

Minor/Elective

Environmental science and Basic Concepts of Ecology

(4 CREDIT)

Environmental science

1. Introduction of environmental Science: Definition, principles and scope of environmental science, structure and composition of atmosphere, hydrosphere, lithosphere and biosphere.

Natural resources: Renewable and Non-renewable resources: land resources and land use change, land degradation soil erosion and desertification.

Environmental Pollution: Types, causes, effects and controls, air, water, soil and noise pollution. Nuclear hazards and human health risks. Solid waste management-Control measures of urban and industrial waste. Pollution case studies.

Environmental Policies & Practices: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. Environmental laws- Environmental Protection Act- Air (Prevention & Control of Pollution) Act. Water (Prevention & Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

Basic Concepts of Ecology

Definition of ecology, environment and its relation to human beings.

Concept of ecosystem: Abiotic, biotic and edaphic factors. Pond, Grassland, Forest & River ecosystems. Energy flow in ecosystem. Pyramids of number, biomass and energy.

Biogeochemical cycles: Water, Carbon and Nitrogen cycles.

Population: Definition and characteristics: density, natality, mortality, migration, emigration and immigration. Dispersion and aggregation. Commensalism, mutualism, predation, competition and parasitism.

Minor/Elective

BioInstrumentation, BioInformatics and Biostatistics(4+2 Credits)

BioInstrumentation

Principles and Techniques of Microscopy, Magnification and Resolution Parameters of Light, Fluorescent Phase Contrast Scanning, Transmission Electron Microscopy, Tunneling Microscopy and Inverted Microscope, Micrometry, Colony Counting and Microtomy. Laboratory Safety Guidelines.

Centrifugation – Basic Principles of Sedimentation, Types of Centrifuges,

Ultracentrifugation, Differential and Rate Zonal Separations, Organellar Separation and Flow Cytometry.

Principle & Applications of Ph Meter, Spectroscopy UV- Vis, Mass Spectrometry (MS) and X-Ray Crystallography.

Chromatographic Techniques, Paper Chromatography, Partition Chromatography, Column Chromatography, Thin Layer Chromatography, Gas Chromatography, Ion Exchange, Affinity Chromatography and Introduction to HPLC,

Electrophoresis: Capillary, Agarose, SDS & Native PAGE, Pulse Field, Immuno-Electrophoresis and Paper Electrophoresis.

PCR & Thermal Cyclers, Nucleic Acid Hybridization: Southern & Northern Blotting, Western Blotting, Autoradiography. ELISA and RIA.

Bio Informatics

Introduction to Computers, Computer Fundamentals (Hardware & Software), Input, Output Devices and Storage Devices, Web Browsers, Search Engines, Flow Charts, Methods and Types of Networks, Intra and Internet, Introduction to MS-Office.

Introduction to Bioinformatics, Scope and Application of Bioinformatics, NCBI Data Model, DNA and Protein Sequence Database, Motif Analysis, Structural Database, Structural Viewers (Rasmol, Rastop, Cn3D, CSHF Chimera, Swiss PDB Viewer, Pymol), Sequence Submission to Database, Literature Database (Pubmed, Biomed Central, Medline), Internet and Biologist. Online Study *E. coli*, *D. melanogaster*, Human Genome, Mice Genome. DNA Chips and their Replications.

Biostatistics

Introduction to Biostatistics, Terminology and Symbols, Research and Types of Research, Applications of Statistics in Biological Research, Data, Collection and Representation of Data (Pie Chart, Bar Diagram, Histogram, Frequency Polygon and Gantt Chart), Measures of Central Tendency (Mean, Median, Mode), Variance, Coefficient of Variation, Standard Deviation, Standard Error of Mean, Analysis of Variation (ANOVA), One Way ANOVA and Two Way ANOVA. Measures of Dispersion, Distribution Patterns (Binomial, Poisson & Normal). Tests of Significance ('T' Test, 'F' Test & Chi-Square Test), Probability, Correlation and Regression Analysis, Introduction to Statistical Software and Handling (SPSS And Excel Data Sheets).

Minor Elective Course in Botany

| Subject: Botany | | | |
|--|--|-------------------------------|-------------------------------|
| Course Code: BOT104M | Course Title: Environmental Pollution | Year: I | Semester: III or IV |
| Course Outcomes: Understanding the problem of pollution of air, water and soil; Causes of pollution; acquaintance with different types pollutants and global environmental problem. | | | |
| Credits: 4 | | Course: Minor Elective | |
| Max. Marks: 100 | | Min. Passing Marks: 33 | |
| Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0 | | | |
| Unit | Topic | No. of lectures hrs (60) | |
| Unit I | 1. Environmental pollution as a global problem and general impact of pollution. 2. Pollutants and their types | 15 | |
| Unit II | 1. Air pollution and its causes; impact of air pollution. 2. Green house gases and global warming | 15 | |
| Unit III | 1. Water pollution and its causes; impact of water pollution. 2. Eutrophication, biological oxygen demand (BOD) and chemical oxygen demand (COD). | 15 | |
| Unit IV | 1. Soil pollution and its causes; impact of soil pollution. 2. Industrial pollutants affecting soil. | 15 | |

Suggested Reading:

- Environment and Pollution: An ecological approach; Author(s)- R.S. Ambasht and P.K Ambasht; CBS Publishers & Distributors, New Delhi
- Ecology and Environment: Author(s)- PD Sharma; Rastogi Publications, Meerut
- Environmental Pollution; Author-N. Manivasakam; National Book Trust, India.

Suggested Online Link: <https://ndl.iitkgp.ac.in/> ; <http://epgp.inflibnet.ac.in/> ;
<http://egyankosh.ac.in/> ; <https://epathshala.nic.in/> ;
<https://www.digitalindia.gov.in/services>

This course can be opted as a Minor Elective paper by the students of other subjects

Suggested Continuous Evaluation: 25 Marks

Minor Elective Course in Botany

| Subject: Botany | | Year: I Semester: I or II |
|--|---|---------------------------|
| Course Code: BOT104M | Course Title: Introduction to Ecosystem | |
| Course Outcomes: 1. Understanding of basic concepts of Ecology, Ecosystem and Environment; 2. Acquaintance with interrelationship between organisms and environment; 3. Understanding of structure and functions of ecosystem; 4. Acquaintance with local ecosystems. | | |
| Credits: 4 | | Course: Minor Elective |
| Max. Marks: 100 | | Min. Passing Marks: 33 |
| Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0 | | |
| Unit | Topic | No. of lectures hrs (60) |
| Unit I | 1. Basic concepts of Ecology, Ecosystem and Environment 2. Structure of ecosystem-biotic and abiotic components | 15 |
| Unit II | 1. Classification of ecosystem 2. Functions of Ecosystem-Nutrient cycling and Energy flow | 15 |
| Unit III | 1. Food chain, Food web & Ecological pyramid 2. Study of local Aquatic and Forest Ecosystem | 15 |
| Unit IV | 1. Concept of ecosystem stability and factors affecting stability; 2. Degraded Ecosystems and Methods of their Restoration | 15 |

Suggested Reading:

- A Text Book of Plant Ecology. Author(s)- R.S. Ambasthi and N.K. Ambasthi; CBS Publishers & Distributors, New Delhi
- Ecology and Environment: Author(s)- PD Sharma; Rastogi Publications, Meerut
- Ecology, Environment and Resource Conservation: Author(s)- J.S. Singh, S.P. Singh and S.R. Gupta; S. Chand and Company Pvt. Ltd., New Delhi.

Suggested Online Link: <https://ncl.iitk.ac.in/>; <http://eozp.inflibnet.ac.in/>; <http://egyankosh.ac.in/>; <https://eopathsala.nic.in/>; <https://www.digitalindia.gov.in/services>

This course can be opted as a Minor Elective paper by the students of other subjects

Suggested Continuous Evaluation: 25 Marks

Handwritten signature

Vocational/Skill Development Course

On Biofertilizers

(For B.Sc. BOTANY)



[AS PER NATIONAL EDUCATION POLICY (NEP)-2020]

FACULTY OF SCIENCE

2023

Course title: Biofertilizers

| | | |
|---|------------------------------|-----------------|
| Programme/Class: Certificate in Science | Year: First | Semester: First |
| Paper- Theory Subject: Vocational/Skill Development Course | | |
| Course Code: | Course Title: Biofertilizers | |

| | |
|--------------------|-----------------------|
| Credits : 03 | Total number of hours |
| Max. Marks 25 + 75 | 45 Hrs |

| Unit | Content | Number of Hours |
|------|---|-----------------|
| 1 | Biofertilizers: Introduction and types and importance of biofertilizers, History of biofertilizers production Classification of biofertilizers microorganisms used in biofertilizers production. | 05 |
| 2 | A study of growth characteristics of various microbes used in biofertilizers production. Nitrogen cycle in Nature. Process of nodule formation, Role of Nif and Nod gene in Biological Nitrogen fixation, Enzyme nitrogenase and its component, Biochemistry of nitrogen fixation. <i>Rhizobium</i> -isolation, identification, mass multiplication, carrier-based inoculants. | 15 |
| 3 | A study of growth characteristics of Actinorrhizal symbiosis, <i>Azospirillum</i> : Isolation and mass multiplication - carrier-based inoculant, associative effect of different microorganisms. | 15 |
| 4 | Growth characteristics of <i>Azotobacter</i> : classification, characteristics - crop response to <i>Azotobacter</i> inoculum, maintenance and mass multiplication. | 10 |



| | | |
|--|------------------------------|------------------|
| Programme/Class: Certificate in Science | Year: First | Semester: Second |
| Paper- Theory Subject: Vocational/Skill Development Course | | |
| Course Code: | Course Title: Biofertilizers | |

| | |
|--------------------|-----------------------|
| Credits : 03 | Total number of hours |
| Max. Marks 25 + 75 | 45 Hrs |

| Unit | Content | Number of Hours |
|------|---|-----------------|
| 1 | General account of Cyanobacteria (blue green algae) | 05 |
| 2 | Azolla and Anabaena azolla association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation. | 15 |
| 3 | Phosphate solubilizing microbes: Phosphate solubilizing microbes (anyone / consortia) - Isolation, characterization, mass inoculum production, field Application | 15 |
| 4 | Introduction to mycorrhiza. Mycorrhizal association, types of mycorrhizal association, Occurrence and distribution of mycorrhiza, growth on grass roots and observations for root colonization. Preparation of VA-mycorrhizal inoculum. | 10 |

Suggested readings

1. Dubey, R.C., 2005 A Textbook of Biotechnology S.Chand & Co, New Delhi.
2. Kumaresan, V. 2005, Biotechnology, Saras Publications, New Delhi.
3. Sathe, T.V., 2004, Vermiculture and Organic Farming, Daya publishers.
4. Subba Rao, N.S. 2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi.
5. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakushan, Nadiad
6. Kannaiyan, S., 2003, Biotechnology of Biofertilizers. CHIPS, Texas.
7. Rai, M. K., 2005, Hand book of Microbial Biofertilizers. The Haworth Press, Inc. New York

activities which can include short exams, in-class or online tests, home assignments, group discussions or oral presentations.

| Evaluation Method | Marks |
|--|-------|
| Mid-term exam/in-class or on-line tests/home assignments/group discussions/oral presentations. | 15 |
| Overall performance throughout the semester, Discipline, participation in different activities& Attendance | 10 |

| | | |
|---|-------------------------------------|------------------------|
| Programme/Class: Certificate in Science | Year: First | Semester: Third |
| Paper- Theory Subject: Vocational/Skill Development Course | | |
| Course Code: | Course Title: Biofertilizers | |

| | |
|---------------------------|------------------------------|
| Credits : 03 | Total number of hours |
| Max. Marks 25 + 75 | 45 Hrs |

| Unit | Content | Number of Hours |
|------|---|-----------------|
| 1 | General account about soil health, Organic farming: History of organic farming, Need of organic farming, Benefits of organic farming, Green manuring and organic fertilizer, Social and market aspect of organic farming. | 10 |
| 2 | Role of microorganisms in decomposition of organic farm wastes, Different methods of Recycling of biodegradable municipal, agricultural and industrial waste. | 10 |
| 3 | Introduction to vermiculture, Vermicomposting: Types and methods of vermicomposting and its field applications Various methods of making bio-composts. | 10 |

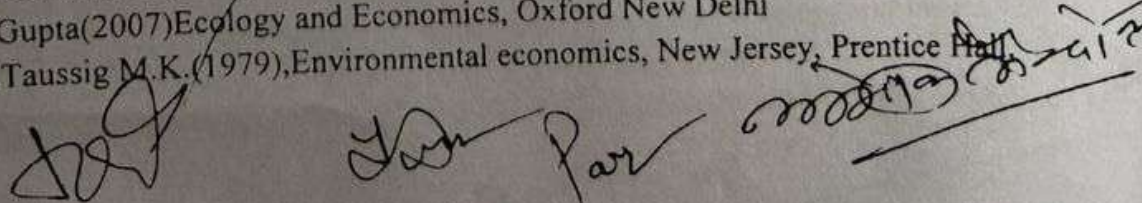
G. D. H.

Vocational/Skill Development Course in Economics Department

| Vocational Course-02 | | |
|--|---|----------------------------|
| Programme: Certificate Course in Economics | Year : First | Semester-I Paper- II VC |
| Course code: ECOVC-02 | Course Title: Environmental Economics-I | |
| Course outcome: | | |
| 1. To learn an economic approach to environmental problems. | | |
| 2. To understand complementary view of environmental economics. | | |
| 3. To develop economic tool kit to evaluate applied problems. | | |
| Credit: 3 (Three) | Elective | |
| Maximum marks: 25+75 | Minimum passing marks: 33 | |
| Total no. of lectures-tutorials-practical(labour per week):3-0-0 | | |
| Unit | Topic | No. of lectures |
| Unit 1 | Environment and Economics: <ol style="list-style-type: none"> 1. Fundamental concepts of Environmental Economics 2. Meaning, nature and scope of Environmental Economics 3. Environmental pollution- air, water and deforestation 4. Inter-linkages between Environment and Economics 5. Economics of Natural Resources- land, air and water | 15 |
| Unit 2 | Environment and Development : <ol style="list-style-type: none"> 1. Environment and Economic Growth: 2. Concepts of Sustainable Development 3. Policy Approach of Sustainable Development 4. Role of State in Environmental Conservation 5. People's participation in management of Natural Resources | 15 |
| Unit 3 | Environmental issues: <ol style="list-style-type: none"> 1. Global warming 2. Climate change 3. Green House Effect, Ozone Depletion 4. Acid Rain 5. Biodiversity Conservation , Chipko movement | 15 |

Suggested readings:

- Bhattacharya, RN(ed) Environmental Economics: An Indian perspective, Oxford New Delhi
- Boumal, W.J. and W.E. Oats, (1998). The Theory of Environmental Policy, Cambridge University Press
- Bromely, D.W. (ed) Hand Book of Environmental Economics, Blackwell, London
- P. Das Gupta and K.G. Milier, (1997) The Environmental and Emerging Development Issues
- Ram Prasad Sen Gupta (2007) Ecology and Economics, Oxford New Delhi
- Seneca, Joseph, J. Taussig M.K. (1979), Environmental economics, New Jersey, Prentice Hall



List of all Papers in Six Semesters AND Semester-wise Titles of the Papers in HINDI

| Year | Sem. | Course Code | Paper Title | Theory/ Practical | Credits |
|---|------|--|---|-------------------|---------|
| Certificate Course in ARTS-HINDI | | | | | |
| FIRST YEAR | I | | प्राचीन एवं भक्तिकालीन काव्य Major/Core | Theory | 6 |
| | | | हिन्दी भाषा व व्याकरण Minor Elective | Theory | 4 |
| | | गढ़वाली भाषा एवं संस्कृति Vocational/Skill Development Course | Theory | 3 | |
| | II | | हिन्दी कथा साहित्य Major/Core | Theory | 6 |
| | | | प्रयोजनमूलक हिन्दी /Skill Development Course | Theory | 3 |
| Diploma in ARTS-HINDI | | | | | |
| SECOND YEAR | III | | ऐतिहासिक काव्य Major/Core | Theory | 6 |
| | | | हिन्दी भाषा : स्वरूप Minor Elective | Theory | 4 |
| | | | कार्यालयी हिन्दी /Skill Development Course | Theory | 3 |
| | IV | | नाटक एवं स्मारक साहित्य Major/Core | Theory | 6 |
| | | | रचनात्मक लेखन / Skill Development Course | Theory | 3 |
| Bachelor of ARTS-HINDI | | | | | |
| THIRD YEAR | V | | द्विवेदीयुगीन एवं छायावादी काव्य Major/Core | Theory | 5 |
| | | | छायावादोत्तर हिन्दी कविता Major/Core | Theory | 5 |
| | | | हिन्दी की वैज्ञानिक एवं तकनीकी शब्दावली/Project | Project | 4 |
| | VI | | हिन्दी निबंध Major/Core | Theory | 5 |
| | | | लोकसाहित्य Major/Core | Theory | 5 |
| | | साहित्यिक विचारधाराओं का अध्ययन : भक्ति-आन्दोलन, छायावाद, प्रगतिवाद, राष्ट्रवाद, अस्तित्ववाद, नारीवाद, दलित विमर्श, आधुनिकताबोध, उत्तरआधुनिकता में से कोई एक | Project | 4 | |

31
37

Minor Chemistry course

Semester-1/2 W.E.F. Jan 2024
Paper-1 (Theory)

| | | |
|--|--|-------------------------------|
| Programme/Class: Certificate in Introductory Chemistry | Year: First | Semester: First/Second |
| Paper-1 Theory Subject: Chemistry | | |
| Course Code: | Course Title: Basics of Chemistry-I | |

Course outcomes: Upon completion of this course, the students will be able to employ critical thinking and scientific inquiry in the performance, design, interpretation and documentation of laboratory experiments, at a level suitable to succeed at an entry-level position in chemical industry or a chemistry graduate program. Students will have theoretical aspect of periodic trends of the periodic table, provide chemists with an invaluable tool to quickly predict an element's properties. Upon successful completion of this course, the students will be able to understand aliphatic, aromatic compounds functional groups in covalent compounds.

| | |
|-------------------|--------------------------|
| Credits:4 | Minor |
| Max. Marks: 25+75 | Min. Passing Marks:..... |

Total Number of Lectures = 60

| Unit | Contents | Number of Lectures |
|------|--|--------------------|
| 1 | Analytical approaches: Types of errors, precision & accuracy, absolute and relative uncertainty. Significant figures; significant figures in Arithmetics-addition, subtraction, multiplication and division. Mean and standard deviation. | 10 |
| 2 | Laboratory Apparatus: Laboratory burner; Bunsen burner, air flow regulation, obtaining warm gentle flame with the burner, hottest flame of the burner. | 5 |
| 3 | Steps in Chemical Analysis: Sampling, sample preparation, analysis, interpretation and preparation of report. | 5 |
| 4 | Use of Measuring Equipments: Pipette, burette, chemical balance, least count. | 5 |
| 5 | Thermochemistry: Energy changes in chemical reactions, Enthalpy, specific heat, heat capacity- constant volume and constant pressure, Standard enthalpy of formation and reactions | 5 |
| 6 | Atom and Molecules: Bohr's Atomic theory (only postulates), structure of an atom; nuclear particles, atomic number, mass number and Isotopes, Atomic orbitals, filling of electrons in various orbitals-Aufbau energy diagram, Pauli's Exclusion Principle, Hund's rule of maximum multiplicity . | 7 |

| | | |
|----|--|---|
| 7 | Ions, Molecules, bonding, molar mass and chemical reactions Ions, ionic bond and ionic compounds, Chemical equations, Reactions in aqueous medium- Arrhenius theory of acids and bases, Acid-Base reaction, definition of acid and base, neutralization, Oxidation Reduction reactions-oxidation number, Molecules and chemical formulae, molar mass, molar mass and Avogadro's number, Covalent compounds-bonding, VSEPR concept and geometry, Valence Bond theory, Hybridization, geometry of covalent molecules, Hydrogen bonding | 8 |
| 8 | Periodic Properties: Periodic table and periodic law, periodic classification of the elements, Periodic relationship among the elements, periodic properties-atomic size, ionization energy, electron affinity, electronegativity | 5 |
| 9 | Hydrocarbons, functional groups: Alkanes, alkenes, alkynes, aromatic hydrocarbons. Homologous series, Preparation and properties of ethene and ethyne. Functional groups in organic compounds-alcohols, ethers, aldehydes, ketones and carboxylic acids | 5 |
| 10 | Environmental chemistry: Atmospheric pollution, Ozone layer depletion, Acid rain, Greenhouse effect, smog, water pollution, soil pollution, green chemistry | 5 |

Recommended Texts:

- Nivaldo, J. and Tro, Ho Yu Au-Yeung, Introductory Chemistry, Pearson India Education, 2017, 5th edition.
- Timberlake, K. C., and Timberlake, W., Basic Chemistry, Pearson India Education, 2017, 4th edition.
- Pavia, D.L., Lampman, G. M., Kriz, G. S, and Engel, R.G., Microscale and Macroscale Techniques in the Organic Laboratory. Harcourt College Publishers, 2001. 1st edition.

Vocational/Skill Development Course in Chemistry

Semester II

Course Title: BASIC ANALYTICAL CHEMISTRY-II

| | | |
|---|---|------------------|
| Programme/Class: Certificate in Science | Year: First | Semester: Second |
| Theory Subject: Vocational/Skill Development Course | | |
| Course Code SCHE-202 | Course Title: BASIC ANALYTICAL CHEMISTRY-II | |

Course Objectives: This course is value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. This course may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge. Basic analytical techniques will be taught in this course.

Course outcomes: After completion of the course, the student shall be able to-

1. Characterize/test various organic/inorganic molecules using different analytical techniques.
2. Analyze various soil, water and food sample along with pollution parameters.
3. Learn various laboratory methods of analysis of various parameters related to environment and can work as an environmental analyst.

| | |
|---------------------------|------------------------|
| Credits: 03 | Elective |
| Max. Marks: 25 + 75 | Min. Passing Marks: 40 |
| Total Number of Hours: 45 | |

Unit- I. (10 Hrs)

Analysis of soil: Composition of soil, Concept of pH and pH measurement, Complexometric titrations, Chelation, Chelating agents, use of indicators a. Determination of pH of soil samples. b. Estimation of Calcium and Magnesium ions as Calcium carbonate by complexometric titration. c. Essential element detection in soil

Unit- II. (12 Hrs)

Analysis of water: Definition of pure water, sources responsible for contaminating water, water sampling methods, water purification methods. Important water quality parameters a. Determination of turbidity, colour, taste, pH, acidity, and alkalinity of a water sample. b. Determination of TDS, toxic metals, total hardness, dissolved oxygen (DO) BOD, COD of a water sample. Standards for drinking water as per BIS specifications.

Unit- III. (5 Hrs)

Pollution: Definition, types of pollution, pollution control measures, types of chemical pollution with examples, four major effects of chemical pollution, chemicals in e-waste and its disposal, toxic effects of chemical pollution.

Unit- IV. (10 Hrs)

Analysis of food products: Nutritional value of foods, idea about food processing and use of food preservatives. Food adulteration and its detection.

- a. Identification of adulterants coffee powder, asafoetida, chilli powder, turmeric powder, coriander powder and pulses, etc.
- b. Analysis of preservatives and colouring matter.

Handwritten signatures and initials at the bottom of the page.

- no. 1.**
1. Elementary Physics-I
 2. Numerical Methods
 3. Computer Programming
 4. Waves and Oscillations

El.1
(One
From the
list)
(04)

El.2
(One
from the
list)
(06)

CERTIFICATE COURSE IN BASIC PHYSICS

Programme: *Certificate Course in Basic Physics*

Year: 1

Semester:
I/II

Subject: Physics

Course Code:

Course Title: **Elementary Physics-I**

Vocational/Minor(Experiments/hands on training)

Min. Passing Marks: 33

Credits: 04

Max. Marks: 100

External Exam: 75

Internal Assessment: 25

Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0

| Unit | Topic | No. of Lectures |
|---------------|---|-----------------|
| Unit I | Basic Idea of Physics and it's uses in daily life, Electric charge, Conductors, Insulators and Semiconductors, Coulomb's law, Quantization and conservation of charge, Basic Idea of electric field | 15 |

Skill Enhancement Course / Vocational Course

1. Public health and Hygiene

- Unit 1:** Scope of Public health and Hygiene – nutrition and health – classification of foods – Nutritional deficiencies - Vitamin deficiencies.
- Unit 2:** Environment and Health hazards – Environmental degradation – Pollution and associated health hazards.
- Unit 3:** Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plague, Leprosy and AIDS.
- Unit 4:** Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health

2. Sericulture

- Unit 1:** Classification of commercial varieties of mulberry. Mulberry plantation establishment and cultivation practices.
- Unit 2:** Diseases of mulberry – fungal, bacterial, viral and Nematode diseases, Deficiency diseases and their remedial measures.
- Unit 3:** Silkworm rearing operations – Chawki rearing and Late age rearing techniques.
- Unit 4:** Physical and commercial characters of Cocoons. Reeling operations, Importance of by-products of Sericulture.
- Unit 5:** Economics of Sericulture – Future and progress of Sericulture Industry in India. Prospects of Sericulture as Self-Employment venture

SEMESTER I

Basics of Nutrition

30 Hrs.

- Nutrition – definition, importance, Good nutrition and mal nutrition; Balanced Diet: Basics of Meal Planning
- Carbohydrates –functions, dietary sources, effects of deficiency.
- Lipids –functions, dietary sources, effects of deficiency.
- Proteins –functions, dietary sources, effects of deficiency.
- Vitamins- functions, food sources, effects of deficiency,
- Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium and Sodium; food sources of Iron, Iodine and Zinc
- Importance of water– functions, sources, requirement and effects of deficiency.
- Spectrum of malnutrition, Micronutrient malnutrition, Prevention and control of malnutrition, IEC on food and nutrition at different levels, Importance of investment in nutrition.

SEMESTER II

Health

30 Hrs.

- Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies
- Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India-2017; Functioning of various nutrition and health organizations in India viz., NIN (National Institution of Nutrition), FNB (Food and Nutrition Board), ICMR (Indian Council of Medical Research), IDA (Indian Dietetics Association), WHO-India, UNICEF-India
- National Health Mission: National Rural Health Mission (NRHM) Framework, National Urban Health Mission (NUHM) Framework
- Women & Child Health Care Schemes: Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+); Janani Shishu Suraksha Karyakaram (JSSK); Rashtriya Bal Swasthya Karyakram(RBSK); India Newborn Action Plan (INAP); Adolescent Health- Rashtriya Kishor Swasthya Karyakram (RKSK)
- Disaster Management – Containment, Control and Prevention of Epidemics and Pandemics – Acts, Guidelines and Role of Government and Public
- Occupational Health: Risk factors for disease Diseases and occupational relevance
Drugs, Tobacco and Alcohol: Chemical agents, Effects and Side effects.

SEMESTER III

Hygiene and Diseases

30 Hrs.

- Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (WATER, Sanitation and Hygiene) programme
- Rural Community Health: Village health sanitation & Nutritional committee (Roles & Responsibilities); Accredited Social Health Activist (ASHA); Village Health Nutrition Day, Rोगी Kalyan Samitis
- Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places
- Public Awareness through Digital Media - An Introduction to Mobile Apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Mantriva Abhiyan (PM Suman Yojana), My Hospital (Mera aspataal), India fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid 19AP
- Contagious (Covid, AIDS, Hepatitis, Influenza, Measles, Malaria, Rabies) and Non-contagious / Non-communicable diseases and disorders (Cancer, Obesity, hyperglycemia/ Diabetes, Angina, osteoarthritis, osteoporosis, Alzheimer's disease, etc.).
- Concepts of Vaccines, Antibiotics, Venom-Antivenom, First-Aid, etc.

SEMESTER IV

Clinical Research & Health Legislation

30 Hrs.

- Drug development and Clinical Trials Response
 - Variables and Biomarkers, Risk identification and Informed consent
 - Clinical Trial Phases I to V
 - Planning and design of Clinical study
 - Concept of Bioavailability and Bioequivalence
 - PK/PD Modelling Clinical Research Operations Management
 - Clinical study reports and its structure
 - Guidelines for Reporting, Publication Bias, Suppression, Delays and Conflicts of Interest
 - Clinical Data Management and Biostatistics: Study Population, Sample size, Baseline, Issues in data analysis Tools and Software used in Clinical studies
 - Regulations in Clinical Research, Drug Accountability, Financial Disclosure Ethical issues, the Belmont Report, Conflict of Interest
 - Politics of Research: Women, Religion, Race, Gender, Developing Countries Current regulatory requirements and overview for New Drug Application, Abbreviated NDA,
 - Study of Sample case studies
 - Public Health laws: need and scope. Historical development
-