self-Government, Anganwadi Workers, Asha Worker
- 3.4 Disaster Rehabilitation: Role of SHGs and NGOs/Civil Society Organizations.

Learning Outcomes:

- After studying this, students understand theoretical and practical processes of disaster management (disaster risk perception and risk reduction, response, and recovery) and their interconnections.

Pedagogy:

- The students can be asked to make content analysis of disasters and listing disasters of Odisha
- They are asked to visit to OSDMA, NGOs and SHGs to have better insights of disaster management and rehabilitation

Unit-IV: Disaster Resilience and Recovery

- 4.1 Meaning of Disaster Resilience and Recovery, Core elements of Disaster Resilience
- 4.2 Disaster Recovery Planning Process
- 4.3 Social Capital in building Resilience and ensuring Recovery
- 4.4 Recovery and Resilience Mechanism and Best Practices

Learning Outcomes:

- Students will be able to analyse, and communicate information on risks, resilience and focus on recovery.
- Students can think of ideas about the resilience and recovery plans by the lessons learned from earlier disasters that help to formulate strategies for mitigation in future.

Pedagogy:

- Students study FAQ (frequently asked questions) on disaster resilience and recovery from website and confirm these in the field.
- Students can make presentation about their ideas of resilience and recovery or use of technology and social media about awareness of disaster resilience.
- They will learn role of different agencies as well as get equipped with various methods of risk reduction measures and risk mitigation.

Lesson Plans:

Unit	Thrust Areas	Method	Total No. of Classes	References
I	The concepts of Disaster, Disaster Resilience and Recovery and Disaster vulnerability and Risk	Lecture/ Tutorial a/	15	<ol style="list-style-type: none"> 1. Blaikie, Piers et al. (1994). <i>At risk: Natural hazards, people's vulnerability, and disasters</i>. New York: Routledge 2. Parasuraman, S., and Acharya, N. (2000). Analysing forms of vulnerability in a disaster. <i>The Indian Journal of Social Work</i>, 61(4) 3. Video on Disasters : Concepts and Management (CEC, New Delhi) https://www.youtube.com/watch?v=Eh8dAmiJ- 4. Meaning and Classification of Disaster (Odisha State Open University) https://egyankosh.ac.in/bitstream/123456789/56103/1/B-1U-1.pdf
II	Impacts of disaster on society, culture, economy and ecosystem	Lecture/ Tutorial a/ filed visit	15	<ol style="list-style-type: none"> 1. Benson, C., & Clay, E. (2004). <i>Understanding the economic and financial impacts of natural disasters</i>. The World Bank. 2. Natural Disasters – Meaning, Types & Effects and Hydrological Disasters (Odisha State Open University) https://drive.google.com/file/d/1AtyglzYoeGMUBpxe0f5I7YOeBcu_4noU/view
III	Disaster preparedness and agency role for rehabilitation (Educational Institutions, media, GOs) and disaster rehabilitation by SHGs, NGO and Local Self-Government	Lecture/ Tutorial a/ filed visit& content analysis	15	<ol style="list-style-type: none"> 1. Sinha, Prabhas Chandra (2006). (ed.) <i>Disaster Mitigation Preparedness Recovery and Response</i>, SBS, New Delhi. 2. Dhir, K.C. (2017). <i>Beyond Disaster: The Disaster Risks and Rehabilitation Strategies</i>, N. Delhi. 3. <i>Disaster Preparedness: Role and Responsibilities of Various Agencies</i> (Odisha State Open University) https://www.egyankosh.ac.in/bitstream/123456789/25409/1/Unit-8.pdf

IV	Disaster recovery planning process, mechanism and best practices, social capital in building resilience	Lecture/ Tutorial a/ filed visit& Documenting	15	<ol style="list-style-type: none"> 1. Arefian, F. F. (2018). <i>Organising Post-Disaster Reconstruction Processes</i>. Springer 2. National Disaster Management Authority (NDMA), India – <i>Disaster risk and resilience: An analytical study</i>, 2019. https://ndmindia.mha.gov.in/images/pdf/Disaster%20Risk%20and%20Resilience%20in%20India.pdf 3. <i>Recovery, Rehabilitation and Reconstruction</i>, Unit 1 (Odisha State Open University) https://drive.google.com/file/d/1s2aJ31pkXujF2bplFoKkTSGM7pWaTRrK/view
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Text Books:

- ✓ Tierney, K. (2019). *Disasters: A Sociological Approach*. United Kingdom: Wiley.
- ✓ Pandey, Rajendra. K. (2020), *Disaster management in India*, Sage, India,
- ✓ Sinha, Prabhas Chandra (2006). (ed.) *Disaster Mitigation Preparedness Recovery and Response*, SBS, New Delhi.
- ✓ Fisher, Henry W. (1998). *Response to Disaster: Fact Versus Fiction & Its Perpetuation: The Sociology of Disasters*. New York: University Press of America, Inc.

References:

- ✓ Blaikie, Piers et al. (1994). *At risk: Natural hazards, people's vulnerability, and disasters*. New York: Routledge
- ✓ Parasuraman, S., and Acharya, N. (2000). *Analysing forms of vulnerability in a disaster*. *The Indian Journal of Social Work*, 61(4)
- ✓ Benson, C., & Clay, E. (2004). *Understanding the economic and financial impacts of natural disasters*. The World Bank.
- ✓ Dhir, K.C. (2017). *Beyond Disaster: The Disaster Risks and Rehabilitation Strategies*, N. Delhi.
- ✓ Arefian, F. F. (2018). *Organising Post-Disaster Reconstruction Processes*. Springer
- ✓ Dhir, K.C. (2019). *Floods in Orissa*, Winshield Press, New Delhi.

E.Resources:

- ✓ *Video on Disasters : Concepts and Management* (CEC, New Delhi)
<https://www.youtube.com/watch?v=Eh8dAmiJ->
- ✓ *Meaning and Classification of Disaster* (Odisha State Open University)
- ✓ (<https://egyankosh.ac.in/bitstream/123456789/56103/1/B-1U-1.pdf>)
- ✓ *Natural Disasters – Meaning, Types & Effects and Hydrological Disasters* (Odisha State Open University)
https://drive.google.com/file/d/1ATyglzYoeGMUBpxe0f517YOeBcu_4noU/view
- ✓ *Disaster Preparedness: Role and Responsibilities of Various Agencies* (Odisha State Open University) <https://www.egyankosh.ac.in/bitstream/123456789/25409/1/Unit-8.pdf>
- ✓ *National Disaster Management Authority (NDMA), India – Disaster risk and resilience: An analytical study*, 2019.
<https://ndmindia.mha.gov.in/images/pdf/Disaster%20Risk%20and%20Resilience%20in%20India.pdf>
- ✓ *Recovery, Rehabilitation and Reconstruction*, Unit 1 (Odisha State Open University)
<https://drive.google.com/file/d/1s2aJ31pkXujF2bplFoKkTSGM7pWaTRrK/view>
- ✓ *Terminology: Basic terms of disaster risk reduction*
https://www.preventionweb.net/files/7817_7819isdrterminology11.pdf

(Answer all questions of the given Part-I, II, III&IV. Part-I with 12 questions one mark each, Part-II with eight questions two marks each and Part-III with 10 questions out of which eight to be answered three marks each and answer all questions within 500 words in Part-IV seven marks each).

Part-I

1. Answer the following questions Mark 1x12=12
Q. What do you mean by disaster vulnerability?

Part-II

Write any eight questions within two or three sentences each Mark 8x2=16
Q. Mention two social consequences of natural disaster

Part-III

3. Answer any eight questions within 75 words each Marks 8x3=24
Q. Analyse the role of educational institution for disaster rehabilitation

Part-IV

4. Answer all of the following with 500 words each Marks 7x4=28
Q. Discuss disaster recovery planning processes

Doing Ethnography

Ethnography has become a common approach in social sciences today. It gives the researcher direct access to the culture and practices of a group. It is a useful approach for learning first-hand information about the behaviour and interactions of people within a particular context.

Course Outcomes:

- By the end of this course the student is expected to develop skills that will enable him/her to negotiate access to the field, take field notes, and use audio-visual recordings of ethnographic data.
- Gain hands-on experience collecting, analyzing and writing up data using a variety of ethnographic techniques including in-depth reading discussions, field exercises, and writing of an original research paper or proposal.

Unit-I: Ethnography

1.1 Meaning and approaches of ethnography

- 1.2 Narrative ethnography
- 1.3 Historical ethnography
- 1.4 Virtual ethnography

Learning Outcomes:

- After completing this unit students can understand and define the meaning, approaches and objectives of ethnography.
- Students can learn concept and principles through narrative, historical and virtual ethnography.

Unit-II: Doing Ethnography

- 2.1 Art of ethnographic fieldwork
- 2.2 Visual ethnography
- 2.3 Framing photographic ethnography
- 2.4 Digital video as research practice

Learning Outcomes:

- After studying this unit students can understand the methods and ethics of ethnographic study.
- Students can analyse the relationship of innovations in film and digital media on the production of vernacular, documentary and ethnographic visual representations.

Pedagogy:

- Students can use their camera/ smartphones to take any social phenomena and analyze how photographic study is different than written text.
- Students can watch digital videos and documentary to observe and learn visual representation.
- Students can take a case study and use digital media, newspapers to analyze the content.

Unit-III: Conducting Ethnography (group activity)

- 3.1 Observing a group of children playing
- 3.2 Observing a village meeting
- 3.3 Observing medical personnel in a hospital
- 3.4 Observing an indigenous village
- 3.5 Observing a high school classroom

Learning Outcomes:

- After studying this unit students can do better observation and critically analyze a social situation.
- Through observation method students can learn from the surroundings and gain insights to some information that will be impossible to gain simply through texts.

Pedagogy: Make a field visit to:

- Observe group of children playing, a village meeting, medical professional in hospital, a indigenous village and high school classroom
- Write observational and critical analysis report of the cases they visited.

Unit-IV: Ethnographic Skill and Ethics

- 4.1 Observing
- 4.2 Interviewing

- 4.3 Taking Notes
- 4.4 Writing report

Learning Outcomes:

- After studying this unit students will be equipped with skills, tools and techniques that requires for ethnographic study.
- They will learn methods like observation, making of interview schedule, taking notes while visiting field and writing report with critical analysis skill.

Pedagogy:

- Students can take up any research topic of their liking and conduct research while using the ethnographic methods, tool and techniques they learned.
- Prepare an interview schedule and collect responses, take note while conducting survey and write a report of the field study.

Lesson plans-

Units	Thrust areas	Teaching methods	Total no. of classes required	References
I	Approaches of ethnography, Narrative ethnography, Historical ethnography and Virtual ethnography	Lecture/ tutorial	15	<ol style="list-style-type: none"> 1. Hine, C (2000) Virtual Ethnography. London: Sage Publications 2. Understanding Ethnography (IGNOU) https://egyankosh.ac.in/bits/tream/123456789/83669/1/Unit-1.pdf 3. Video-Lecture 2: Situating Ethnography(IIT Bombay) https://www.youtube.com/watch?v=7JA0InnelMY&list=PLOzRYVm0a65fhRBCF65lHpOj0JJ84UoEZ&index=3
II	Doing Ethnography- Art of ethnographic fieldwork, Visual ethnography, Framing photographic ethnography and Digital video as research practice	Lecture/ tutorial	15	<ol style="list-style-type: none"> 1. Walsh, D. (1998). Doing ethnography (Vol. 2012, pp. 245-262). London: Sage. 2. Grimshaw, A. (2001). <i>The Ethnographer's Eye: Ways of Seeing in Anthropology</i>. Cambridge: Cambridge University Press. 3. Coleman, E.G. (2010) 'Ethnographic approaches to digital media', Annual Review of Anthropology,39(1) 487-505

III	Conducting Ethnography: (group activity) Observing a group of children playing, a village meeting, medical personnel in a hospital, an indigenous village and school classroom	Lecture/ tutorial	15	<ol style="list-style-type: none"> 4. Goffman, E. (1989). On Fieldwork. <i>Journal of Contemporary Ethnography</i>, 18:123-32. 5. Walsh, D. (1998). <i>Doing ethnography</i> (Vol. 2012). London: Sage.
IV	Ethnographic Skill and Ethics- Observing, Interviewing, Taking Notes and Writing report	Lecture/ tutorial	15	<ol style="list-style-type: none"> 1. Goode, J and P.K. Hatt. (2017). <i>Methods in Social Research</i>. Asia Law House. Atkinson,

Text Books:

- ✓ *Hammersley, Martyn and Paul Atkinson. (1995). Ethnography: Principles in Practice. Routledge: London.*
- ✓ *Heyl, Barbara Sherman. (2001). "Ethnographic Interviewing," Handbook of Ethnography, edited by Paul Atkinson, et al. Thousand Oaks, CA: Sage.*
- ✓ *Grimshaw, A. (2001). The Ethnographer's Eye: Ways of Seeing in Anthropology. Cambridge: Cambridge University Press.*

References:

- ✓ *Pink, S. (2001). Introduction from Doing Visual Ethnography. Thousand Oaks, CA: Sage.*
- ✓ *Hine, C (2000) Virtual Ethnography. London: Sage Publications*
- ✓ *Walsh, D. (1998). Doing ethnography (Vol. 2012, pp. 245-262). London: Sage.*
- ✓ *Coleman, E.G. (2010) 'Ethnographic approaches to digital media', Annual Review of Anthropology, 39(1) 487-505*
- ✓ *Goffman, E. (1989). On Fieldwork. Journal of Contemporary Ethnography, 18:123-32.*
- ✓ *Walsh, D. (1998). Doing ethnography (Vol. 2012). London: Sage.*
- ✓ *Goode, J and P.K. Hatt. (2017). Methods in Social Research. Asia Law House. Atkinson,*

E. Resources:

- ✓ *Understanding Ethnography(IGNOU)*
<https://egyankosh.ac.in/bitstream/123456789/83669/1/Unit-1.pdf>
- ✓ *Video-Lecture 2: Situating Ethnography(IIT Bombay)*
<https://www.youtube.com/watch?v=7JA0InnelMY&list=PLOzRYVm0a65fhRBCF65IHpOj0JJ84UoEZ&index=3>

Sample Questions

Answer all questions of the given Part-I, II, III&IV

Part-I

1. Answer all questions of the following Mark 1x12=12
Q. What do you mean by visual ethnography?

Part-II

2. Write any eight questions within two or three sentences each Marks 8x2=16
Q. Write two features of narrative ethnography

Part-III

3. Answer any eight questions within 75 words each Marks 8x3=24
Q. Explain ethnographic skill and ethics of interviewing
4. Answer all following questions with 500 words each Marks 7x4=28
Q. Elaborate ethnographic group work of village meeting

Social Work

Law

Legal Drafting

Aim of the course is to equip participants with the essential skills and knowledge required for proficient legal drafting in both civil and criminal contexts, thereby enabling them to effectively navigate legal proceedings and contribute meaningfully to the any profession.

Course Objective:

1. Develop comprehensive understanding of fundamental rules of civil and criminal pleadings.
2. Cultivate proficiency in drafting legal documents like complaints, bail applications, etc.
3. Acquire knowledge of procedural aspects.
4. Foster critical thinking for accurate and legally sound drafting.
5. Enhance ability to apply legal principles effectively in drafting.

Course Outcomes:

1. Understand fundamental rules of pleadings in civil and criminal cases.
2. Proficiency in drafting legal documents such as complaints, bail applications, etc.
3. Knowledge of procedural aspects.

4. Practical skills in drafting notices, replies, agreements, petitions, and applications.

Learning Outcomes:

1. Comprehensive understanding of pleading structure and content.
2. Effective application of legal principles in drafting.
3. Evaluation of legal process steps in civil and criminal contexts.
4. Development of critical thinking for accurate and legally sound drafting.

Unit I: Fundamental Legal & Professional Skills

- (a) Legal language & Communications Skills
- (b) Client Counselling, Advocacy, Mediation & Para-legal skills.
- (c) Plaint- Nature and Structure
- (d) Written Statement and Affidavit

Unit II: General Principles of Criminal Pleadings

- (a) Information to Police in Cognizable and Non-Cognizable case under Section 173 & 174 of BNSS (Second), 2023.
- (b) Complaint to Magistrate, Section 223- of BNSS (Second), 2023
- (c) Grant of Maintenance for Wives, Children and Parents under Section 144 of BNSS (Second), 2023
- (d) Application for Bail.

Unit III: Drafts

- (a) Notice to the tenant under section 106 of Transfer of Property Act
- (b) Reply to notice
- (c) General Power of Attorney
- (d) Will

Unit IV: Drafts

- (a) Agreement to Sell, Sale deed
- (b) Petition for grant of probate / Letters of Administration
- (c) Application for appointment of receiver/Local Commissioner

Paper	2.4
Course Title	Fundamentals of Data Science & Data Management
Paper Code	SEC-2
Paper Type	Skill Enhancement Course
Credit Points	2
Course Objectives	<p>The course aims to:</p> <ol style="list-style-type: none"> 1.To understand the Basics of Data Science: 2.To explore Data Collection and Pre-processing Techniques: 3.To learn Fundamentals of Data Analysis: 4.To master Data Visualization and Communication: 5.To gain Proficiency in Data Management: 6.To develop Skills in Machine Learning and Predictive Modeling: 7.To apply Data Science Techniques to Real-World Problems:
Course Outlines	<p>Unit 1: Foundations of Data Science Introduction to Data Science, Definition and Scope of Data Science, Historical Overview and Evolution, Applications and Real-World Examples, Understanding Data, Types of Data: Structured, Semi-Structured, and Unstructured, Data Sources and Collection Methods, Data Quality and Pre-processing Techniques, Introduction to Programming for Data Science, Basics of Python Programming Language, Data Structures and Control Flow, Introduction to Libraries such as Pandas and NumPy for Data Manipulation, Statistics for Data Science.</p> <p>Unit 2: Data Analysis and Visualization Exploratory Data Analysis (EDA), Data Visualization Techniques: Matplotlib, Seaborn, Summary Statistics and Data Visualization, Identifying Patterns and Relationships in Data, Data Munging and Data Wrangling, Cleaning and Pre-processing Data, Handling Missing Values and Outliers, Data Transformation and Feature Engineering, Data Dashboards and Storytelling, Principles of Effective Data Visualization, Tools for Creating Interactive Dashboards: Tableau, Power BI, Communicating Insights from Data through Storytelling</p> <p>Unit 3: Machine Learning Fundamentals Introduction to Machine Learning, Supervised vs. Unsupervised Learning, Regression and Classification Techniques, Model Evaluation and Selection Criteria, Deep Learning Basics, Introduction to Neural Networks, Deep Learning Architectures: CNNs, RNNs, Applications of Deep Learning in Commerce and Business</p> <p>Unit 4: Advanced Topics in Data Science Big Data and Distributed Computing, Introduction to Big Data Technologies: Hadoop, Spark, Handling Large Volumes of Data: Batch vs. Real-Time Processing, Scalable Data Storage and Processing Solutions, Data Ethics and Privacy, Ethical Considerations in Data Collection and Usage, GDPR and Data Privacy Regulations, Strategies for Ensuring Data Security and Compliance</p>

Course Outcomes	<p>After completion of the course, learners will be able to:</p> <p>CO1: Define the key concepts and principles of data science and data management.</p> <p>CO2: Collect, clean, and pre-process data for analysis using appropriate techniques.</p> <p>CO3: Analyse data using statistical methods and interpret the results effectively.</p> <p>CO4: Create informative and visually appealing data visualizations to communicate insights.</p> <p>CO5: Demonstrate proficiency in managing data and ensuring its integrity, security, and privacy.</p> <p>CO7: Apply machine learning algorithms to build predictive models and evaluate their performance.</p> <p>CO8: Solve real-world problems using data science techniques and present findings in a clear and concise manner.</p>
Evaluation	<p>End-term Marks= 60</p> <p>Mid-term Marks= 40 P</p>
Suggested Readings	

(d) Application for Appointment of Guardian

Text Books:

- ✓ *Conveyancing – N.S. Bindra*
- ✓ *Conveyancing – A.N. Chaturvedi*
- ✓ *Mogha’s Law of Pleading*

Commerce

Paper	3.5
Course Title	Income Tax e-Return Filing
Paper Code	SEC-3
Paper Type	Skill Enhancement Course
Credit Points	2
Course Objectives	
Course Outlines	
Course Outcomes	
Evaluation	Practical 100 Marks

Suggested Readings	
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Paper	3.6
Course Title	Entrepreneurship Development and Start-up
Paper Code	MD-3
Paper Type	Multi-Disciplinary
Credit Points	3
Course Objectives	The paper aims to provide exposure to the students to the entrepreneurial culture and industrial growth and to prepare them to set up and manage their own small units.
Course Outlines	<p>Unit 1: Introduction Evolution of term 'Entrepreneurship'; Factors influencing; Characteristics of an entrepreneur; Types of entrepreneurs; Ideapreneurship; Barriers to entrepreneurship; Creativity and entrepreneurship- Creativity and entrepreneurship; Steps in Creativity; Innovation and inventions; Skills of an entrepreneur; Decision making and Problem Solving (steps indecision making);</p> <p>Unit 2: Organisation Assistance and legal aspects Assistance to an entrepreneur; New Ventures; Financial assistance to MSME; Copyright, Patent, Trademark, Franchise. Acts governing Entrepreneurship.</p> <p>Unit 3: Mobilizing Resources Resource Mobilization for entrepreneurship: Resources mobilization, types of resources, Process of resource mobilization, Arrangement of funds; writing a Funding Proposal, Traditional sources of financing, Venture capital, Angel investors, Business Incubators.</p> <p>Unit 4: Managerial Aspects of Business and Government Initiatives Managing finance; Understanding capital structure; organisation structure and management of human resources of a new enterprise; Marketing-mix; Management of cash; Relationship management; Cost management, Government initiatives for promoting entrepreneurship.</p>
Course Outcomes	<p>After completion of the course, learners will be able to:</p> <p>CO1: Identify and assess the different types of entrepreneurs and barriers to entrepreneurship;</p> <p>CO2: Develop the decision-making skills to be an entrepreneur by creating new ideas;</p> <p>CO3: Understand the financial assistance provided by the government and other organizations;</p> <p>CO4: Demonstrate capacity to improve student achievement, engagement and retention;</p> <p>CO5: Enhances the critical thinking skills and gives a chance to think from a different perspective about industries.</p>
Evaluation	End-term Marks= 60 Mid-term Marks= 40 (20 T + 20 P)
Suggested Readings	<ul style="list-style-type: none"> ● Aron, R. A., & Tang, J. (2021). The Role of Entrepreneurs in Society: An Action Perspective. Edward Elgar Publishing.

	<ul style="list-style-type: none"> ● Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2021). Entrepreneurship. McGraw-Hill Education. ● Kuratko, D. F., & Neck, H. M. (2017). Entrepreneurship: Theory, Process, and Practice. Cengage Learning. ● Shane, S. A. (2017). A General Theory of Entrepreneurship: The Individual-Opportunity Nexus. Edward Elgar Publishing. ● Shepherd, D. A., & Patzelt, H. (2020). The New Field of Sustainable Entrepreneurship: Studying Entrepreneurial Action Linking "What Is to Be Sustained "with" What Is to Be Developed". Springer. ● Desai, V. (2009). Dynamics of Entrepreneurial Development and Management. Mumbai: Himalaya Publishing House. ● Dollinger, M. J. (2008). Entrepreneurship: Strategies and Resources. New Jersey: Prentice Hall. ● Hisrich, R., Peters, M., & Shepherd, D. (2017). Entrepreneurship. New York: McGraw Hill Education. ● Rao, T. V., & Kuratko, D. F. (2012). Entrepreneurship: A South Asian Perspective. Boston: Cengage Learning
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Paper Code	SEC-4
Paper Type	Skill Enhancement Course
Credit Points	3
Course Objectives	<ol style="list-style-type: none"> 1. To provide students with a foundational understanding of financial technology (Fin-Tech) and its evolution within the financial services industry. 2. To explore the key technologies driving Fin-Tech innovation, including block-chain, artificial intelligence, big data analytics, and machine learning. 3. To examine the impact of Fin-Tech on traditional financial services, including banking, insurance, investment management, and payment systems. 4. To analyze the regulatory challenges and opportunities associated with the adoption of Fin-Tech solutions. 5. To evaluate the role of start-ups, incumbents, and partnerships in driving Fin-Tech innovation and disruption. 6. To discuss emerging trends and future directions in Fin-Tech, including decentralized finance (DeFi), digital currencies, and financial inclusion initiatives. 7. To develop critical thinking and problem-solving skills through case studies, discussions, and hands-on exercises related to real-world Fin-Tech applications.
Course Outlines	Unit 1: Foundations of FINTECH Introduction to FINTECH, Definition and Scope of FINTECH, Historical Evolution and Impact on Financial Services Industry, Key Drivers and Trends in the FINTECH Landscape. Regulatory Environment; Overview of Regulatory Frameworks Governing FINTECH, Compliance and Legal Considerations for FINTECH Start-ups, Understanding Regulatory

	<p>Challenges and Opportunities. Emerging Technologies in FINTECH; Block-chain Technology and Cryptocurrencies, Artificial Intelligence and Machine Learning in Financial Services, Robotic Process Automation (RPA) and its Applications.</p> <p>Unit 2: Digital Payments and Transactions Digital Payment Ecosystem, Evolution of Payment Systems: From Cash to Digital Payments, Payment Gateways, Wallets, and Payment Apps, Trends in Contactless Payments and Mobile Wallets, Peer-to-Peer (P2P) Lending and Crowdfunding, Overview of P2P Lending Platforms, Understanding Crowdfunding Models: Rewards, Equity, and Debt-Based Crowdfunding, Risks and Benefits of P2P Lending and Crowdfunding, Cryptocurrencies and Decentralized Finance (DeFi). Introduction to Cryptocurrencies: Bitcoin, Ethereum, and Altcoins, Decentralized Finance (DeFi) Ecosystem, Opportunities and Challenges in Cryptocurrency Trading and Investing</p> <p>Unit 3: Financial Inclusion and Access Microfinance and Mobile Banking, Role of Microfinance Institutions (MFIs) in Financial Inclusion, Mobile Banking Solutions for the Unbanked and Underbanked, Case Studies of Successful Financial Inclusion Initiatives, Insurtech and Digital Insurance, Overview of Insurtech: Innovations in the Insurance Industry, Digital Insurance Platforms and Peer-to-Peer Insurance Models, Improving Access to Insurance Through Technology, Wealthtech and Robo-Advisors, Introduction to Wealthtech: Digitizing Wealth Management Services, Robo-Advisors: Automated Investment Platforms, Benefits and Limitations of Robo-Advisory Services</p> <p>Unit 4: Future Trends and Career Opportunities Emerging Trends in FINTECH; Future of Banking: Open Banking and API Integration, Rise of Embedded Finance and Financial Superapps, Impact of Quantum Computing and Internet of Things (IoT) on FINTECH. Career Opportunities in FINTECH; Roles and Responsibilities in the FINTECH Industry, Skills and Qualifications Required for Careers in FINTECH, Networking and Professional Development Opportunities</p>
<p>Course Outcomes</p>	<p>After completion of the course, learners will be able to:</p> <p>CO1: Students will be able to explain the concept of financial technology (Fin-Tech) and its significance in transforming the financial services industry.</p> <p>CO2: Students will demonstrate an understanding of key Fin-Tech technologies, including block-chain, artificial intelligence, and big data analytics, and their applications in financial services.</p> <p>CO3: Students will be able to analyze the impact of Fin-Tech on traditional financial institutions and business models, identifying opportunities and challenges for innovation and disruption.</p> <p>CO4: Students will understand the regulatory environment surrounding Fin-Tech and its implications for industry stakeholders, including compliance requirements and consumer protection measures.</p> <p>CO5: Students will evaluate different strategies for leveraging FinTech, including partnerships, acquisitions, and in-house development, to enhance business operations and customer experiences.</p> <p>CO6: Students will be able to identify emerging trends and opportunities in the Fin-Tech landscape, such as decentralized finance (DeFi), digital identity, and sustainable finance solutions.</p> <p>CO7: Students will develop critical thinking skills by analyzing and proposing solutions to real-world Fin-Tech challenges through case studies</p>

	and group projects.
Evaluation	End-term Marks= 60 Mid-term Marks= 40 (20 T1 + 20 P)
Suggested Readings	Akkizidis, I., &Stagars, M. (2015). Marketplace Lending, Financial Analysis, and the Future of Credit. New Jersey: Wiley. Chishti, S., &Barberis, J. (2016). The Financial Technology Handbook for Investors, Entrepreneurs and Visionaries. New Jersey: Wiley. Chishti, S., Craddock, T., Courtneidge, R., &Zachariadis, M. (2020). The PayTech Book. New Jersey: Wiley. Diamandis, P. H., &Kotler, S. (2020). The Future Is Faster Than You Think: How Converging Technologies Are Disrupting Business, Industries, and Our Lives. New York: Simon & Schuster. Hill, J. (2018). FinTech and the Remaking of Financial Institutions. London: Academic Press, Elsevier.

Archaeology

Zoology

Fermentation Technology and Industrial Enzymes Credit

Unit I

Introduction to fermentation: History and development of fermentation technology, basic requirements of fermentation, Types of fermentations: Aerobic and Anaerobic fermentation, Solid state and Submerged fermentation (Batch, Fed-Batch and continuous system), Upstream and Downstream processing.

Unit II

Isolation and preservation of industrial microorganisms, Controlling mechanism and regulation of catabolic and anabolic processes/pathways in microbial induction, carbon catabolite repression, feedback inhibition. Types of culture medium; Selective media, differential media, industrial media, carbon and nitrogen sources, use of anti-foaming agents.

Unit III

Basic function of fermenter for microbial and animal cell culture, fermenter design (Stirred tank, bubble columns, airlift) and body construction, various parts of fermenter. Biochemical process variables and their measurements; Measurement and control of pH, temperature, dissolved oxygen, aeration and agitation. Online analysis and control of process parameters and biosensors.

Unit IV

Enzymes of industrial applications, enzyme classification and nomenclature, quantification of enzyme activity and specific activity. Kinetics of enzyme catalyzed reaction (steady state kinetics). Industrial production of enzymes; Amylase and Cellulase. Industrial application of Enzyme immobilization (Calcium alginate beads, polyacrylamide beads).

Practical

1. Screening and Identification of industrially important microorganisms from natural habitats through microbial methods i.e. spread plate, streak plate, serial dilution, simple staining, differential staining, acid fast staining and spore staining.
2. Enumeration of starch hydrolyzing and cellulose decomposing bacteria through plate count methods.
3. Production of amylase and cellulase from steady state batch culture fermentation in Erlenmeyer flask.
4. Study on extraction and purification of enzymes (crude enzyme, partially purified enzyme) through ammonium sulphate precipitation, gel/size –exclusion chromatography (demonstration of procedures through pictomicrographs/ slides/presentations).

Semester-IV

Molecular Diagnostics

Programme Outcome

- Understanding of disease diagnosis and types of infectious disease.
- To diagnose diseases.
- Knowledge of advanced technology for interpretation of genetic diseases .
- Knowledge of various immunoassays and Immunohistochemistry techniques.

Course Outcome

- Acquisition of skills in disease diagnosis.
- Understanding PCR based molecular diagnosis of bacterial, viral and fungal pathogens.
- Knowledge on application of DNA sequencing and DNA finger printing.

Learning Outcome

- Learner gains knowledge on collection methods and storage of clinical samples for disease diagnosis.
- Acquire skills for detection and quantification of biological parameters for disease identification and diagnosis.
- Molecular diagnosis of pathogens through DNA sequencing, PCR and restriction enzyme based technique.
- Understanding the role of immunohistochemistry in disease diagnosis.

Unit I

Introduction and history of disease diagnosis, mode and type of infectious disease, philosophy and ethics for clinical samples. Various methods of collection, storage and transport/shipping procedures for clinical samples. Diagnosis of infectious disease caused by bacteria, fungi, viruses, protozoa and Helminthes.

Unit II

Biochemical parameters for detection and quantification of clinical samples (i.e. urine, blood, fecal matters, tissue biopsy) for bacterial disease. Detection and quantification of sugars, albumin, urea, protein, globulin and vitamins. Disease identification, genetic test for disorders, population screening for genetic disorder. Treatment and management in genetic diseases.

Unit III

Culture independent analysis of bacteria, PCR based microbial typing, Molecular diagnosis of fungal pathogens. DNA finger printing, Southern blotting and electrophoresis analysis, RAPD and RFLP techniques, DNA sequencing (Sanger). Multiplex-PCR analysis.

Unit IV

Principle and diagnosis techniques of immunoassays: Radio immunoassay (RIA), Enzyme linked immunosorbent assay (ELISA), chemiluminescent immunoassay (CIA), fluorescent antibody test/ immunoassay (FIA). Principle and techniques of Immunohistochemistry. Application of Biosafety cabinets and containment for clinical specimens. Good laboratory practices in handling clinical samples.

Practical

1. Introduction to Biosafety Laboratory (BSL-1 to 4) level for bacteria/ cell culture.
2. Culture and analysis of pathogenic microbes from clinical samples (Refer: BSL-1/2).
3. Preparation of buffer solutions, reagents and culture media.
4. Isolation of chromosomal and plasmid DNA from bacteria.
5. Isolation of genomic DNA from tissue.
6. Spectrophotometric Quantitation of genomic DNA.
7. Gel electrophoresis of DNA and PCR amplification (procedure demonstration through Pict micrograph/ slides/ video lectures)

Microbiology

History

Urdu

رتہمج الگری

Tarjuma Nigari

Course Outcomes:

1. To acquaint the students with the tradition of Translation and its relevance.
2. To develop understanding among students towards techniques of Translation and differences between creative and non-creative writings.

Unit I

1- رتہمج کی معرفت فی اور اہمہ والقدت

2- رتہمجے کا وصلو ووضاب

Learning Outcome: After completion of this unit the learner will be able to explain the need and utility of translation and understand the techniques of translation also.

Unit II

1- ریغ ادبیرشا کر تہمج

2- ادبیرشا کر تہمج

3- سارعی کر تہمج

Learning Outcome: After completion of this unit the learner will be able to explain about different types of translation and their methods and differentiate between translation method of prose and poetry

forms and literary and non-literary language.

Unit III

1- اصطلاح ساری کے کا وصل

2- اردو رتہمج کے کا ادارے

Learning Outcome: After completion of this unit the learner will be able to discuss about the uses of terminologies and its formation and get informed about different institutions of Urdu translation.

Unit-IV

1۔ رتبہ کی کثرت

۱۔ ارگنٹری کے سارے دور تہج

۲۔ ذمہ / دلے سارے دور تہج

Learning Outcome: After completion of this unit the learner will be able to translate the literary and non-literary text from Hindi/English to Urdu or vice-versa.

اون تک

1۔ ن فر تہج اگری --- قیلخ امجن

2۔ ر تہج اگری --- لانت دص رفہ

3۔ ن فر تہج اگری --- وبظر ادلی

4۔ اصطلاح بیتہج --- اخدل وہمد

Model Questions

- 01 1۔ ر تہج اگری کے کی سکان کا دارے کن ام لہ ہے۔
- 02 2۔ ر تہج کی کر عن فی دنج الفل طہیم ہے۔
- 05 3۔ اصطلاح ساری کے کا وصل ر پر متخا ر ونش دایہ۔
- 08 4۔ ر تہج اگری کے کا وصل ووضاب سے ش حب ہے۔

اردو صحافت

Urdu Sahafat

Course Outcomes:

1. To acquaint the students with the basic feature of Journalism and its relevance.
2. To develop understanding among students towards Journalism and professional opportunity in this field.

Unit I

1. ادھتفیکر عتفی

2. اد بلور اھتف اکاؤزق

3. رنخ کی کرتفی اور اسقم

Learning Outcome: After completion of this unit the learner will be able to explain the need and utility of journalism and differentiate a literary piece from a journalistic work and discuss about news and its forms.

Unit II

1. رنخ کے کوصل کے داعن

2. رنخ کے اسقم) رسیخ، ادتبا ایئہ اور ن تم)

Learning Outcome: After completion of this unit the learner will be able to explain about the sources of news and its collection and news writing.

Unit III

1. رنخ انگری کی ریسق

ا۔ ر عم ویض

آ۔ ر شتھی

آ۔ ش ینت

Learning Outcome: After completion of this unit the learner will be able to explain about different types of news and differentiate among objective news, elaborative news and investigative news.

Unit-IV

1- ریڈیا انگری

2- ادارہ انگری

3- آرٹھوی

Learning Outcome: After completion of this unit the learner will be able to write news feature and editorial and take interview hence creating employability for themselves.

اون تک

1- ریڈ انگری --- ساعفقوایئ

2۔ نفاہرتف۔۔۔ و بظرا دلنی 3۔ نفاہرتف۔۔۔

رمحیلع البلمش 4۔ اردور جزلم۔۔۔۔۔ نسج اع دبی

5۔ اردواہرتف رتہج و ادارب۔۔۔ دیس ایض ابلا

6۔ ر ربہ الخرون سی۔۔۔ دیس ابول اقدری

Model Questions

1۔ خ۔ بوکی تاریخ اے سہ صخشے کرتے پس سے لموج اس اظال غے سوات یقے کس اہت س اہت اس ی کر بہشتاک

01 اقدس قی ہب رکھن اوہو تاریخے کا ہے سے ذاعی ایک کھالے مت یہ؟

02 2۔ ریخی کر عتفی رمتخما ّ۔ لہے۔

05 3۔ شریقت ریخ پر متخما ّ۔ ونب لکھے۔

08 4۔ ریخے کو صجلے کے ذاعیے ست حبر بیک۔

Botany

Bio-Fertilizers (A)

Objectives:

1. To understand the methods of isolation, propagation, and application of different bacterial, fungal and algal biofertilizers.
2. To learn the characteristics of strains of importance for use as biofertilizers and the methods of their cultivation, processing and application.
3. To inculcate the knowledge for understanding the concept and procedure of organic farming for sustainable agroecosystem.
4. To learn the processing and recycling methods of biodegradable organic wastes of diverse origin and their integration with biofertilizers.
5. To learn the techniques and application of composting, vermin-composting and reuse of complex organic matters and method of their agricultural application.

Outcomes:

- After the completion of the course the students are expected to have
1. Knowledge of biofertilizers belonging to different microbial groups and their association with crop plants.
 2. Skill on isolation, culture, mass propagation and harvesting, processing, storage and marketing of various types of biofertilizers.
 3. Detailed understanding on the techniques and benefits of organic farming following green manuring and organic manure application.
 4. Knowledge on the nutritional advantage of the application of biofertilizers and the field doses of various biofertilizers for nitrogen and phosphorus nutrition.
 5. Skill to properly compost the organic wastes of various complexity and use of the compost on crop field for enhanced yield.

Unit I: LO: Awareness about the microbial groups, preparation and types of biofertilizers

General account about the microbes used as biofertilizer– Rhizobium – isolation, identification, mass multiplication, carrier-based inoculants, Actinorrhizal symbiosis. *Azospirillum*: isolation and mass multiplication, *Azotobacter*: classification, characteristics – crop response to *Azotobacter* inoculums, maintenance and mass multiplication.

Unit II: LO: Knowledge on isolation, culture, harvesting, processing, storage and marketing of biofertilizers

Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, nitrogen fixation, factors affecting growth, blue green algae and *Azolla* in rice cultivation.

Unit III: LO: Understanding the nutritional advantage of various biofertilizers

Mycorrhizal association, types of mycorrhizal association, taxonomy, occurrence and distribution, phosphorus nutrition, growth and yield – colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.

Text Books:

- ✓ *Mahendra Rai, (2006). Hand book of Microbial Bio-fertilizers. CRC Press.*

Reference Books:

<ul style="list-style-type: none"> ✓ <i>Dubey, R.C., 2005 A Text book of Biotechnology S. Chand & Co, New Delhi.</i> ✓ <i>Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.</i> ✓ <i>John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi.</i> ✓ <i>Sathe, T.V. 2004 Vermiculture and Organic Farming. Daya publishers.</i> ✓ <i>Subha Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New -Delhi.</i> ✓ <i>Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic. Farming Akta Prakashan, Nadiad</i> ✓ <i>Pravin Chandra Dwivedi. (2008). Biofertilizers. Pointer Publishers.</i>
Nursery And Gardening (B)
Objectives:
<ol style="list-style-type: none"> 1. To give a general concept on the nursery techniques and requirements. 2. To impart knowledge on seeds and seed technology. 3. To learn about the methods of propagation of plants in the nurseries and infrastructural requirements. 4. To give a general knowledge on the gardening techniques at different scales. 5. To impart knowledge on modern methods of gardening with respect to the application of computer technology. 6. To learn the techniques of raising seedlings of common horticulturally and agriculturally important plants.
Outcomes:
<p>On completion of the course the students shall</p> <ol style="list-style-type: none"> 1. Have knowledge on plants and planting methods. 2. Be able to understand the process for storing seeds and plant propagules. 3. Skills on various methods of propagation and requirements of production of propagules. 4. Able to understand the type of gardens and methods to develop a garden. 5. Have knowledge on garden management and disease control. 6. Have ability to cultivate commonly used vegetable crops and understand the method of cultivation.
Unit-I: LO: Students will learn about the idea of nursery activities. They will also learn about the seed planting and production.
<p>Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.</p> <p>Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage:</p>
<p>Seed banks, factors affecting seed viability, genetic erosion – Seed production technology - seed testing and certification.</p>
Unit-II: LO: Students will learn about various methods of plant propagation and about green house.
<p>Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants – green house - mistchamber, shed root, shade house and glass house.</p>
Unit-III: LO: Students will learn about types of gardening for landscape and home. They will also learn about the soil, water and pest management.

	Gardening: definition, objectives and scope - different types of gardening – landscape and home gardening - parks and its components - plant materials and design – computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.
Text Books:	
	✓ <i>Saidaiah Pidigam, Sindhuja S., Geetha Amarapalli. (2018) Text Book of Nursery, Gardening and floriculture, Kalyani Publishers, New Delhi.</i>
Reference Books:	
	<ul style="list-style-type: none"> ✓ <i>Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.</i> ✓ <i>Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.</i> ✓ <i>Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.</i> ✓ <i>Edmond Musser & Andres, Fundamentals of Horticulture, McGraw Hill Book Co., New Delhi.</i> ✓ <i>Agrawal, P.K. 1993, Handbook of Seed Technology, Dept. of Agriculture and Cooperation, National - Seed Corporation Ltd., New Delhi.</i> ✓ <i>Janick Jules. 1979. Horticultural Science. (3rd Ed.), W.H. Freeman and Co., San Francisco, USA.</i>
Soil Less Cultivation (C)	
Objectives:	
	<ol style="list-style-type: none"> 1. To study about Introduction Soilless Organic and Semi-organic Cultivation, types, importance of Cultivation of plants under Hydroponic condition. 2. To learn about the Physical parameters affecting growth of Hydroponically Cultivated plants. 3. To study about various Nutrition medium for Hydroponic Cultivated plants. 4. To understand about Disease and pest management and Management of waste Nutrient Solution 5. To learn about the future prospective of Hydroponic Cultivation of Commercial plants.
Outcomes:	
	<ol style="list-style-type: none"> 1. Have knowledge about the types, methods and importance of Hydroponic. Cultivation of plants. 2. Have clear understanding how the physical parameters affect the growth of Hydroponically Cultivated plants. 3. Have ability to understand the different types of Nutrition medium available for Hydroponic Cultivated plants. 4. Gain knowledge about different Nutrition medium for Hydroponic Cultivated plants. 5. Be able to describe the Disease and pest management of hydroponic plants
Unit I: LO: Students will learn basic and importance of soilless farming.	
	Introduction to soilless plant cultivation: available issues in soil-based plant cultivation.
	Introduction to soilless farming. Organic, Inorganic and Semi-organic cultivation. Basic principle and technique of soilless cultivation. Importance of soilless cultivation in the current scenario.
	Advantages and disadvantages of Soilless cultivation.
Unit II: LO: This will enable to acquire knowledge hydroponic plant cultivation techniques.	
	Hydroponic Plant Cultivation: Importance of nutrients (Macronutrient and micronutrient) for plant growth. Nutrient media used in soilless culture. Use of Biofertilizer: Phosphate Solubilizing Bacteria, Potassium Solubilizing Bacteria, Nitrogen fixing Bacteria etc. Nutrient in chemical forms and Real time Monitoring of nutrient via Sensors: TDS, pH, DO etc.
Unit III: LO: This is to understand the semi-hydroponic plant cultivation techniques.	

	Semi-hydroponic Plant Cultivation: Growing plants through various substrate culture. Vermiculite, Vermicompost, Cocopeat, perlite, Lica ball, Rock wool etc. Substrate as organic nutrient and neutral substrate. Aeroponics cultivation and its mechanism. Nutrient deficiency and disease Management.
Text Books:	
	✓ <i>Singh, D. J., & Davidson, J. (2016). Introduction to Hydroponics-Growing Your Plants Without Any Soil. Mendon Cottage Books.</i>
Reference Books:	
	✓ <i>Resh, H. M. (2022). Hydroponic food production: a definitive guidebook for the advanced home gardener and the commercial hydroponic grower. CRC press.</i> ✓ <i>Raviv, M., Lieth, J. H., & Bar-Tal, A. (Eds.). (2019). Soilless culture: Theory and practice: Theory and practice. Elsevier.</i>
Organic Farming (D)	
Objectives:	
	<ol style="list-style-type: none"> 1. To understand about organic farming and its significance in modern day of farming 2. To learn the characteristics features of organic farming and its difference from traditional method of farming. 3. To learn about government promotions and beneficial role of organic farming towards farmers.
Outcomes:	
	After the completion of the course the students are expected to have <ol style="list-style-type: none"> 1. Knowledge of organic farming and its need and prospect in modern day farming. 2. Learn about the organic farming and its relevance with the sustainability, biodiversity and ecological balance. 3. To get idea on the government policies on organic farming
Unit I: LO: The students will learn about the concept of organic farming and its relevance with modern day farming.	
	Definition, need and scope of organic farming, Relevance to modern agriculture. Difference between organic and conventional farming practices. Modern farming practices – Permaculture, biodynamic farming. Organic farming – perspective in Odisha and India. Global status of organic farming. Future prospects of organic farming - advantages and barriers.
Unit II: LO: Learners will learn about government initiative and promotions. They will learn about organic fertilizers used in organic farming.	
	Governmental initiative on promotion of organic farming in India - policies and success stories. Marketing and export potential of organic products – impact on national economy Organic nutrient sources and their fortification, Nutrient management in organic farming

	Green Organic manures – methods of preparation of green manures, impact of green. manures towards organic farming. Biofertilisers – types, methods of application – benefits and limitations
Unit III: LO: The students will learn about the methods of controlling pest and diseases during organic farming. Also, they will learn about bioformulations for better organic farming.	
	Disease management, weed management and insect management under organic farming. Use of biological methods for pest and disease management. Use of plant-based formulations for disease management – Use of neem extracts, seed kernels and other natural non-chemical-based formulation for management of diseases and pest for organic farming.
Text Books:	
	✓ Maliwal, P. L. (2020). <i>Principles of Organic Farming: Textbook</i> . Scientific Publishers.
Reference Books:	
	✓ Somasundaram, E., Nandhini, D. U., & Meyyappan, M. (2021). <i>Principles of organic farming</i> . CRC Press. ✓ Das, S., Chatterjee, A., & Pal, T. K. (2020). <i>Organic farming in India: a vision towards a healthy nation</i> . <i>Food Quality and Safety</i> , 4(2), 69-76. ✓ Dabbert, S., Haring, A. M., & Zanoli, R. (2004). <i>Organic farming: policies and prospects</i> . Zed books.

Ethnobotany (A)	
Objectives:	
	<ol style="list-style-type: none"> 1. To educate the students about the concept and importance of ethnobotany as an interdisciplinary science. 2. To learn about the tribals / ethnic groups of India, their life style and their role in conservation of medicinal plants. 3. To acquire basic knowledge about key medicinal plants used in ethnobotany. 4. To understand the legal aspect of ethnobotany
Outcome:	
	<p>After the completion of the course the students are expected to</p> <ol style="list-style-type: none"> 1. Conceptualize the importance of ethnobotany as an interdisciplinary science. 2. Understand various methodologies of ethnobotany studies and traditional practices for conservation of knowledge and plants. 3. Have an understanding about the taxonomic and medicinal importance of widely used medicinal plants. 4. Understand the legal aspect associated with ethnobotany, biopiracy and Intellectual Property Rights to protect the interest in tribals.
Unit I: LO: Students will able to conceptualize the methods of ethnobotany as an interdisciplinary science.	

<p>Introduction, concept, scope and objectives; Ethnobotany as an interdisciplinary science. The relevance of ethnobotany in the present context; Major and minor ethnic groups or Tribals of India, and their life styles. Plants used by the tribals: a) Food plants b) intoxicants and beverages c) Resins and oils and miscellaneous uses.</p> <p>Methodology of Ethnobotanical studies a) Field work b) Herbarium c) Ancient Literature d) Archaeological findings e) temples and sacred places.</p>
<p>Unit II: LO: Students acquire knowledge about different plants and its role in ethnobotany as well as the role of ethnobotany on modern medicine.</p>
<p>Role of ethnobotany in modern Medicine Medico-ethnobotanical sources in India; Significance of the following plants in ethno botanical practices (along with their habitat and morphology) a) <i>Azadiracta indica</i> b) <i>Ocimum sanctum</i> c) <i>Vitex negundo</i> d) <i>Gloriosa superba</i> e) <i>Tribulus terrestris</i> f) <i>Pongamia pinnata</i> g) <i>Cassia auriculata</i> h) <i>Indigofera tinctoria</i>. Role of ethnobotany in modern medicine with special example <i>Rauvolfia sepentina</i>, <i>Trichopus zeylanicus</i>, <i>Artemisia</i>, <i>Withania</i>.</p>
<p>Unit III: LO: Students will comprehend the importance of ethnic group and forest management for conservation of plants.</p>
<p>Role of ethnic groups in conservation of plant genetic resources. Endangered taxa and forest management (participatory forest management).</p>
<p>Practicals:</p>
<ol style="list-style-type: none"> 1. Collection and taxonomy of local medicinal plants 2. Documentation of use of local medicinal plants 3. Filed survey and study of local medicinal plants. 4. Extraction of active ingredients of medicinal importance- aqueous extract, acetone extracts, alcohol extracts, combination extracts 5. Rotary evaporation methods
<ol style="list-style-type: none"> 6. Antimicrobial activity of crude extracts 7. Determination of minimum inhibitory concentration and zone of inhibition
<p>Text Books:</p>
<p>✓ <i>Faulks, P.J. 1958. An introduction to Ethnobotany, Moredale pub. Ltd</i></p>
<p>Reference Books:</p>
<ul style="list-style-type: none"> ✓ <i>S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.</i> ✓ <i>S.K. Jain (ed.) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981</i> ✓ <i>Lone et al, Palaeo ethnobotany</i> ✓ <i>S.K. Jain (ed.) 1989. Methods and approaches in Ethnobotany. Society of Ethnobotanists, Lucknow, India.</i> ✓ <i>S.K. Jain, 1990. Contributions of Indian ethnobotny. Scientific publishers, Jodhpur.</i> ✓ <i>Colton C.M. 1997. Ethnobotany – Principles and applications. John Wiley and sons –Chichester</i> ✓ <i>Rama Ro, N and A.N. Henry (1996). The Ethnobotany of Eastern Ghats in AndhraPradesh, India. Botanical Survey of India. Howrah.</i> ✓ <i>Rajiv K. Sinha – Ethnobotany The Renaissance of Traditional Herbal Medicine – INA –SHREE Publishers, Jaipur-1996</i> ✓ <i>Rath, A. K. and Mishra, S. R. (2017). Ethnobotany, Kalyani Publishers, New Delhi.</i>
<p>Mushroom Cultivation (B)</p>
<p>Objectives:</p>

	<ol style="list-style-type: none"> 1. To study about types, nutritional and medicinal value of edible mushrooms and the toxicity of Poisonous Mushrooms. 2. To learn the Cultivation Technology of edible mushrooms and its regulating factors. 3. To know about short-term and long-term storage of mushrooms and their products. 4. To understand the Cost benefit ratio - Marketing in India and abroad.
Outcomes:	
	<p>On completion of the course the students shall</p> <ol style="list-style-type: none"> 1. Have knowledge about the importance for integrating mushroom as an alternate nutritive food. Mushrooms. 2. Have knowledge and skills for Cultivation of edible mushrooms. 3. Know about the edible mushrooms available in India and their processing and storage methods. 4. Have an understanding about the Low-cost cultivation Technology of edible mushrooms and adoption of mushroom cultivation as a profitable entrepreneurship.
Unit I: LO: The students know about the nutritional and medicinal value of edible mushrooms and the toxicity of Poisonous Mushrooms.	
	<p>Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - <i>Volvariella volvacea</i>, <i>Pleurotus citrinopileatus</i>, <i>Agaricus bisporus</i>. Cultivation Technology: Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low-cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.</p>
Unit II: LO: The students will know the Cultivation Technology of edible mushrooms.	
	<p>Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low-cost technology, Composting technology in mushroom production.</p>
Unit III: LO: The students know about the short-term and long-term storage of mushrooms and their products.	
	<p>Storage and nutrition: Short-term storage (Refrigeration – up to 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fiber content - Vitamins.</p>
Practical:	
	<ol style="list-style-type: none"> 1. Preparation of spawn, mycelium culture (paddy mushroom) 2. Raw materials of mushroom bed preparation 3. Treatment of raw materials for sterilization 4. Composting technology in mushroom production 5. Storage, packaging and nutrient analysis of mushroom
Text Books:	
	<p>✓ <i>B. C. Suman and V. P. Sharma. (2007). Mushroom Cultivation in India. Daya Publishing House, New Delhi.</i></p>
Reference Books:	

<ul style="list-style-type: none"> ✓ <i>Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R (1991) Oyster Mushrooms, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.</i> ✓ <i>Swaminathan, M. (1990) Food and Nutrition. Bappco, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore - 560018.</i> ✓ <i>Tewari, Pankaj Kapoor, S.C., (1988). Mushroom cultivation, Mittal Publications, Delhi.</i> ✓ <i>Nita Bahl (1984-1988) Hand book of Mushrooms, II Edition, Vol. I & Vol. II.</i> ✓ <i>Anon. (2010). The Cultivation of Mushrooms - An Outline of Mushroom Culture, Read Book Design, New Delhi</i>

Tissue Culture & Plant Regeneration (C)

Objectives:

1. To know the about the plant tissue culture techniques and its practical applications.
2. To understand the requirement for setting up a tissue culture laboratory.
3. To know the commercial aspects of plant tissue culture.

Outcomes:

- On completion of the course the students shall
1. have ability to understand the basic of plant tissue culture methods.
 2. have knowledge to develop a startup facility using tissue culture techniques.
 3. be able to understand the economics of the process and know its potential.

UNIT I: LO: Learners gain knowledge of tissue culture, its laboratory and basic requirements.

Introduction to plant tissue culture: Laboratory organization and instruments requirement, aseptic techniques required for tissue culture, culture medium (MS) and its composition, plant growth regulators and their uses in plant tissue culture, preparation of culture media. Totipotency.

UNIT II: LO: Learners know about different methods of plant regeneration through plant tissue culture.

Micropropagation: Micropropagation by mature nodal explants, surface sterilization, stages of micropropagation, selection of plants and explants, proliferation of shoot, rooting of shoots, acclimatization; organogenesis, environment inside the culture room.

UNIT III: LO: Students will know the applications of plant tissue culture.

Tissue culture applications: Uses of micropropagation, anther culture (haploid and doubled haploid production), shoot apex/ tip culture (virus elimination), secondary metabolite production, synthetic seed production (germplasm transfer); Cryopreservation and in vitro culture (germplasm conservation).

Practical:

1. Sterilization of plasticwares, glass wares and use of autoclaves or its alternatives.
2. Preparation of tissue culture medium (e.g., MS medium).
3. Readiness of Laminar air flow cabinet for aseptic culture work (Demonstration).
4. Demonstration of in vitro sterilization and inoculation methods using nodal explants of any plant species as per available.
5. Over all study of micropropagation by photographs.
6. Study of anther culture through photographs.
7. Preparation of synthetic seeds.

Text Books:

✓ <i>Chawla, H. S. (2010). Introduction to Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.</i>
✓ <i>Purohit S.D. (2013) Introduction to Plant Cell, Tissue and Organ Culture. PHI Learning Private Ltd., Delhi</i>
Reference Books:
✓ <i>Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.</i>
✓ <i>Singh, B. D. (2018). Plant Biotechnology Kalyani Publishers, New Delhi.</i>
✓ <i>Gupta, P. K. (2017). Plant Biotechnology, Rastogi Publication, Meerut.</i>
Vermitechnology (D)
Objectives:
<ol style="list-style-type: none"> 1. To introduce the students with the scope and importance of vermitechnology. 2. To introduce the students with different methods of vermicomposting. 3. To introduce the students with the role of vermicomposting.
Outcomes:
<ol style="list-style-type: none"> 1. Students would understand the scope and importance of vermitechnology. 2. Students would get the skill to produce vermicompost. 3. Students would understand the use of vermicomposting and its potential & constraint in India
Unit I: LO: Students will learn about the scope and importance of vermitechnology.
Vermiculture: Definition, scope and importance; Common earthworm species for vermiculture; Environmental parameters; Culture methods-warmery-breeding techniques; monoculture & polyculture
Unit II: LO: Students will able to know different methods of vermicomposting.
Vermicomposting of wastes in field its, ground heaps, tank method, roof shed method, harvesting the compost, storage, vermiwash-preparation & application
Unit III: LO: Students will able to comprehend the role of vermicomposting and its potential.
Use of vermicomposting in organic farming; management of solid wastes using vermitechnology; predator/pathogen control in wormeries; potential and constraints for vermiculture in India.
Practicals:

	<ol style="list-style-type: none"> 1. Isolation of common earthworms species 2. Preparation of culture bed using cow dungs and plant wastes. 3. Culture of vermiworms. 4. Determination of moisture content of vermicompost. 5. Determination of water holding capacity of vermicompost.
Text Books:	
	<ul style="list-style-type: none"> ✓ <i>Sreenivasan, E. (2014). Handbook of Vermicomposting Technology. The Western India Plywoods Ltd, Kerala, India.</i>
Reference book:	
	<ul style="list-style-type: none"> ✓ <i>Anand, K., & Sinha, P. B. (2020). Vermitechnology: a solution for agricultural waste. In Innovative Waste Management Technologies for Sustainable Development (pp. 273-290). IGI Global.</i> ✓ <i>Walia, S. S., & Kaur, T. (2024). Vermitechnology: History and Its Applications. In Earthworms and Vermicomposting: Species, Procedures and Crop Application (pp. 37-53). Singapore: Springer Nature Singapore.</i>

Home Science

Hindi

Gender Studies

Education

Life Skills Education

Course Outcomes (COs):

On completion of this course, the learners will be able to:

CO1: Identify career opportunities in consideration of their own potential and aspirations.

CO2: Gain self-competency and confidence.

CO3: Participate in simulated interview.

CO4: Analyse the role of digital literacy in professional life.

CO5: Develop interpersonal skills and adopt good leadership behaviour for self-empowerment and the empowerment of others.

CO6: Demonstrate a set of practical skills such as time management, self-management, conflicts management, team leadership etc.

CO7: Understand the importance of values in individual, social circles, career path and national life.

Course Contents

CO: Familiar with the concept of Life Skills.

Unit I: Introduction to Life Skills Education.

- Concept, need and objectives of life skills education.
- Recommendations of WHO and UNICEF over the years.
- Four Pillars of Education - Learning to Know, Learning to Do, Learning to Be, Learning to Live Together.

Unit II: Social Skills

CO: Communicate efficiently and develop good interpersonal skills.

CO: Use social digital platforms efficiently.

- Communication skill-types of communication, barriers to communication, strategies for effective communication.
- Interpersonal skills-determinants, maintaining and sustaining a relationship, conflict resolution.
- Digital literacy and social media-digital ethics and cyber security.

Unit III: Life Skills for Self-Management and Career Planning

CO: Develop awareness about one's own self and plan a career accordingly.

- Self-awareness-self-concept, self-esteem, time management and empathy.
- Emotional intelligence, social intelligence and spiritual intelligence.
- Choosing a career-sources of career information, preparation of resume, interview facing and group discussion.

Unit IV: Universal Human Values

CO: Understand the importance of values and develop values for life.

- Truth, love, compassion and non-violence.
- Constitutional values- justice and human rights.
- Understanding happiness and prosperity correctly- a critical appraisal of the current scenario.

Sample Questions

- What is meant by Life skills? (1 Mark)
- Mention any two life skills as laid down by WHO. (2 Marks, Within 50 words)

- Define Communication. Discuss strategies for effective communication. (5 Marks, Within 300 words)
- Critically reflect on Four Pillars of Education. (8 Marks, Within 500 to 800 words).

Mode of Course Transaction: Seminar, Team Teaching, Dialogue, Peer-Teaching, Collaborative and Cooperative Learning, Field Trip, Concept Mapping, Self-Learning.

Activities

Each student will be required to prepare and submit a report on any one of the following:

- Prepare a report on the implications of any two pillars of education in developing life skills education in India.
- Examine the opportunities and challenges in application of life skills education and write a report.
- Conduct a semi structured interview on parents exploring the challenges of parenting and life skills needed for effective parenting. Compare the gender difference of parenting.
- Conduct Case study on life history of great personalities who contributed towards universal values.

Suggested Readings

- ✓ *Dahama O.P., Bhatnagar O.P, (2005). Education and Communication for Development (2nd Edn.). New Delhi: Oxford & BH Publishing Co. Pvt. Ltd.*
- ✓ *Hendricks, P.A. Developing Youth Curriculum Using the Targeting Life Skills Model: Incorporating Developmentally Appropriate Learning Opportunities to Assess Impact of Life Skill Development (Iowa State Extension Publication 4H-137A, 1998). Ames, IA: Iowa State University.*
- ✓ *Konar, N. (2011). Communication Skills for Professionals (Second Edition). New Delhi: PHI Learning Private Limited.*
- ✓ *Mangal, S.K., and Mangal, U.(2014). Essentials of Educational Technology, PHI Learning Pvt. Ltd. 3.*
- ✓ *Sampath, K, A., Panneerselvam, S.S. (2007).Introduction to Educational Technology. Sterling Publisher Pvt. Ltd.*
- ✓ *Verma, S. Development of Life Skill-II, Vikas Publishing House.*
- ✓ <http://www.unesco.org>
- ✓ <http://www.unicef.org>
- ✓ <http://www.un.org>
- ✓ <http://www.who.int/en/>

Peace Education

Course Outcomes (COs):

On completion of this course, the students will be able to:

CO1: Understand the need of peace education in life.

CO2: Acquire a holistic and critical understanding of the theory and practice of peace education.

CO3: Describe the reports of different commissions and role of eminent personalities for the establishment of world peace.

CO4: Critically examine the key concepts, theories and ethical considerations underpinning peace education.

CO5: Appreciate positive action and non-violent conflict resolution in society.

CO6: Develop personal initiative and resources for the pursuit and promotion of peace.

CO7: Summarize the concept of peace education and point out the role of social institutions in developing values among children.

Course Contents

Unit I: Introduction to Peace Education

CO: Understanding Peace Education and its implication.

- Concept and significance of peace education.
- Aims and objectives of peace education at different levels.
- Role of social agencies in promoting peace education-family, religion, mass media and education.

Unit II: Contribution of Organisations and Eminent Personalities for Peace

CO: Familiar with international organisations engaged in Peace Education.

CO: Informed about role of distinguished individual and organisation for peace.

- Delor's Commission 1996, UNESCO's Conferences/recommendations for peace and international understanding.
- Contribution of eminent personalities for peace-Mother Teresa, Mahatma Gandhi and Dalai Lama.
- Contribution of organizations towards global peace- organizations working under United Nations.

Unit III: Peace in Indian Context

CO: Able to explain peace education in Indian context.

- Role of religion in propagation of peace.
- Democracy and peace, secularism.
- Socio-cultural diversity and peace.

Unit IV: Building a Culture of Peace

CO: Able to appreciate activities to promote a culture of peace.

- Challenges to peace- stress, conflict, terrorism, crime and violence.
- Sources of conflict and conflict management strategies.
- Factors contributing to violence in schools.
- Strategies of teaching peace education and role of teacher.

Sample Question

1. What is meant by peace? (1 Mark)
2. Mention any two objectives of peace education. (2 Marks, Within 50 words)
3. Define Conflict. Discuss the strategies for conflict management with suitable examples. (5 Marks, Within 300 words)

4. Critically reflect the contributions of Dalai lama towards peace education. (8 Marks, within 500-800 words)

Mode of Course Transaction: Team Teaching, Dialogue, Peer-Teaching, Peer Group Discussion, Collaborative and Cooperative Learning, Field Trip, Self-Learning.

Practicum/Activities

Each student will be required to prepare and submit a report on any one of the following:

- Organize an activity in school to promote world peace.
- Write a report on great personalities who contributed towards world peace.
- Write about the contribution of any two Nobel Prize winners who worked for world peace.
- Prepare an album of Indian philosophers and write their thoughts on peace.
- Prepare a proposal covering short analysis of any contemporary conflict and ways to resolve it.

Suggested Readings

- ✓ *Delor Jacques. (1996). Learning the Treasures Within. UNESCO Publishing, Paris.*
- ✓ *Gandhi, M.K., (1944). Non-violence in Peace and War. Ahmedabad: Navajivan Publishing House.*
- ✓ *Harris, I. & Morrison, M. (2003). Peace Education. New York: McFarland & Co.*
- ✓ *Johnson, D. W. & Johnson, R. T. (1991). Teaching students to be peacemakers. Edina, MN: Interaction Book Company.*
- ✓ *Kaur, B. (2006). Peace Education: New Trends and Innovations. New Delhi: Deep & Deep Publications Private Limited.*
- ✓ *Kreidler, W.J. (1995), Teaching, Conflict Resolution Through Children's Literature: New York: Scholastic.*
- ✓ *Loknath, M. (2009). Peace Education Framework for Teachers. New Delhi: A.P.H. Publishing Corporation.*
- ✓ *NCERT. (2004). Peace Education: Self Instructional Package for Teacher Education. NCERT, New Delhi.*
- ✓ *NCERT. (2006). NCF 2005 Position Paper, National Focus Groups on Education for Peace. New Delhi.*
- ✓ *Timpson, W. (2002). Teaching and learning peace. Madison, WI: Atwood Publishing.*
- ✓ *UNESCO. Learning the Way of Peace: Teacher's Guide.*

Art and Craft Education

Course Outcomes (COs)

On completion of the course, the students will be able to:

CO1: Define arts education and craft education.

CO2: Differentiate different forms of art education.

CO3: Develop aesthetic sensibility among learners about the environment, including classroom, school, home and community through an integrated learning approach.

CO4: Develop a perspective and appreciation of art, nature, and human existence relationship.

CO5: Develop awareness about the rich cultural heritage of their own locality/state/region as well as that of the nation.

CO6: Reflect on life and work of artists and their contribution to teaching and learning.

Unit I: Understanding Basics of Art Education

LO: Familiar with art traditions.

- Meaning and Concept of Art Education (i) Visual Arts (ii) Performing Arts and its significance in school Education
- Nature and Scope of Art Education
- Knowledge of Regional Arts and Crafts (Local Specific) and its Relevance in Regional Art and Craft, Teaching Students about Folk Objects and Traditional Arts, Knowledge of contemporary Arts and Artists

Unit II: Expression through Art Forms

LO: Understand and create new art expressions.

- Expressing ideas about different aspects of life
- Expressing various emotions
- Enhancing communication and presentation skills, developing imagination, creativity and aesthetic sensibility among the student teachers
- Utilizing different art expressions in teaching learning situation

Unit III: Literature and Art

LO: Understand literary expressions and the methods of teaching.

- Meaning and Aims of Literature art
- Different parts of literary Education
 - Story writing
 - Poem writing
 - Writing of drama
- Method of teaching of literary art at the elementary stage.
- Evaluation of literary art at the elementary stage.

Unit IV: Cultural heritage of India

LO: Familiar with cultural heritage of India.

- Exposure to the cultural heritage of (i) Locality (ii) state/region (iii) Nation

- Reflection and incorporation of the rich cultural heritage during the celebrations of festivals, functions and special days
- document processes of an art or craft form from the pedagogical point of view; such as weaving or printing of textiles, making of musical instruments, folk performances in the community.

Sample Questions

- What is art education? (1 Mark)
- Write any two objectives of Literature art. (2 Marks, Within 50 words)
- Discuss the nature and scope of Art education. (5 Marks, Within 300 words)
- Discuss the method of teaching of literary art at the elementary stage. (8 Marks, Within 500 to 800 words).

Mode of Course Transaction:

Seminar, Team Teaching, Dialogue, Peer-Teaching, Peer Group Discussion, Collaborative and Cooperative Learning, Field Trip, Concept Mapping, Lecture Method, Self-Learning.

- Preparation of an album of greeting cards with appropriate caption.
- Prepare three rangoli / paintings / teracota art
- Conduct Art Exhibition in the institution by displaying art of different forms
- Dramatize any topic for classroom presentation
- Conduct of story/ poem writing competition in the school and document those writings.

Suggested Readings

- ✓ *Dodd, Nigel and Winifred Hickson (1971/1980). Drama and theatre in education. London: Heinmann.*
- ✓ *Gupta, Arvind (2003). Kabad se Jugad: Little Science. Bhopal: Eklavya.*
- ✓ *Khanna, S. and NBT (1992). Joy of Making Indian Toys, Popular Science. New Delhi: National Book Trust.*
- ✓ *NCERT, (2006). Position Paper National Focus Group on Arts, Music, Dance and Theatre. New Delhi: NCERT.*
- ✓ *Sahi, Jane and Sahi, R. (2009). Learning through art. Bhopal: Eklavya.*
- ✓ *NCERT (2023). Art Integrated Learning, New Delhi <https://ncert.nic.in/deaa/pdf/ArtIntegratedLearning-Handbook-Classes%20VI-VIII.pdf>*

Computer applications in teaching learning

Course Outcomes (COs):

On completion of this course, the learners will be able to:

CO1: Learn basis of Basics of MS Windows.

CO2: Demonstrate basic understanding of computer applications with reference to MS Windows, MS excel and MS PowerPoint.

CO3: Generate spread sheets, charts and presentations.

CO4: Design personal, academic and business documents using MS Office.

CO5: Model the modes of development of self-learning materials and prepare different types of instructional material.

CO6: Explain different OERs, MOOCs available for effective learning.

CO7: Develop learners' e-portfolios.

CO8: Classify various e-resources for effective learning.

CO9: Describe the concept of artificial intelligence and its applications in teaching learning.

CO10: Determine similarity index of the various documents like dissertations, theses etc.

Course Contents

Unit I: Basics of Computer Applications

LO: Able to use a computer.

LO: Operate MS Window System, MS Excel, PPT and Hyperlinking.

- Basics of MS Windows: Desktop, Recycle bin, My Computer, Documents, Pictures, Music, Videos, Task Bar and Control Panel. MS-Word and its features: Creating, Editing, Formatting and Printing of Documents, Inserting, Word Art, Page Numbers, Mail Merge.
- MS-Excel and its features: Creating a new worksheet, selecting cells, Entering and editing Text, Numbers, Inserting Rows/Columns, changing widths and heights of row and columns, Formulae, referencing cells, changing of font sizes and colours.
- MS-PowerPoint and its features: Creating, Inserting and Deleting Slides of a Presentation. Adding Pictures, Inserting Objects, Audio, Video, Custom Animation and Hyperlinking of documents.

Unit II: Introduction to E-learning

LO: Understand and use E-learning facilities through computer and other digital instruments like mobile and tablets.

- Concept of e-learning, benefits of E-learning, Introduction to LMS using E-learning
- Approaches to e-learning: Offline, Online, Synchronous, Asynchronous, Blended learning and Mobile Learning.
- Security concerns related to interactive contents: Viewing, disabling and managing interactive content; securing the computer from viruses and other internet attacks.

Unit III: Application of E-Learning

LO: Able to apply E- Learning tools.

- Creating and Sharing: (i) G-Suite: Gmail, Drive, Calendar, Meet, Chat, Doc, Sheet, Slides (ii) Surveying: SurveyMonkey, Google Forms, online spreadsheets (iii) Google Classroom: conducting classes, assessment and evaluation.
- Development of Self-Learning Materials (SLM) and e-content: Concept and its purposes, Conventional Teaching versus SLMs & e-content, Types of SLMs and E-content,
- Process of Developing SLMs and e-content, Content Organization, Integrating video and audio into SLMs.

Unit IV: Trends in Teaching Learning Practices

LO: Understand contemporary utilisation of E-tools for teaching learning process.

- Open Education Resources: Creative Common, Massive Open Online Courses; creating learners' E-portfolios; accessing Online Repositories, Online Libraries and E-Resources.
- Artificial Intelligence: Concept and its applications in teaching learning practices. Introduction to SPSS and R, Latex.
- Plagiarism: Regulations, similarity index of the various documents like dissertations, theses etc. through plagiarism testing software (Mendeley, Zotero).

Sample Question

5. What is meant by computer? (1 Mark)
6. Mention any two benefits of mobile learning. (2 Mark, Within 50 words)
7. Discuss the benefits of e- learning and LMS in teaching learning process. (3 Mark, Within 300 words)
8. Give an account of Artificial Intelligence with reference to classroom management. (8 Mark, within 500-800 words)

Transaction Mode

Workshop, ICT-Lab Learning, Lecture Method, Seminar, team teaching, tutoring, peer group discussion, mobile teaching, self-learning, Collaborative learning, Cooperative learning.

Practical/ Assignment/ Activities:

Each student is required to submit Practical/Project report/Assignments selecting any one of the following:

1. Prepare Project Report on Role of Technology for Women Empowerment.
2. Overview of different Plagiarism detection tools and suggestive measures.
3. Prepare a Power Point Presentation of any content of your course and Presentation including Viva Voice.

* It will be evaluated by External and Internal Examiners.

References Books:

- ✓ *Creating learning materials for open and distance learning: A Handbook for Authors and Instructional Designers (2005). Commonwealth of Learning. Vancouver: Canada*
- ✓ *Excel 2020 in easy steps-Michael Price – TMH publications*
- ✓ *Foundations of Self-Learning Materials. http://wikieducator.org/Session_3.*
- ✓ *Garrison, D.R. and Anderson, T. (2003). e-learning in the 21st century: a framework for research and practice. London: Routledge.*
- ✓ *Haas, K.B. and Packer, H.Q. (1990): Preparation and use of audio-visual aids, 3rd Edition, Prentice Hall, Inc.*
- ✓ *Jayaram, K and Dorababu, K.K. (2015). Self-learning materials in distance education system. International Journal of Current Research. Vol. 7, Issue, 10, pp.21929-21934.*
- ✓ *Minnick, D.R. (1989). A guide to creating Self Learning Materials. International Rice Research Institute Los Baños, Laguna, Philippines.*
- ✓ *MS Office 2007 in a Nutshell –Sanjay Saxena – Vikas Publishing House.*
- ✓ *Murthy, CRK and Santosh Panda (2002). Report of the workshop on strategies for revision of self-learning materials, IGNOU, New Delhi. (Unpublished).*
- ✓ *Oreyet.al. (2009). Educational media and technology. New York: Springer Science Business Media.*
- ✓ *Rana, S. (1994): Open Learning in India, Commonwealth Publishers, New Delhi.*
- ✓ *Roblyer, M.D. (2008). Integrating educational technology into teaching. New Delhi: Pearson.*
- ✓ *Rowntree, Derek (1986). Teaching through self-instruction, Kogan Page, London/Nichola Pub. Comp. New York.*
- ✓ *Senapaty, H.K. (2009). ICT integrated learning materials on basic school subjects from constructivist perspectives. Bhubaneswar: Regional Institute of Education, NCERT.*
- ✓ *UNESCO (2005). How ICT can create new, open learning environments: Information and communication technologies in schools: A handbook for teachers. Paris: UNESCO.*
- ✓ *UNESCO (2008). Capacity building for ICT integration in education. Retrieved from <http://portal.unesco>.*
- ✓ *UNESCO (2008). ICT Competency standards for teachers: Policy Framework. Retrieved from <http://portal.unesco>.*
- ✓ *Working in Microsoft Office – Ron Mansfield - TMH.*

Computer Science

Advanced Python Programming

1. Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese".
2. Write a python program to demonstrate various kinds of inheritance.
3. Write a python program to catch following exception i) Value Error ii) Index Error iii) Name Error iv) Type Error v) Divide Zero Error
4. a) Create a numpy array from list, tuple with float type
b) Python program to demonstrate slicing, integer and boolean array indexing
5. a) Write a python program to find min, max, sum, cumulative sum of array.
b) Write a python program to demonstrate use of ndim, shape, size, dtype.
6. a) Write a python program to implement Pandas Series with labels.
b) Create a Pandas Series from a dictionary.
c) Creating a Pandas Data Frame.
d) Write a program which make use of following Pandas methods
i) describe() ii) head() iii) tail()
7. a) Write a program that converts Pandas Data Frame and Series into numpy.array.
b) Write a program that demonstrates the column selection, column addition, and column deletion.
c) Write a program that demonstrates the row selection, row addition, and row deletion.
d) Get n-largest and n-smallest values from a particular column in Pandas data Frame
8. a) Write a program which use pandas' inbuilt visualization to plot following graphs:
i. Histograms ii. Line plots iii. Scatter plots iv. Bar plots
b) Write a program to demonstrate use of group by() method.
9. a) Write a program to demonstrate pandas Merging, Joining and Concatenating
b) Creating data frames from csv and excel files.
10. Write a Python program using pandas that finds Missing Data and replace missing data.

Principles of Management

Course Objectives:

- To understand the basic principles of management
- To provide an insight into different management functions and strategies

Learning Outcomes:

Upon completion of this course, students will be able to:

LO 1: understand the evolution management and various school of thoughts

LO 2: learn different management functions and decision-making process

LO 3: know about different leadership styles and importance of co-ordination

LO 4: learn about the need for strategic management

Unit I:

Nature of Management: Meaning, Definition, its nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration- Organization. Evolution of Management Thought: Contribution of F.W. Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Various approaches to management (i.e. Schools of management thought) Indian Management Thought.

Unit II:

Functions of Management (Part-I) Planning - Meaning - Need & Importance, types levels– advantages & limitations, Forecasting - Need & Techniques, Decision making - Types - Process of rational decision making & techniques of decision making. Organizing - Elements of organizing & processes: Types of organizations, Delegation of authority - Need, difficulties in delegation – Decentralization.

Unit III:

Functions of Management (Part-II) Staffing - Meaning & Importance, Direction - Nature – Principles, Communication - Types & Importance, Motivation - Importance – theories, Leadership - Meaning - styles, qualities & functions of leaders. Controlling- Need, Nature, importance, Process & Techniques, Coordination - Need, Importance.

Unit IV:

Strategic Management Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India.

Text Books:

- ✓ Essential of Management by Horold Koontz & Itainz Weibrich, McGraw-Hills International.
- ✓ Essential of Business Administration by K. Aswathapa, Himalaya Publishing House.

Reference Books:

- ✓ *Principles & Practice of Management* by L.M. Prasad, Sultan Chand & Sons pub.
- ✓ *Principles of Management* by Tripathi & Reddy, Tata McGraw Hill

BCA

Electronic

Physics

Renewable Energy and Energy Harvesting

Theory

CO-1: Basic understanding of alternative sources of energy.

CO-2: Conceptual understanding and importance of solar cell , characterization

CO-3: Understating the energy harvesting and its applications using wind and piezoelectric material

CO-4: Understating the electromagnetic energy harvesting and its applications

Unit I

Fossil fuels and Alternate Sources of energy:

Fossil fuels and Nuclear Energy, their limitation, need of renewable energy, non-conventional energy sources. An overview of developments in Offshore Wind Energy, Tidal Energy, Wave energy systems, Ocean Thermal Energy Conversion, solar energy, biomass, biochemical conversion, biogas generation, geothermal energy tidal energy, Hydroelectricity.

Unit II

Solar energy:

Solar energy, its importance, storage of solar energy, solar pond, non-convective solar pond, applications of solar pond and solar energy, solar water heater, flat plate collector, solar distillation, solar cooker, solar green houses, solar cell, absorption air conditioning. Need and characteristics of photovoltaic (PV) systems, PV models and equivalent circuits, and sun tracking systems.

Unit III

Wind Energy harvesting:

Fundamentals of Wind energy, Wind Turbines and different electrical machines in wind turbines, Power electronic interfaces, and grid interconnection topologies.

Piezoelectric Energy harvesting: Introduction, Physics and characteristics of piezoelectric effect, materials and mathematical description of piezoelectricity, Piezoelectric parameters and modeling piezoelectric generators, Piezoelectric energy harvesting applications, Human power.

Unit IV

Electromagnetic Energy Harvesting:

Linear generators, physics mathematical models, recent applications 42 Carbon captured technologies, cell, batteries, power consumption Environmental issues and Renewable sources of energy, sustainability.

Reference Books:

- ✓ *Non-conventional energy sources - G.D Rai - Khanna Publishers, New Delhi*
- ✓ *Solar energy - M P Agarwal - S Chand and Co. Ltd.*
- ✓ *Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.*
- ✓ *Godfrey Boyle, "Renewable Energy, Power for a sustainable future", 2004, OxfordUniversity Press, in association with The Open University.*
- ✓ *Dr. P Jayakumar, Solar Energy: Resource Assesment Handbook, 2009*
- ✓ *J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).*
- ✓ http://en.wikipedia.org/wiki/Renewable_energy

Applied Optics and Photonics

CO-1: Basic understanding of different sources and detectors, principles.

CO-2: Conceptual understanding of frequency filtering and its application.

CO-3: Basic concept of holography, and its application in microscopy and interferometry.

CO-4: Basic knowledge in Optical fiber, and its principle and application in sensors.

CO-5: Apply the acquired knowledge in Experiments

Theory:

Unit I

Sources and Detectors

Lasers, Spontaneous and stimulated emissions, Theory of laser action, Einstein's coefficients, light amplification, Characterization of laser beam, He-Ne laser, Semiconductor Lasers.

Fourier Optics and Electron Microscopy

Unit II

Concept of spatial Frequency Filtering, Fourier Transforming property of a thin lens.

Electron Microscope, Working Principle, Types of electron microscope: TEM, SEM(BASICS), Applications of electron microscope, Advantages and limitations of electron microscope

Unit III

Holography

Basic principle and theory: coherence, resolution, Types of holograms, white light reflection hologram, application of holography in microscopy, interferometry.

Unit IV

Photonics: Fiber Optics

Optical fibers and their properties, Principal of light propagation through a fiber, The numerical aperture, Attenuation in optical fiber and attenuation limit, Single mode and multimode fibers, Fiber optic sensors.

1. Experiment on Lasers:

To find the width of the wire or width of the slit using diffraction pattern obtained by a He-Ne or solid-state laser.

2. Experiments on Semiconductor Sources and Detectors

- a. V-I characteristics of LED
- b. Photovoltaic Cell

3. Experiments on Holography and interferometry.

- a. Constructing a Michelson interferometer or a Fabry Perot interferometer.
- b. Constructing a Mach-Zender interferometer.

4. Experiments on Photonics: Fiber Optics

- a. To measure the numerical aperture of an optical fiber.
- b. To study the variation of the bending loss in a multimode fiber.
- c. To determine the power loss at a splice between two multimode fiber

Reference Books:

✓ *Fundamental of Optics, F.A. Jenkins &H.E. White ,1981, Tata McGraw hill.*

