Prospectus

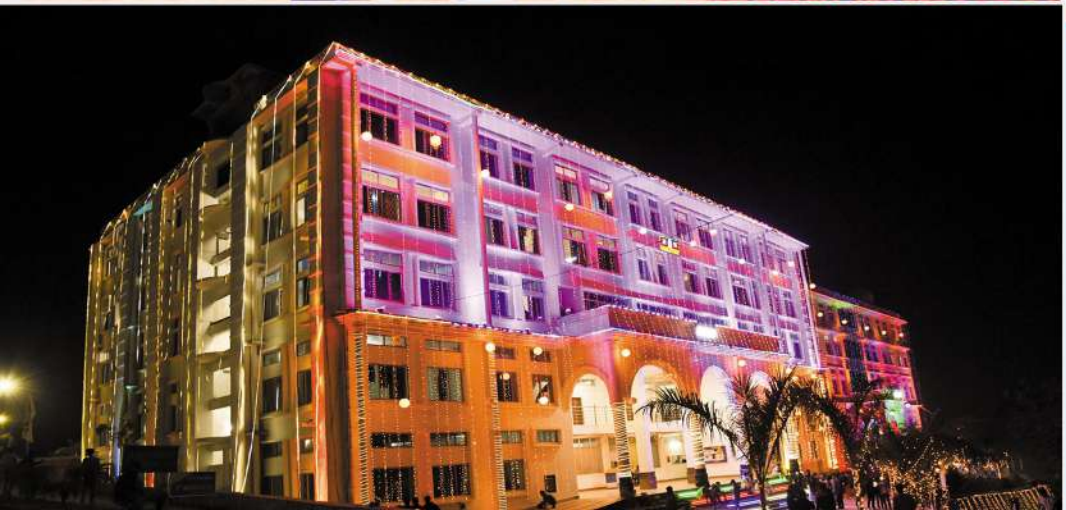
VALUE ADDED COURSES

2018-19

Unveiling Excellence

UNIVERSITY OF SCIENCE & TECHNOLOGY MEGHALAYA

- Applied Biology
- Botany
- Business
- Chemistry
- Commerce
- Computer Science
- Earth Science
- Economics
- Education
- English
- Library
- Mathematics
- Physics
- Political Science
- Rural Development
- Social Work
- Sociology
- Zoology



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Unveiling Excellence

University of Science & Technology, Meghalaya
Techno City, 9th Mile, Meghalaya

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Introduction

No university curriculum can adequately cover all areas of importance or relevance. It is important for higher education institutions to supplement the curriculum to make students better prepared to meet industry demands as well as develop their own interests and aptitudes. USTM offers a wide variety of value added courses which are conducted after class hours or during the semester breaks. These courses are conducted by the various professionals and industry experts in addition to the faculty experts there by helping the students by adding further value to their resume.

These courses will equip our students in current trends and technologies and will also reduce the gap between academic and industry.

Objective

The Value Added Courses aim to provide additional learner centric graded skill oriented training primarily to improve the employability skills of the students. The university provides range of value added courses with the following objectives

1. To provide students an understanding of the expectations of industry.
2. To improve employability skills of students along with the global demand.
3. To bridge the skill gaps and make students industry ready.
4. To provide an opportunity to students to develop inter-disciplinary skills.
5. To update the knowledge of the students with the emerging trends of technology and their applications.

VALUE ADDED COURSE TO BE OFFERED DURING THE ACADEMIC SESSION: 2018-19

SL. NO.	NAME OF THE COURSE	COURSE CODE	DEPARTMENT
1	AGRI-BIOTECHNOLOGY& FARM MANAGEMENT	VAC-1401	APPLIED BIOLOGY
2	ADVANCED CALLUS CULTURE AND MICRO-PROPAGATION TECHNIQUES	VAC-1402	
3	BIOMARKER IN HEALTH CARE	VAC-1403	
4	INDUSTRIAL ENZYMOLOGY AND APPLICATION	VAC-1501	
5	FOOD CHEMISTRY AND QUALITY ASSURANCE	VAC-1502	
6	GLOBAL FOOD SAFETY	VAC-1503	
7	APPLIED INDUSTRIAL MICROBIOLOGY	VAC-1601	
8	RECENT TRENDS IN CLINICAL MICROBIOLOGY AND BIOCHEMISTRY	VAC-1602	
9	INDIGENOUS DAIRY PRODUCTS	VAC-1603	
10	QUALITY CONTROL IN HERBAL DRUGS	VAC-1701	
11	NUTRITION AND IMMUNITY	VAC-1702	
12	NUTRITION IN EMERGENCIES	VAC-1801	
13	NUTRITION AND PHYSICAL FITNESS	VAC-1802	
14	POST-HARVEST TECHNOLOGY OF FRUITS & VEGETABLES	VAC-1803	
15	PLANT RESOURCE UTILISATION AND CONSERVATION	VAC-1404	BOTANY
16	MUSHROOM CULTIVATION	VAC-1405	
17	HORTICULTURAL NURSERY MANAGEMENT	VAC-1604	
18	ORNAMENTAL HORTICULTURE	VAC-1705	
19	HYDROPHONICS(SOILLESS PLANTATION)	VAC-1706	
20	PHYSICO-CHEMICAL AND BIOLOGICAL CHARECTERISTICS OF WATER	VAC-1704	
21	BIOFERTILIZER PRODUCTION	VAC-1703	
22	CONSERVATION AND UTILISATION OF MEDICINAL HERBS	VAC-1804	
23	INSURANCE SERVICES	VAC-1406	BUSINESS ADMINISTRATION
24	SUPPLY CHAIN MANAGEMNT	VAC-1504	
25	TECHNICAL SUPPORT EXECUTIVE -NON VOICE	VAC-1605	
26	DIGITAL MARKETING	VAC-1805	
27	START UP, INNOVATION, INCUBATION AND ENTREPRENEURSHIP	VAC-1806	
28	EVENT MANAGEMENT	VAC-1807	
29	LABORATORY OPERATIONS TECHNIQUES-CHEMICAL AND GLASSWARE SAFETY	VAC-1407	CHEMISTRY

30	INDUSTRIAL CHEMISTRY AND ITS APPLICATIONS	VAC-1505	
31	NANOTECHNOLOGY AND ITS APPLICATIONS	VAC-1506	
32	RECENT DEVELOPMENT IN DRUG INDUSTRY	VAC-1507	
33	SYMMETRY ELEMENTS THROUGH MODEL PREPARATION	VAC-1606	
34	AWARENESS IN PLASTIC TECHNOLOGY	VAC-1707	
35	FUNDAMENTALS OF GREEN CHEMISTRY	VAC-1708	
36	RECENT TRENDS IN POLYMER TECHNOLOGY WITH SPECIAL EMPHASIS ON FABRICATION, MOLDING AND PROCESSING OF PLASTICS	VAC-1808	
37	POLLUTION CONTROL AND MANAGEMENT	VAC-1809	
38	MANAGEMENT OF FINANCIAL SERVICES	VAC-1508	COMMERCE
39	ENTREPRENEURSHIP AND INNOVATION	VAC-1607	
40	GOODS AND SERVICES TAX: REGISTRATION, E-FILING AND COMPLIANCE	VAC-1709	
41	E-FILING: INCOME TAX AND INTRODUCTION TO GST	VAC-1710	
42	RURAL MARKETING	VAC-1711	
43	BRAND MANAGEMENT	VAC-1811	
44	COMPUTER NETWORKING AND INTERFACING	VAC-1408	COMPUTER SC. & ELECTRONICS
45	ADVANCED INDUSTRIAL COURSE ON ANDROID DEVELOPMENT	VAC-1509	
46	ADVANCED WEB PROGRAMMING	VAC-1712	
47	DATA ANALYTICS AND MACHINE LEARNING	VAC-1714	
48	IMPLEMENTATION OF DIGITAL VLSI DESIGN USING TANNER EDA TOOL	VAC-1812	
49	APPLICATIONS OF GIS IN FOREST RESOURCE MANAGEMENT	VAC-1409	EARTH SC.
50	CLIMATE CHANGE: SCIENCE AND IMPACT	VAC-1510	
51	REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM	VAC-1608	
52	HAZARD MANAGEMENT AND DISASTER PREPAREDNESS IN EMERGENCIES	VAC-1609	
53	DATA ANALYSIS USING STATISTICAL TOOLS	VAC-1715	
54	MANAGEMENT OF FINANCIAL SERVICES	VAC-1508	ECONOMICS
55	CONSUMER DECISIONS AND FINANCIAL LITERACY	VAC-1713	
56	RECENT DEVELOPMENT IN MONETARY POLICY IN INDIA	VAC-1813	

57	JUGULAR VEIN OF ECONOMY: BANKING AND FINANCE	VAC-1815	
58	GST: AN INCLUSIVE TAX REGIME	VAC-1816	
59	ROLE OF ART IN EDUCATION	VAC-1410	EDUCATION
60	PRE-PRIMARY TEACHERS TRAINING COURSE	VAC-1511	
61	MANAGERIAL SKILLS AND PROMOTING LEADERSHIP	VAC-1716	
62	BASICS IN COUNSELING	VAC-1817	
63	PEDAGOGICAL TECHNIQUES	VAC-1825	
64	APTITUDE SKILL TRAINING AND PERSONALITY DEVELOPMENT	VAC-1826	
65	DIGITAL PEDAGOGIES(PGCEDP)	VAC-1827	
66	ASSESSMENT OF HIGHER EDUCATION	VAC-1828	
67	BENEFITS OF YOGA	VAC-1610	
68	COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT	VAC-1411	ENGLISH
69	CREATIVE WRITING-SHORT STORY	VAC-1512	
70	THEATER AND STAGECRAFT	VAC-1513	
71	CREATIVE WRITING-POETRY	VAC-1717	
72	PUBLIC SPEAKING, ANCHORING AND NEWS READING	VAC-1818	
73	INFORMATION RETRIEVAL TECHNIQUES FROM ACADEMIC AND SCHOLARLY DATABASES	VAC-1412	LIBRARY AND INFORMATION SC.
74	ADVANCE LIBRARY SOFTWARE TRAINING	VAC-1514	
75	EFFECTIVE ACADEMIC WRITING AND PRESENTATION	VAC-1515	
76	AN ADVANCED APPROACH TO WEB DESIGNING	VAC-1611	
77	LATEX	VAC-1718	MATHEMATICS
78	MATLAB	VAC-1719	
79	MATHEMATICA	VAC-1720	
80	RECENT DEVELOPMENT IN NANOTECHNOLOGY	VAC-1612	PHYSICS
81	ADVANCED COMPUTATIONAL PHYSICS	VAC-1712	
82	ASTROPHYSICS AND ASTRONOMICAL INSTRUMENTATIONS	VAC-1819	
83	CHANGING PARADIGM OF CITIZENSHIP IN NORTH EAST INDIA	VAC-1722	POLITICAL SC.
84	WHY DO PEOPLE MIGRATE: THEORIES AND APPROACHES	VAC-1820	
85	HOW TO WRITE RESEARCH PROJECT PROPOSALS	VAC-1821	
86	RURAL TECHNOLOGY	VAC-1413	RURAL

87	FOREST AND TRIBAL LIVELIHOOD DEVELOPMENT	VAC-1516	DEVELOPMENT
88	TECHNOLOGIES IN AGRICULTURE AND ALLIED SECTOR	VAC-1613	
89	ORGANIC FARMING	VAC-1723	
90	INDIGENOUS TECHNOLOGICAL KNOWLEDGE SYSTEM	VAC-1822	
91	PROJECT PROPOSAL AND PROFESSIONAL REPORT WRITING	VAC-1517	SOCIAL WORK
92	STREET THEATRE TRAINING	VAC-1518	
93	SOCIAL ENTREPRENEURSHIP	VAC-1724	
94	LEADERSHIP AND TEAM BUILDING	VAC-1823	
95	PUBLIC HEALTH AND EMERGENCY	VAC-1824	
96	APPLICATIONS OF SOCIOLOGY	VAC 1414	SOCIOLOGY
97	SOCIAL POLICY AND DEVELOPMENT ADMINISTRATION	VAC-1415	
98	SOFT SKILLS AND PERSONALITY DEVELOPMENT	VAC 1519	
99	INTRODUCTION TO PROFESSIONAL COUNSELLING	VAC 1614	
100	USING STATISTICAL SOFTWARE IN RESEARCH	VAC-1725	
101	DIVERSITY MANAGEMENT	VAC-1726	
102	FIELD SURVEY ON HERPETAFAUNA	VAC-1416	ZOOLOGY
103	WILDLIFE RESEARCH TECHNIQUES	VAC-1520	
104	WILDLIFE CONSERVATION	VAC-1615	
105	RECENT DEVELOPMENT IN PISCICULTURE FOR ENTREPRENEUR DEVELOPMENT	VAC-1825	

Department of Applied Biology

I. Agri-Biotechnology & Farm Management **Course code: VAC: 1401**
Duration: 36hrs **Total Marks: 50**

Background:

Biotechnology provides a great potential for a new technological revolution in industrial and agricultural sectors. Biotechnology in rural areas means integrated use of biochemistry, microbiology and engineering sciences to achieve technological application of the capabilities of microorganisms and cultured tissues/cells for rural development. An integrated knowledge of this field is afoot to bring a potential development in the rural population in which an inter relationship is needed as an essential support between rural people and biotechnologists/industrialists/extension agencies.

Human civilization is basically an agrarian one. Neglecting agriculture and endogenous knowledge has visibly started to affect our ecosystem, environment, economy, and civilization. Rural development is inevitably connected to several key endeavors having global impacts like food security, protection of environment, and conservation of natural resource base including local landraces, germplasm, and biodiversity. Successful application of rurally relevant biotechnology will be a necessity in transforming agriculture besides enhancing and protecting rural livelihoods as well as rural integrity.

Training Curriculum: The course structure consists of theoretical approach as well as visit to sites/centres where activities related to the application of biotechnological concept/tools/ techniques are carried out to give an exposure to the students to acquaint them related to the course.

Course Outcomes:

CO1. To understand the basic concept of composting technology, raw materials, method and utilization of the end product.

CO2. To understand the technique methane production following the concept of methanogenesis using organic raw materials.

CO3. To get an insight into the technical aspects of rain water harvesting; designing of a rain harvesting plant utilization of harvested water

CO4. To understand the mechanism of mass cultivation of edible mushroom using organic waste and it's processing.

CO5. To understand the varieties and breeding techniques associated with ornamental fish.

Theory:

Module I: Composting Technology [6 hrs]

Historical background; raw materials and methods; factors influencing the process.

Vermiculture Technologies: different types of waste suitable for vermicomposting; raw materials, species used and methods. Utilization of vermicompost for crop production.

Visit to vermicompost industries with field demonstration.

Module II: Biogas Technology [6 hrs]

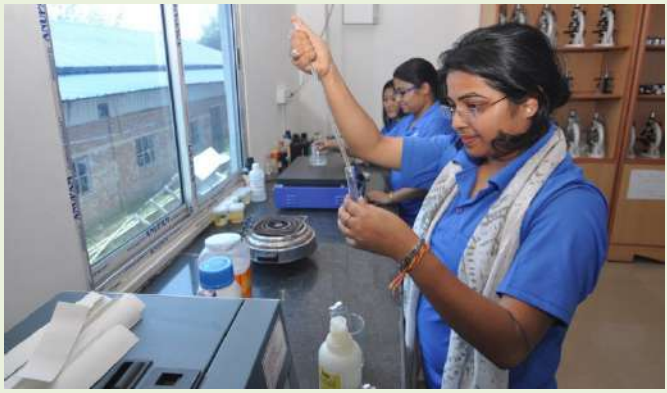
Historical background; microbes involved; wastes used in methanogenesis, factors influencing methane production and stages of methane generation.

Visit to biogas production units with field demonstration.

Module III: Rain Water Harvesting [6 hrs]

Concept and technical aspects. Design of a rain harvesting plant; harvesting rain water for drinking and other purposes.

Module IV: Mushroom Technology **[6 hrs]**
Mushroom farming and prospects; Bioconversion of organic wastes into protein using mushroom technology; post-harvest technology.
Visit to mushroom farms with field demonstration.



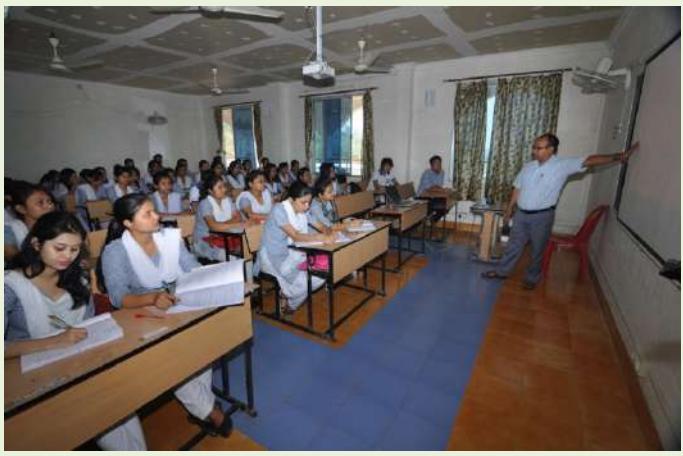
Module V: Ornamental Fish Culture **[6 hrs]**
Present status and importance; Popular varieties; artificial and live feeds; breeding techniques of egg layers.
Visit to ornamental fish farms with field demonstration.

Module VI: Apiculture Technology **[6 hrs]**
Types of honey bee; Importance and scopes of Bee-Keeping in rural areas. Design and structure of Apiary.
Impact of Apiculture in Socio-Economic development of Indigenous tribe of India.
Visit to Apiculture centre with field demonstration.

II. Advanced Callus Culture and Micro-propagation Techniques Course code: VAC: 1402

Duration: 38hrs **Total Marks: 50**

Background:
Micro-propagation has become an important alternative where any plant species can be cloned and a large number of genetically uniform disease-free plants can be obtained within a short period of time. The technique enables production of plants in a small laboratory space round the year, independent of season. The controlled physico-chemical culture environment ensures uniform growth and optimum field performance of the plants. The technique has been widely applied for large-scale production of quality plants including fruit plants, ornamentals, plantation crops, tree species, spices and condiments. The demand for tissue culture derived plants has been growing exponentially across the globe. A large number of tissue culture based industries have been engaged in commercial production of selected plant species in India and abroad. There is a huge demand for trained manpower in this sector. The course being offered will train manpower suited to the needs of the industry so that the trained personnel become employable. In addition, the course will also provide advanced training to become an entrepreneur in the said area.



Training Curriculum: The course structure consists of both theoretical and hands on training on plant tissue culture approaches in obtaining industrial products and use of plant tissue culture in industries concerned with detergents, leather etc.

Course Outcomes:
CO1. To have the basic concept of plant tissue culture and the technical requirement for establishingacademic/commercial tissue culture laboratory.
CO2. To understand the concept of plant tissue culture medium; its composition, type and importance. Growth regulators and their role in nutrient media.
CO3. To understand the application and role of growth regulators in tissue culture.

CO4. To understand the techniques of micro-propagation using meristem and nucellus culture for the production of improved varieties.
CO5. To understand the different stages of micro-propagation using the concept of organogenesis and Somatic embryogenesis.

Theory:

Module I: Basics of Plant Tissue Culture **[6 hrs]**
History. Scope. Advantages. Applications. Limitations.
Guidelines for establishing academic and commercial laboratory.

Module II: Techniques in Callus Culture **[8 hrs]**
Steps involved in Callus Culture, nutrient medium composition, Plant growth regulators and their role in nutrient media.
Types of organ cultures and their applications

Module III: Micro propagation **[8 hrs]**
Meristem culture for the production of virus free plants.
Nucellus culture for clonal propagation and large scale multiplication.

Module IV: Stages and strategies for low cost micro-propagation **[8 hrs]**
Stages of micro propagation via axillary shoot proliferation in Monocots and Dicots.
Stages in micro propagation via direct and indirect organogenesis.
Stages in micro propagation via direct and indirect somatic embryogenesis.

Practical **[8 hrs]**
1. Preparation of stock solutions and nutrient media.
2. Surface sterilization of Explants.
3. Monocot and Dicot Seed cultures for the establishment of organ cultures.
4. Embryo / Endosperm/ Ovules and anther Cultures.
5. Preparation of mother plants for collection of explants. Establishment of cultures for the induction of embryogenic callus.

III. Biomarker in Health Care

Course code: VAC: 1403
Duration: 35hrs
Total Marks: 50

Background:

'Biomarker' is a word formed from a conjunction of two words biological and marker. Any organic molecule found in blood, other body fluids, or tissues that are a sign of a normal or abnormal process or of a condition or disease can be considered as a biomarker. So biomarker marks a trait or diseased condition or a specific response to medication. Examples of biomarkers include high blood pressure, specific anatomical structures, and physiological measures. Biomarkers are being used in basic and clinical research and clinical practices more often since specific and well-characterized biomarkers contribute to precisely predict relevant clinical outcomes across a variety of treatments and populations. They are aggressively being used in tumor research where cell type-specific markers, tissue-specific markers, tumor type-specific markers, markers of malignancy, and prognostic or predictive markers of cancers are used.

Department of Applied Biology proposes a Value added Course on "Biomarker in Health care" to provide an insight into the current knowledge, future potential use and development of biomarkers as both prognostic and diagnostic tools in health care.

Training Curriculum: The course structure consists of both theoretical and hands on training on enzymatic approaches in obtaining industrial products and use of enzymes in industries concerned with detergents, leather etc.

Course Outcomes:

CO1. To have the basic idea about biomarkers and their application in molecular level studies.
CO2. To understand the different types of biomarkers and their structural features.
CO3. To understand the application of biomarkers in the fields like agriculture, clinical and forensic science.
CO4. To understand the applications of biomarkers in the phylogenic study of cellular organism.

Theory:

Module I: Basics of Biomarkers **[8 hrs]**
Introduction of Biomarkers
Discovery and validation of Biomarkers
Process and methods of Biomarkers

Module II: Classification of Biomarkers **[8 hrs]**
Types and Chemical structures of Biomarkers
PCR based Biomarkers
Non PCR based Biomarkers

Module III: Applications of Biomarkers **[6 hrs]**
Application in Agriculture
Application in Clinical research
Application in Forensic Science

Module IV: Advances in Biomarker **[6 hrs]**
Organism Physiology and Phylogeny
Analytical Techniques used to Study Biomarkers
Paleoreconstruction using Biomarkers

Practical: **[6 hrs]**
1. Techniques of Polymerase Chain Reaction
2. PCR based Markers techniques
3. Non PCR based Biomarker techniques

IV. Industrial Enzymology and Application

Course code: VAC: 1501
Duration: 37hrs
Total Marks: 50

Background:
Enzyme is one of the main mediators in industrial production process involving microbes. The enzymology principle including fundamental properties of enzymes, enzyme catalytic mechanisms and enzyme kinetics. In industrial sector these concepts are applied in obtaining valued products using microbes or their products.

The value added course on "Industrial Enzymology and Application" provides the theory and knowledge relevant to the techniques employed in enzymes purification and characterization. Students will be acquainted to the applications of enzyme technology in food, medical and household industries to make them aware of the current and possible future applications of enzyme technologies. This course also emphasizes on the development of attitude and capability of the students to work in a group and gather information on the related field for lifelong learning.

Partner Institute: CSIR Institute of Integrative Medicine, Jammu.

Training Curriculum: The course structure consists of both theoretical and hands on training on enzymatic approaches in obtaining industrial products and use of enzymes in industries concerned with detergents, leather etc.

Course Outcomes:

CO1. To understand the basic concept of enzymes, their types and specificity.
CO2. To understand enzyme structure and associated components like coenzymes and cofactors.
CO3. To get an insight into enzyme catalysed reactions and their regulation mechanism.
CO4. To have the concept on industrial application of enzymes and the different products of enzyme mediated processes.
CO5. To understand the mechanism of enzyme immobilization and modification/improvement of enzyme activity through enzyme engineering.

Theory:

Module-I: Basic Concept of Enzyme **[4 hrs]**

1. Definition, nomenclature and classification of Enzymes.
2. Concept of coenzymes and cofactors.

Module-II: Enzyme Catalysis-Regulation and Inhibition **[8 hrs]**

1. Enzyme substrate reaction; Michealis-Menten Equation, estimation of Km and Vmax value;
2. Regulation of Enzyme activity; Kinetics of Enzyme Inhibition.

Module-III: Applied Enzymology (Industrial uses of Enzymes) **[8 hrs]**

1. Industrial Enzymes- Proteolytic enzymes in meat and leather industry; Enzymes in fermentation processes. Clinical enzymes; Enzyme immobilization and Enzyme Engineering.
2. World Leather Industry at Crossroads: Can Biotechnology/Enzyme Technology Help?

Practical:

1) To learn the process of bacterial cellulose production (Demonstration).
2) To learn the application of enzymes in Leather Technology (Demonstration).
3) To learn bio-fuel production from yeast.
4) To study the production and optimization of enzymes.

V. Food Chemistry and Quality Assurance

Course code: VAC: 1502
Duration: 37hrs
Total Marks: 50

Background:
Food analysis is the discipline dealing with the development, application and study of analytical procedures for characterizing the properties of foods and their constituents. These analytical procedures are used to provide information about a wide variety of different characteristics of foods, including their composition, structure, physicochemical properties and sensory attributes. This information is critical to our rational understanding of the factors that determine the properties of foods, as well as to our ability to economically produce foods that are consistently safe, nutritious and desirable and for consumers to make informed choices about their diet. The objective of this course is to review the basic principles of the analytical procedures commonly used to analyze foods and to discuss their application to specific food components, e.g. lipids, proteins, water, carbohydrates and minerals.

Training Curriculum: The course structure consists of both theoretical and hands on analytical methods in food processing.

Course Outcomes:
CO1. To understand the different techniques related to food analysis.
CO2. To understand physical parameters of different food.
CO3. To get an insight into the chemical parameters of different food.
CO4. To have the concept on chromatographic approach in food.
CO5. To understand the mechanism of sensory evaluation in food.

Theory:
Module I: Food Analysis **[4hrs]**
Food analysis: significance. Sampling: techniques, preparation, preservation.
Module II: Food Properties **[6 hrs]**
Physical properties and analysis of foods and food products: appearance, texture, specific gravity.
Module III: Chemical Analysis **[8 hrs]**
Chemical analysis: significance. Proximate analysis: moisture, ash, proteins, lipids, carbohydrates, fiber, NFE, acidity, pH, sugars, mineral elements, vitamins – significance, methods.
Module IV: Analytical Instrumentation **[6 hrs]**
Chromatography: paper, thin layer. Spectroscopy: atomic emission, atomic absorption.
Module V: Quality Analysis **[5 hrs]**
Sensory evaluation of foods: attributes, difference and preference tests, consumer acceptance.

Practical **[8 hrs]**

1. Lab safety requirements. Preparation and standardization of laboratory solutions.
2. Sampling. Determination of specific gravity, refractive index, moisture, ash, crude protein, crude fat, NFE, pH and acidity.
3. Estimation of vitamin C. Paper and thin layer chromatography. Sensory evaluation of foods.

VI. Global Food Safety

Course code: VAC: 1503
Duration: 32hrs
Total Marks: 50

Background:

Food safety is used as a scientific discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness. The occurrence of two or more cases of a similar illnesses resulting from the ingestion of a common food is known as a food-borne disease outbreak. This includes a number of routines that should be followed to avoid potential health hazards. In this way food safety often overlaps with food defence to prevent harm to consumers. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer. In considering industry to market practices, food safety considerations include the origins of food including the practices relating to food labelling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods. In considering market to consumer practices, the usual thought is that food ought to be safe in the market and the concern is safe delivery and preparation of the food for the consumer.

Training Curriculum: The course structure consists of both theoretical and practical knowledge of food and its nutritional aspects in global prospects.

Course Outcomes:

CO1. To enable the students to know the global nutritional problems and intervention programs.
CO2. To gain an understanding of the nature and scope of the chief nutritional problems in low-income countries.
CO3. To gain an understanding of the principal environmental, cultural, socioeconomic, and political factors related the distribution and severity of global nutritional problems.
CO4. To gain an understanding of the chief public-health approaches for prevention, surveillance, and relief of the global nutritional problems.

Theory:

Module I: Food Consumption and Patterns **[8 hrs]**
Food consumption pattern of developed and developing countries.

Module II: Global Nutritional Scenario **[12 hrs]**
An overview of world nutrition situation and assessment of problems of developing countries in light of prevalence, etiology, Indicators and preventive measures.

Module III: Health and Food Safety **[12 hrs]**
Nutrition and health programmes to alleviate malnutrition; role of national and international organizations.

VII. Applied Industrial Microbiology

Course code: VAC: 1601
Duration: 38hrs
Total Marks: 50

Background:
Industrial Microbiology encompasses the use of microorganisms in industrial sector for the production of valued products including food, solvents, beverages, enzymes and pharmaceutical products. The microbes used industrially may be a natural isolate, laboratory selected mutant or even genetically engineered one. Fermentation is the basis of using microbes in the industrial production process which is an age old concept. This process is now extensively utilized for obtaining important products to meet the need of recent time.
Department of Applied Biology proposes a value added course on "Applied Industrial Microbiology" to enhance knowledge on the industrial use of microbes for the production of valued products. The practical process can enhance the idea of studying and handling such microbes as well as the production process using laboratory scale fermenter.

Training Curriculum: The course structure consists of both theoretical and hands on training related to the industrial use of microbes and production process for different valued products.

Course Outcomes:
CO1. To have the concept on industrially important microorganisms and their characteristic features.
CO2. To understand the laboratory techniques for the isolation, screening, preservation and improvement of industrially important microorganisms. .
CO3. To get an insight into the concept, types functioning of industrial bioreactors.
CO4. To understand the mechanism of fermentation process and its regulation in the industrial sector. It also gives an insight into the various requirements of the process.
CO5. To have an idea of various fermentation products produced industrially and their beneficial aspects.

Theory:
Module I: Industrial Microbiology **[8 hrs]**
Historical perspective; Characters of industrially important micro-organisms; Isolation, preservation, improvement and screening methods of industrially important microorganisms.
Module II: Basic Concept of Fermentation **[10 hrs]**
Components of a typical bio-reactor; Types of bioreactors; Basic functions of a fermenter for microbial culture.
Types of fermentation processes; Measurement and control of fermentation parameters.
Media for industrial fermentations: Typical media and medium formulation. Raw materials and highest-yielding strain in fermentation.
Module III: Production Process **[8 hrs]**
Industrial products and process: food and beverages, microbial enzymes, fuels and industrial chemicals and pharmaceuticals.
Recovery and purification of end products.

Practical: **[12 hrs]**
1. To isolate and characterize industrially important microbes.
2. To study the basic design of laboratory scale/industrial fermenter.
3. To prepare industrial products like alcoholic beverage, enzyme and antibiotics using fermentation process.

VIII. Recent Trends in Clinical Microbiology and Biochemistry

Course code: VAC: 1602
Duration: 38hrs
Total Marks: 50

Background:
The course concerns microbiological aspects of human infection by pathogens like bacteria, fungi, protozoa and virus. Common topics of interest include nature of the etiologic agents, their interaction with the host and diagnosis and epidemiology of the infectious diseases. It correlates the biochemical approaches in the characterization and identification of the causative agents.

The value added course on "Recent Trends in Clinical Microbiology and Biochemistry" deals with the study on clinical aspect of microbiology that helps in generating skilled persons for diagnostic laboratories. The dearth of proper and expert pathology and microbiology technicians within the arena of Medical Services coupled with the knowledge on clinical biochemistry. Such a course can provide excellent opportunities for the youth as well as bridge the gap in medical services which is a challenging job in the laboratories and hospitals.

Partner Institute: Shankardeva Netralaya Hospital, Guwahati and IIT-Guwahati
Training Curriculum: The course structure consists of both theoretical and hands on training related to the Clinical testings and Isolation of various disease related microbes.

Course Outcomes:
CO1. To know about the superficial and enteric microbes associated with human body and their specific interaction with the host.
CO2. To understand the causative agents, symptoms and disease cycle of bacterial, fungal and viral diseases in man.
CO3. To get an insight into the laboratory techniques related to collection and culturing of clinical samples and isolation and characterization of the pathogenic microbes from such samples.
CO4. To learn the different diagnostic techniques like ELISA, Immunofluorescence etc for the detection and identification of pathogens.
CO5. To have an idea of various antimicrobial substances and their mode of action.

Theory:
Module I: Normal microflora of the human body and host pathogen interaction [8 hrs]
Normal microflora of the human body: Microflora of skin, respiratory tract, gastrointestinal tract and urogenital tract and their importance.
Host pathogen interaction: Concept of infection, invasion, pathogenicity, virulence, toxigenicity; Opportunistic infections.

Module II: Microbial diseases in man [6 hrs]
Bacterial, fungal and viral diseases in man with special reference to causative agents, symptoms and pathogenicity.
Module III: Diagnostic Methods [8 hrs]
Collection, transport and culturing of clinical samples; Isolation and characterization of the pathogenic microbes. Principles of diagnostic tests like ELISA, Immunofluorescence and Agglutination based tests.
Module IV: Antimicrobial agents and mode of action [6 hrs]
Antibacterial agents: Types and Mechanism of action.
Antifungal agents: Types and Mechanism of action.
Antiviral agents: Types and Mechanism of action.
Practical: [10 hrs]
1. To isolate and characterize microorganism from skin, throat and urine samples.

2. To perform antibiotic sensitivity test of the isolated microbes against known antibiotic materials through the determination of Minimal Inhibitory Concentration.
3. To perform serological tests like Widal Test, VRRL Test and Slide Agglutination Test.

IX. Quality Control in Herbal Drugs

Course code: VAC: 1701
Duration: 32 hrs
Total Marks: 50

Background:

Since ancient times, mankind has used plants to cure disease and relive physical sufferings. Their understanding of herbal drugs was very innovative and critical from earliest times and usually was restricted to the medicine men of the tribe. Knowledge regarding sources and uses of different parts of medicinal plants was inherited through generations. Deep rooted traditional systems of medicine like Ayurveda, Sidha, and Unani have been in existence for several centuries that play an important role in health care of people, particularly in poorer sections for economic and other reasons.
Quality control for efficacy and safety of herbal products is of paramount importance. Quality can be defined as the status of a drug that is determined by identity, purity, content and other chemical, physical, or biological properties or by the manufacturing processes. Quality control is a term that refers to processes involved in maintaining the quality and validity of manufactured products.
Department of Applied Biology proposes a value added course on "Quality Control in Herbal Drugs" to enhance knowledge on the use of medicinal plants, extraction of active ingredients and issues related to the use of such products. The built of hands on training in developing herbal drugs from the medicinal plant of North East India and check the quality and its application in the field of Ayurveda, Unnani and Siddha. Such a course can provide excellent opportunities for the youth as well as bridge the gap in use of ayurvedic drugs and commercialized medicines.

Partner Institute: Govt. Ayurvedic College, Jalukbari, Assam
Training Curriculum: The course structure consists of both theoretical and hands on training related to the extraction and standardization of herbal drugs.

Course Outcomes:
CO1. To have the concept of herbal drugs and their sources.
CO2. To know the plant resources having medicinal properties and their utilization for commercial formulations.
CO3. To understand the concept of quality assurance in herbal drug industries and various regulatory guidelines associated with this.
CO4. To understand the mechanism of formulating new drug materials from herbal resources and their standardization.
CO5. To have an idea about the benefits of herbal formulations over the conventional/commercial medicines.

Theory:
Module I: Basic Concept of Herbal Drugs **[5 hrs]**
Herbal Drugs-Definition, Historical perspective and their uses in India.
Medicinal plants materials and dosage forms; Evaluation of commercial crude drugs intended for use.
Module II: Quality Assurance in Herbal Drug Industry **[8 hrs]**
Concept of cGMP, GAP, GMP and GLP in traditional system of medicine.
WHO Guidelines on- current good manufacturing practices (cGMP) for herbal drugs and GACP for Medicinal Plants.

EU and ICH guidelines for quality control of herbal drugs.

Module III: Experimentation in Herbal Drugs **[6 hrs]**

Methods involved in the development of new drugs. Stability testing of herbal drugs.
Application of chromatographic techniques in standardization of herbal products.
Preclinical toxicological studies; Calculation of LD50 & ED50.

Module IV: Regulatory Requirements for Herbal Drugs **[7 hrs]**

WHO guidelines on safety monitoring of herbal drugs in pharmacovigilance systems.
Herbal vs Conventional drugs; Efficacy of herbal drugs; Pharmacodynamics and Pharmacokinetic issues.
Role of chemical and biological markers in standardization of herbal products.

Practical: **[6 hrs]**

1. To study of different quality control parameters of herbal drug industries.
2. To study chromatographic techniques in herbal drug standardization
3. To prepare plant extracts using soxhlet apparatus.
4. To perform physicochemical analysis of plant extracts.

X. Nutrition and Immunity

Course code: VAC: 1702
Duration: 34 hrs
Total Marks: 50

Background:

Immunity is a complex and redundant system that requires all nutrients for proper functioning. An immune response can be broken into 3 phases: surveillance, the response, and ending the response. Nutrient needs are greater during the response because of the need for cell proliferation and mediator synthesis. Chronic inflammation is the result of not ending the response and can lead to disease. The immune system is supported by the classic essential nutrients as well as beneficial, nonessential phytochemicals.

Department of Applied Biology proposes a value added course on "Nutrition and Immunity" to enhance knowledge on the relationship of immunity with nutrition.

Training Curriculum: The course structure consists of theoretical understanding on nutrition for maintaining immunity.

Course Outcomes:

CO1. To make the students understand the importance of various nutrients in maintaining and improving the immunity of individuals.
CO2. To translate the human nutrient and energy needs into daily food selection utilizing appropriate standards and guidelines.
CO3. To explain the significance of food practices to nutrition and disease prevention.
CO4. Effectively evaluate meal plans for nutritional adequacy, nutrient density, balance, variety, and calorie control.
CO5.To evaluate and effectively communicate accurate nutrition information to target audiences.

Theory

Module I: Introduction to Immunity **[8 hrs]**

Immunity: definition and history. Classification, immunological responses, cell types involved. Mechanism of phagocytosis and antigen-antibody reactions. Regulation of immunity. Mucosal defence system- effect of nutrients.

Module II: Nutritional aspects on Immunity **[10 hrs]**

Effect of malnutrition on immunity. Carbohydrates and immune system. Fat and immune system-factors affecting acquired immunity. Protein and immune functions- effect of arginine, glutamine and sulphur amino acids. Glutathione and immune system.

Module III: Functions of Macro & Micronutrients **[8 hrs]**

Role of vitamins in immune functions-effect of deficiency. Role of minerals-effect of deficiency and excess on immune cell functions.

Module IV: Prebiotics and Antioxidant **[8 hrs]**

Probiotics and antioxidants – their effect on immune function. Immunity against infection – role of immunization.

XI. Nutrition in Emergencies

Course code: VAC: 1801

Duration: 33 hrs **Total Marks: 50**

Background:

Hunger and malnutrition are rampant among refugees and displaced populations, representing currently around 40 million people worldwide, many of whom – infants, children, adolescents, adults and older people – suffer from one or more of the multiple forms of malnutrition.

Besides wasting, deficiencies of iodine, vitamin A and iron are common in emergency-affected populations. In addition, scurvy, pellagra and beriberi frequently occur in populations entirely dependent on food aid. The levels of risk of malnutrition in emergencies depends on factors such as the degree of civil security, food availability and accessibility, access to health services, and adequacy of assistance delivery.

The course is focus on acknowledging about the nutrition related to the time of emergencies.

Training Curriculum: The course structure consists of theoretical understanding on nutrition for emergencies.

Course Outcomes:

CO1. To acquaint the students with latest advances in management of food and nutrition in emergent situations.

CO2. To develop practical skills that will enable participants to support emergency nutrition responses more effectively.

CO3. To identify the various forms of malnutrition and micronutrient deficiencies that occur during emergencies

CO4. To demonstrate how to take anthropometric measurements and to calculate nutritional indices.

CO5. Explain the links between nutrition, health, food security and livelihoods in emergencies.

Theory:

Module I: Effect of Disasters and Crisis **[9 hrs]**

Starvation in emergencies arising out of drought, floods, earth quakes, locust, war, wrong policies and poverty; historical perspectives.

Module II: Food and Nutritional needs in Emergencies **[8 hrs]**

Effect of inanition, short, medium and long term emergencies on food and nutrients intake, precautions against food shortage. Food needs at national level during normal emergencies,

Module III: Deficiency Disease in Emergencies **[8 hrs]**

Major nutritional deficiency diseases in emergencies; mobilization of local resources; general fund distribution; mass and supplementary feeding; therapeutic feeding; social funds.

Module IV: Communicable Disease and Its Control **[8 hrs]**

Control of communicable diseases; public health and hygiene problems during emergencies.

XII. Nutrition and Physical Fitness

Course code: VAC: 1802
Duration: 32hrs
Total Marks: 50

Background:

Good nutrition, physical activity, and a healthy body weight are essential parts of a person's overall health and well-being. Together, these can help decrease a person's risk of developing serious health conditions, such as high blood pressure, high cholesterol, diabetes, heart disease, stroke, and cancer. A healthful diet, regular physical activity, and achieving and maintaining a healthy weight also are paramount to managing health conditions so they do not worsen over time.

Training Curriculum: The course structure consists of theoretical understanding on nutritional importance for maintaining fitness.

Course Outcomes:

CO1. To enable the students to know the recent techniques of body composition and energy metabolism for the assessment of nutritional status.
CO2. To know how to prevent and/or reduce overweight and obesity through improved eating and physical activity behaviors. Control total calorie intake to manage body weight.
CO3. To promote health and reduce chronic disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights.
CO4. To measure physical performance in a single frame of time. Process is defined as ongoing and continuous participation in physical activity.

Theory :

Module I: Nutritional Management **[6 hrs]**

Overview of nutritional management vis-a-vis physical fitness, body composition and physical fitness.

Module II: Body composition and methods of measurement **[8 hrs]**

Methods of measuring body composition: direct and indirect. Body composition in different physiological conditions and factors affecting it.

Module III: Concept of Energy metabolism **[8 hrs]**

Energy metabolism and physical fitness: concept, importance, influencing factors.

Module IV: Techniques of Physical Assessment **[10 hrs]**

Techniques to measure energy expenditure and energy intake. Techniques to assess physical fitness. Aging theories, physiology, mechanism and role of nutrients in arresting aging process.

XIII. Indigenous Dairy Products

Course code: VAC: 1603
Duration: 37 hrs
Total Marks: 50

Background:

Traditional Indian dairy products or indigenous milk products can be defined as the milk products which are native to India. The vigorous efforts towards such accomplishment including concentration, coagulation, desiccation, fermentation and use of certain others ingredients resulted into an array of products which led to a vast arena of products and approximately 150 types of sweetmeats are available in our country.

The traditional Indian dairy products and a great taxonomy of sweets are an integral part of vast Indian heritage. Depending upon various methods of processing, it possesses great social, cultural and economic importance. It is estimated that about fifty percent of milk produced in India is converted into a variety of products such as khoa, chhana, paneer, dahi, ghee, shrikhandetc.It is having strong foothold not only in Indian market but also having a great export potential because of presence of Indian diaspora across the globe.

Training Curriculum: The course structure consists of theoretical and hands on training related to dairy and different processing and preservation techniques with quality assurance.

Course Outcome:
CO1. To develop proficiency skill in producing different Indigenous dairy products.
CO2. To gain an understanding of storage and preservation methods of Indigenous dairy products.
CO3. Operating & maintenance of the modern Equipments & machineries
CO4. Make different Indigenous dairy products with quality assurance

Theory:
Module I: Indigenous Indian Dairy Products **[4 hrs]**
Definition, Status, Scope & Challenges of Indigenous Milk Products. Pattern of milk utilization in India.
Module II: Ghee **[6 hrs]**
Definition of ghee, importance of ghee in India , Methods of manufacturing ghee , Grading of Ghee and factors influencing quality of ghee , Difference of ghee & butter oil ,Utilization of ghee and residue.
Module III: Khoa, Chhana, Paneer, Dahi & Indigenous Cheese **[6 hrs]**
Preparation & Packaging, yield and composition, Factor affecting quality, Packaging & Preservation, Marketing and grading, Legal standards.
Module IV: MILK BASED SWEETS **[6 hrs]**
Place of milk based sweets in India and abroad. Method of manufacture, packaging, storage and transportation of Rasgulla, Gulab jamun, Kalakhand, Rabri, Keer, malai, Rasmalai, Barfi, Peda, Sandesh and lassi.

Practicals **[10 hrs]**
Preparation of khoa. Preparation of Ghee from butter and cream. Preparation of Paneer. Preparation of chhana . Preparation of Dahi. Preparation of milk based sweets: Rasogulla, Gulab jamun, Kalakhand, Rabri, Rasmalai, Barfi, Peda, Sandesh and lassi.

Industrial / Incubation centre visit related to Indigenous Dairy Products **[5 hrs]**

XIV. Post-Harvest Technology of Fruits & Vegetables

Course code: VAC: 1803
Duration: 34 hrs
Total Marks: 50

Background:

Post harvest technologies constitute an interdisciplinary science and techniques applied to agricultural commodities after harvest for the purpose of preservation, conservation, quality control, processing, packaging, storage, distribution, marketing and utilisation to meet the food and nutritional requirements of consumers in relation to their needs again, fruits and vegetables are highly perishable commodities and the ambient high

temperature obtained in the tropical country like ours makes them more susceptible for rapid development of senescence , decay and rotting.in this course , the various changes that takes place in the fruits and vegetables after harvesting as well as the maturity indices for harvesting a particular crop will be discussed.

Training Curriculum: The course structure consists of theoretical and hands on training related to dairy and different processing and preservation techniques with quality assurance.

Course Outcome:
CO1. To develop proficiency skill in producing different processed Fruits and vegetables food products
CO2. Operating & maintenance of the modern Equipments & machineries
CO3. Make different processed food products with quality assurance
CO4. Process of Packaging, Storing & marketing

Theory:
Module I: Scope & Post Harvest Losses **[4 hrs]**
Scope of Fruits and vegetables Preservation in India. Post-harvest losses;
Nature of losses, causes and control of losses, quality and factor affecting fruit and vegetable.
Module II: Preservation Methods **[4 hrs]**
Methods and principles of preservation. Quality control in fruits and vegetables processing. Beverages; Fruits based beverages, vegetables based beverages. Use of chemical preservatives in fruit and vegetable products – limitations.

Practical **[16 hrs]**
Drying and dehydration of fruits and vegetables.
Production of fruit jam, jelly, marmalade, RTS, Squash from cheese, preserve and candies fresh fruits.
Preparation of pickles and chutneys with salt, oil, vinegar and sauces; production of tomato puree and paste - sauce, ketchup.
Demonstration **[10 hrs]**

Department of Botany

1. Plant resource utilization and conservation **Course code: VAC-1404**
Duration-40 Hrs. **Total Marks: 50**

Course Outcome:
CO1: It will help the students to identify different variety of Crops.
CO2: To understand the conservational methods of important variety of plants.
CO3: To understand the conservation genetic resources of plants.
CO4: Learn about the preparation and extraction of valuable plants.

Course Contents:
Unit 1: **6 hrs**
Cultivation and uses of selected- Food, forage and fodder crops, Fibre crops,Vegetable oil-yielding crops.
Unit 2: **6 hrs**
Principles of conservation, extinction, environmental status of plants on international strategies for conservation.
In situ conservation: International effort and Indian initiatives.
Unit 3: **13 hrs**

Strategies for conservation: Ex –situ conservation. Principles and practises. Botanical gardens, field gene banks, in vitro repository, cryobanks, general account of the activities of BSI, NBPGR, ICAR, CSIR and DBT for conservation and non formal conservation efforts.

Unit 4: **15 hrs**

Introduction and scope, Herbal preparations Methods of extraction – Maceration,digestion, decoction, aromatic waste, extracts and tinctures i) Aloe, ii) Henna, iii) Lemon grass, iv) Rose, v) Jasmine vi) Turmeric, vii) Ginger, viii) Neem, ix) Holy basil, x) Amla with reference to part used, products and uses.

2. Mushroom Cultivation

Course code: VAC-1405
Duration -32 hrs
Total marks: 50

Course outcome:

CO1: This course has been prepared with the objective of providing the mycology/microbiology students a concise and practical information about wild and cultivated mushrooms, their nutritional and medicinal values.
CO2: To understand spawn production and cultivation techniques.
CO3: post - harvest management, pest and disease problems and the economics and marketing strategies.
CO4: The course also aims to give the students exposure to the experiences of experts in the field and to functioning mushroom farms which will help the students to learn a means of self-employment and income generation.

Course contents:

Unit I **8hrs**

Introduction to mushroom fungi, nutritional value, edible and poisonous type, edible mushrooms -- Pleurotus, Volvariella and Agaricus, medicinal value of mushrooms, genetic improvement of mushrooms.

Unit II **8hrs**

Preparation of culture, mother spawn production, multiplication of spawn, cultivation techniques

Unit III **8hrs**

Harvesting, packing and storage; problems in cultivation --- diseases, pests and nematodes, weed moulds and their management strategies. Economics of cultivation, post harvest technologies.

Unit IV **8hrs**

Equipment and sterilization techniques for culture media, isolation of mother culture, spawn preparation and maintenance of mushroom beds of oyster mushroom, Volvariella and Agaricus. Processing and preservation of mushrooms, economics of spawn and mushroom production and mushroom recipes

3. Horticultural Nursery Management

Course code: VAC-1604
Duration-40 Hrs.
Total marks: 50

Course Outcome:

CO1: Students will understand about the Nursery and its perspectives.
CO2: Creates the practical techniques for plant propagation methods.
CO3: To learn about the packaging and preparation of plant root media.
CO4: Student will understand about the identification of valuable plants.
CO5: It will give an understanding of Marketing of valuable plant.
CO6: It will give a practical idea about the functions of Nursery.

Course Contents:

Unit-I. Preparation of Nursery **3 hrs.**
Criteria for selection of site for nursery
Unit-II. Plant Culture Techniques **6 hrs.**
Propagation structures
Propagation techniques
Unit-III. Packaging of Plants **12 hrs.**
Containerization
Preparation of Rooting media/potting mixture
Unit-IV.Identification and assessment of Plants **7 hrs.**
Importance of mother plants
Care of nursery plants
Unit-V. Marketing & Management **6 hrs.**
Marketing tips
Market selection
Unit-VI. Field Visits **6 hrs.**
Nursery visit

4. Biofertilizer Production **Course code: VAC-1703**
Duration-30 Hrs. **Total marks: 50**

Course Outcome:
CO1: To understand about the Biofertilizer and its importance.
CO2: The hands on training will provide basic knowledge to the learner.
CO3: To learn about the utilization of Algae for production of biofertilizer.

Course Contents:

Unit I **8hrs**
Introduction to Biofertilizers
Types of biofertilizers
Media preparation
Advantages of biofertilizers over chemical fertilizers
Introduction to Biopesticides
Types of biopesticides and their function.
Mass scale production of biofertilizer
Unit II **12hrs**
Hands on training on production of biofertilizer from kitchen wastes
Hands on training on production of biofertilizer from algae
Unit III **8hrs**
Scale up and formulation
Field application techniques
Visit to organic farm
Expert talk **2 hrs**

5. Physico-chemical and Biological characteristics of water **Course code: VAC-1704**
Duration: 36 hrs **Total marks: 50**

Course Outcome:
CO1. To enable the students to determine the physico-chemical and biological characteristics of water bodies and different water samples so as to determine the quality of water and the anthropogenic activities disturbing the water quality.

CO2. This course will train the students for jobs in pollution control board, jal board, water testing laboratories etc.

Course content:

Unit I **12 hrs**

Water sampling techniques
Water preservation techniques for analysis
Biological collection techniques and preservation methods

Unit II **12 hrs**

Physico-chemical analysis of different water samples
pH, DO, conductivity, turbidity, acidity, alkalinity, nitrate, phosphate, temperature, chloride, BOD, COD etc
Biological analysis of different water samples.
Culture techniques for bacteria, fungi and algae

Unit III **12 hrs**

Toxic metal analysis like aluminium, iron, sulphur, chloride, nickel, arsenic, lead etc by AAS.
Comparision of water samples
BIS standard

6.Ornamental Horticulture **Course code: VAC-1705**
Duration: 42 hrs **Total marks: 50**

Course Outcome:

CO1: The course aimed to know the different types of gardens in India, interior scaping, landscaping, lawns etc. To understand and study the different types of garden.
CO2: Identification and description of trees, shrubs. Description and designing of garden structures, layout of terrarium / bottle garden, dish garden, lawn making - preparation of land and planting, designing and layout of rockery, water garden, vertical garden, roof garden are some of the practical approaches of this course.
CO3: Horticulture in different sites like garden, recreational gardens and children's parks, educational institutions, public places, industrial areas, railway stations, bus terminals, dam sites, hydroelectric stations, river banks, etc
CO4: Practical approach of the course. The course is mainly designed for pursuing entrepreneurship as career option.

Course content:

Unit I **8hrs**

History, importance and scope of gardening; principles of gardening; types of gardens - formal and informal gardens
Garden styles - Hindu type gardens (vanams), natural garden, wild garden, Mughal gardens, Persian gardens, Italian gardens, French gardens, English gardens, Japanese gardens

Unit II **8hrs**

Popular gardens in India; special types of gardens - roof garden, sunken garden, vertical garden, terrace garden, water garden, bog garden, shade garden, rock garden, terrarium, bottle garden, window garden
Components and features of landscaping - plant components, non-plant components; classification of ornamental plants based on utilities.

Unit III **10hrs**

Significance and utility of various plant groups in landscaping .landscape designing for various situations - home garden, recreational gardens and children's parks, educational institutions, public places, industrial areas, railway stations, bus terminals, dam sites, hydroelectric stations, river banks, etc

Interiorscaping: lawns - lawn grasses, establishment and maintenance, lawns for playgrounds; bonsai - styles, plants, containers and tools, cultural practices, special practices, care and maintenance; flower arrangement - principles and styles; value addition in flowers.

Unit IV **16 hrs**

Practical's

Identification and description of trees, shrubs, flowering annuals, bulbous ornamentals, climbers, creepers, palms, ferns, cycads, ornamental grasses, cacti and succulents, indoor plants, foliage plants and water plants.

Description and designing of garden structures - edges and hedges, flower beds, flower borders, arboretum, rosary, fernery, palmatum, carpet garden, arches, bowers, pergolas, roads, walks, paths, bridges, fountains and statues; planning, designing and layout of gardens - house garden, roadside planting, gardens in industrial areas.

Layout of terrarium / bottle garden, dish garden; lawn making - preparation of land and planting.

Designing and layout of rockery, water garden, terrace garden, roof garden; practising flower arrangement, dry flower making and bouquet making; practicing the art of Bonsai.

7. Hydroponics (Soilless plantation)

Course code: VAC-1706

Duration: 36 hrs

Total marks: 50

Course outcome:

CO1: Hydroponics, a recently remodeled rage in consideration of vertical farming, is a fascinating method of growing plants and gives a garden lover or a serious grower many hours of pleasure and they can completely switch to Hydroponics as a career option for them in future. To understand the global aspects of Hydroponics .

CO2: Mechanism of Hydroponics

CO3:. Explore the impact irrigation strategies have on growing media and crop production (includes EC, pH, air composition, water content and drain %). Assess media types, characteristics, and their application, and understand the principal factors affecting their selection. Monitor plant health, hydroponic environment, nutrient solution and perform routine maintenance checks, maximize greenhouse efficiency and energy conservation.

CO4: Undertake harvesting, grading and marketing of the produce.

Course content

Unit I - **8 hrs**

Introduction

Hydroponic systems, global industry, comparison to growing in soil, resources and contacts.

Unit II **8 hrs**

How a plant grows

Plant structure, biochemistry, biochemical cell processes, mechanisms of nutrient uptake photosynthesis; minerals and nutrients, the role of pH in plant growth, hydroponic nutrient solutions, preparing nutrient solutions.

Unit III **10hrs**

Hydroponics system

Location, equipment systems, soilless mixes, rockwool manufacture,development of propagating blocks, propagation applications, recommended practices for propogation nutrient film techniques, alternative layouts for NFTmethods of solution dispention, closed and open systems; techniques. Understanding nutrient formulae, atoms, elements & compounds what does a plant need, calculating formulae, mixing nutrients, symptoms of nutrient deficiency, recommendations, adjusting the pH, using electrical conductivity measures.

Unit IV **10hrs**

Green house operation and management

Growing crops in greenhouses, solar energy, greenhouses, nature of active solar heating systems examples of solar greenhouse facilities, green house management, what you can grow greenhouse and other growing structures, environmental factors that influence plant growth plant needs, temperature control, heat loss heaters, light factors, artificial light, horticultural management in a greenhouse, greenhouse benches, greenhouse cooling fog.

8. Conservation and Utilisation of Medicinal Herbs **Course code: VAC-1804**
Duration-35 Hrs. **Total marks: 50**

Course Objectives:

CO1: To understand about the Biodiversity of medicinal plant and its importance.
CO2: The learner will understand about the conservation of crop genome and utilization of arable land.
CO3: To learn about the packaging and management of medicinal plants.

Course Contents:

Unit I: Biodiversity and its Conservation **10 hrs**

Definition, levels, measurement, threats, drivers of biodiversity loss, strategies for biodiversity conservation.

Unit II: Conservation of Medicinal plants **10 hrs**

Conservation of agriculture and arable land; conservation tillage, conservation of crop genome; Strategies of conservation of crops.

Unit III: Packages and practices **15 hrs**

Packages and practices of the following medicinal herbs – Eryngium foetida, PaederiaFoetida, Menthaarvensis, Ocimumscantum, Houttuyniacordata, Oxalis Corniculata, Aloeveraand Gingiberofficinales,

Department of Business Administration

Insurance Services **Course Code: VAC-1406**
Duration: 32 hrs **Total marks: 50**

Course Outcomes:

CO1 To provide candidates with skills required in the insurance sector.
CO2 To train students for skills of interaction, research and teaching them the fundamental principles of insurance and different types of coverage.
CO3 To introduce the diverse aspects of the insurance sector, providing them with grounding in basic fundamental principles of insurance field.
CO4 To prepare the students in understanding the various opportunities in the field, help them develop their communicative skills and knowledge of the subject.

Course Content

Unit- I: Insurance Concepts and Laws **[12 hrs]**

Detailed study of the concepts applied to various sectors of Insurance, Regulations, and norms required to be followed in case of Understatements and claims.

Unit-II: Insurance Principles **[10 hrs]**
Principles, Fundamentals and Theories of Insurance Principles.
Unit-III: Life Insurance or General (Non-Life) Insurance **[10 hrs]**
Risks and its management, Difference between Life Insurance and General Insurance, the benefits and returns.

Supply Chain Management **Course Code: VAC-1504**
Duration: 32 hrs **Total marks: 50**

Course Outcomes:
CO1 To provide students the fundamental understanding of company supply chain management from global perspective.
CO2 To enable students to develop high level of technical and managerial competence in relation to supply chain management.
CO3 To enable the students to understand the effects of the operations and supply chain management on business performance and objectives.

Course Content
Unit: I: Introduction to Supply Chain Management **[12 hrs]**
Basics of Supply Chain, Supply chain Strategies, Evolution of Supply Chain Management, Study of different industrial Supply Chain
Unit: II: Inventory Management **[10 hrs]**
Introduction to Inventory Management, Inventory control techniques, Selective approaches to Inventory control.
Unit: III: Logistics Management **[10 hrs]**
Elements and Characteristics of Logistics Management, Measuring Performance of Logistics, 3PL and 4PL

Technical Support Executive- Non Voice **Course Code: VAC-1605**

Course Outcomes:
CO1 To provide students fundamental understanding of technical support business
CO2 To enable students to develop high level of technical and managerial competence for Technical Support Executive- Non Voice business
CO3 To prepare students for various opportunities in the field of technical support executive-non voice.

Course Content

Unit: I: Introduction to IT **8 hrs**
Introduction, Representation of Information, Integer Representation, Fixed point and Floating point representation, Knowing Computer
Unit: II: Networking and Troubleshooting **8 hrs**
Baseline, Network Problem Analysis, TCP/IP, UDP, IP Troubleshooting Suggestions, Troubleshooting Local Connectivity Problems, Troubleshooting Physical Connectivity Problem, Troubleshooting IP Connectivity, Troubleshooting Upper-Layer Problems
Unit: III: Dealing Remote Customers **8 hrs**
Introduction, Customer needs, In-Focussed or Customer Focussed Organization, Bouncing back from Service Blunders, E mail Etiquette and Writing
Unit: IV: Self and Work Management **8 hrs**
Introduction, Etiquette and Ethics, Being Assertive, Goal Setting, Time Management, Work Management, Quality and Standard Adherence

Unit: V: Team Building Skills **8 hrs**
What is Team, Team building skills

Digital Marketing **Course Code: VAC 1805**
Duration: 32 hrs **Total marks: 50**

Course Outcomes:
CO1 To give understanding on digital marketing and its importance to students.
CO2 To give understanding to students on knowledge of search engine optimization and its mechanism.
CO3 To give the Understanding of SMO.
CO4 To give overall understanding to students on web analytics, Ad design and its implementation in search engine optimization.

Course Content:
Unit-I: Introduction to Digital Marketing **[3 hrs]**
What is digital marketing?
- How is it different from traditional marketing?
- ROI between Digital and traditional marketing?
- Discussion on Ecommerce

Unit-II: Introduction to Digital Marketing Continues **[3hrs]**
- How can digital marketing be a tool of success for companies?
- How did digital marketing help the small companies and top inc
- Categorization of digital marketing for the business
- Diagnosis of the present website and business.

Unit-III: Search Engine Optimization (Seo) **[3hrs]**
In this module you will learn complete about SEO (Search engine Optimization, what is On page optimization, Off page optimization, and you also learn how to prepare a reports like- Keywords, titles, meta tags etc..
- On page optimization techniques
- Off page Optimization techniques
- Reports

Unit-IV: Social Media Optimization (Smo) **[3hrs]**
In this module will help in how to do SMO (Social Media Optimization) like Facebook, Twitter, LinkedIn, Tumblur, Pinterest and more social media services optimization.
- Introduction to social Media Marketing
- Advanced Facebook Marketing
- Word Press blog creation
- Twitter marketing

Unit-V: Social Media Optimization (Smo): Continues **[3hrs]**
- LinkedIn Marketing
- Google plus marketing
- Social Media Analytical Tools

Unit-VI: Search Engine Marketing: **[3hrs]**
In this module you will learn what SME (Search Engine Marketing) is a paid tool like Google Adwords, now a days we have so many paid tools we discuss is briefly and display advertising techniques and all.
- Introduction to Search Engine Marketing
- Tools used for Search engine Marketing

Unit-VII: Search Engine Marketing Continues **[3hrs]**

- PPC /Google Adwords Tool
- Display advertising techniques
- Report generation

Unit: VIII: Advanced Analytics **[3hrs]**

In this module you will learn about tools for more useful to SEO, these tool used for analysis on website traffic, keyword analysis and also you can learn Email marketing and all.

- Google Analytics
- Online Reputation Management

Unit: IX: Advance Analytics Continues **[3hrs]**

- E-Mail Marketing
- Affiliate Marketing
- Social Media Analytics

Unit: X: Ad Designing **[5hrs]**

Start up, Innovation, Incubation and Entrepreneurship **Course Code: VAC 1806**
Duration: 36 hrs **Total marks: 50**

Course Outcomes:

CO1 To acquaint students with concept of Start- up, Innovation, Incubation and Entrepreneurship
CO2 To introduce the students with the process of starting a new enterprise
CO3 To give understanding on how to write a business plan
CO4 To give a clear understanding about Intellectual Proper Rights.

Course Content

UNIT 1

Start-up, Innovation, Incubation and Entrepreneurship: **[10 hrs]**

Concept: Need and Significance of Entrepreneurship Development in Global contexts. Entrepreneurship Development – concepts, Process, Experience and strategies. Dynamics of Entrepreneurship Development.

UNIT 2 **[8 hrs]**

Launching a Start-up Enterprise:

Enterprise Launching & Resources: Government Programmes, Policies, Incentive and Institutional Networking for Enterprise setting, Steps of setting new Enterprise, Scanning Business Environment, Sensing Business opportunity & Identifying Product.

UNIT 3

Business Plan Preparation: **[9 hrs]**

Business Plan Preparation – Procedure & Steps, Market Survey & Demand Analysis, Growth, Modernization & Expansion of Enterprise, Business environment of North East India.

UNIT 4

Intellectual Property Rights: **[9 hrs]**

Constituents of Intellectual Property Rights, Managing Intellectual Property Rights in Business Organisations, Trading with Intellectual Property Rights, Process for filing Intellectual Property Rights

Event Management Course Module **Course Code: VAC 1807**
Duration: 34 hrs **Total marks: 50**

Course Outcomes:

CO1 To give understanding the students on basics of Event Management.
CO2 To enable the students for preparing effective event budget.

CO3 To give the students ideas about transport and logistic management in case of an event.
CO4 To give the students an insight about crisis and crowd management.

Course Content

Module 1 – Introduction to Event Planning **[4 hrs]**
Event Planning Overview, What is Event Planning ,The Corporate Market, Social Events
Role of an Event Planner, Main tasks involved in Event Planning., Skills required for event planners., Where and for whom event planners work.
The basics of event planning, Benefits of successful and safe events.

Module 2 – Types of Event **[2 hrs]**
Corporate Event, Meetings, Conference/Conventions ,Seminars/Training Events, Leisure Event, Sports, Events, Festivals/Concerts, Fashion Shows, Private Event, Weddings Parties .

Module 3 – Event Planning Process **[2 hrs]**
Initiating an event, Planning an event's scope, Conducting a site survey, Managing client's goal &expectations, Site venue layout/design, Selecting, managing, contracting performers Staging the event

Module 4 – Event Concept & Theme **[2 hrs]**
Theming the event, Environmental Scanning, The Brain Storming Process, Managing the creative theme

Module 5 – Event Budgeting **[2 hrs]**
Feasibility Study , How to make a budget,

Module 6 – Event Management Plan **[2 hrs]**
Preparing a plan, Event Details, Health & Safety & Administrative permits, Briefing before the event, De-briefing after the event, Documentation

Module 7 – Venue Management & Operations **[2 hrs]**
Venue Selection, Types of venues, Site design consideration
Production, Infrastructure & Back Stage Requirement, Fire & Ambulance requirements, Noise considerations, Welfare facilities

Module 8 – Human Resource Management **[2 hrs]**
Identifying people needs, Sourcing people, Selecting Staff for the project, Staff Training, Developing the Team
Maintaining Effective Team Management, Resolving Conflicts, Releasing Staff at the end

Module 9 – Marketing the Event **[2 hrs]**
Promotion, Event Marketing Mix, Marketing Strategy, Developing Marketing plan for the event

Module 10 – Crisis Management **[2hrs]**
Risk Management – The Planning process, Hazard Analysis , Contingency Plans, Monitoring safety performance, Preparing for major incident & dealing with disaster, Pre-event briefing of security personnel

Module 11 – Health & Safety Requirements **[2 hrs]**
Event Safety management plan for larger & smaller events

Module 12 – Communication & Customer Service **[2 hrs]**
Developing framework for handling event, Maintaining off site & on site communication, Customer service skills required for event co-ordinator , Understanding & managing irate customers

Module 13– Catering Operations **[2 hrs]**
Understanding tastes & preferences, Planning & managing catering facilities, Syncing Catering with other facility management

Module 14– Transport & Logistics Management **[2 hrs]**
Public Transport management for larger events, Parking, Emergency Access, Managing material transport

Module 15 – Crowd Management **[2 hrs]**
Managing the entry & exit gates, Managing crowd for Celebrities & VIPs

Module 16 Monitoring & Evaluating the Event **[2 hrs]**
Evaluation Methods, Event Surveys, Questionnaires, Interviewing, Observation

Department of Chemistry

Pollution control and management **Course Code: VAC-1809**
Duration: 40 hrs **Total Marks: 50**

Course Outcome: After successful completion of the course students will be able to
CO1. Understand broad scope of environmental pollution
CO2. Understand awareness on water, air and soil pollution
CO3. Understand concept of waste management and recycling

Contents
Unit I: Air pollution **[10 hrs]**
Acid-rain, photochemical smog, effects of industrial and automobile pollution, toxic effects of CO and NO_x, ozone layer depletion, global warming, and methods for controlling of these problems.

Unit II: Water pollution [10 hrs]
Origin and effects of water pollution, Eutrophication, ground water contamination with arsenic, fluoride, toxic heavy metals and remediation, water-borne diseases, sources of microorganisms and their prevention.
Unit III: Soil pollution [10 hrs]
Soil pollution, cause and effects of soil pollution, effect of pesticides, insecticides and fertilizers on soil, remediation of soil.
Unit IV: Management of waste materials and their recycling method **[10 hrs]**
Classification of waste, waste management and disposal, dumping of waste, treatment of waste water, sludge treatment, importance of water reuse and recycling and future challange.

Nanotechnology and its applications **Course Code: VAC-1506**
Duration: 35 hrs **Total Marks: 50**

Course Outcome: After successful completion of the course students will be able to
CO1. Understand the scope and applications of nanotechnology
CO2. Understand different methods of synthesizing Nanomaterials
CO3. Understand properties and applications of Nanomaterials

Contents
Unit I: Introduction **[10 hrs]**
Introduction of nano particles, importance and challenges of nanotechnology, Size and shape effect of nano parciles, graphene, carnon nano tube (CNT), single walled Carbon nanotubes (SWCNTs), multi-wall carbon nanotubes (MWCNTs).
Unit II: Methods of Synthesis **[10 hrs]**

Different methods of synthesis, Top-Down and bottom up processes, Lithography, Sol-gel, hydrothermal, co-precipitation, reverse-micelle, vapour phase deposition and various chemical process.

Unit III: Properties of nano-materials **[10 hrs]**

Optical and electrical properties, semi conducting properties, magnetic properties, sensors and coating, surface effects, adsorption and catalysis.

Unit IV: Application of Nanotechnology **[5 hrs]**

Nano materials and nanotechnology in pharmaceuticals and medicinal science, biology, industrial applications, smart materials, nano catalysis, future scope, advantage and disadvantage.

Note: Demonstration on synthesis of some common nanopaticles will be conducted.

Recent development in Drug Chemistry **Course Code: VAC-1507**
Duration: 35 hrs **Total Marks: 50**

Course Outcome: After successful completion of the course students will be able to

CO1. Understand the concept of a drug and activity
CO2. Understand different classes of drugs
CO3. Understand mode of action of different drugs

Contents

Unit I: Introduction to Drugs **[7 hrs]**

Introduction of Drug, agonist and antagonist, allosteric sites, host-receptors concept, chemical messengers, Structure activity relationship (SAR and QSAR), chemotherapy, theory of drug action (ADME), classification of drug based on their mode of action.

Unit II: Analgesics and anti-histamine **[10 hrs]**

Introduction of analgesics, steroidal anti inflammatory drug (SAID) and non steroidal anti inflammatory (NSAID), Antipyretics, aspirin, paracetamol, Ibuprofen, mode of action of analgesics.

Anti-histamine and H_1-Receptor antagonists, cyclizine, ceterizine, allegra, diphenhydramine, mode of action of anti-histamines.

Unit III: Antibiotics **[8 hrs]**

Introduction, broad spectrum and narrow spectrum antibiotics, anticeptics and disinfectants, sulpha drug, adrug β-lactam anti biotics, mode of action of penicillins, penicillin G, penicillin V, ampicillin, amoxicillin, streptomycin, tetracyclines and chloroamphanicol and cephalosporin, β-lactamase inhibitors.

Unit IV: Anti-neoplastic drug **[10 hrs]**

Taxol, tamoxifen, letrozole, mitotane, bleomycin, cis platin, mechloraethamine, mephalan, uracils, mustards, natural products, recent development in cancer chemotherapy.

Awareness in Plastic Technology **Course Code: VAC-1707**
Duration: 35 hours **Total marks: 50**

Course Outcome: After successful completion of the course students will be able to

CO1. Understand different plastic materials and applications
CO2. Understand processing and testing of plastic products as per ISO standards
CIO3. Understand designing of plastic products and mould design

Contents

Unit I: Introduction **[5 hrs]**

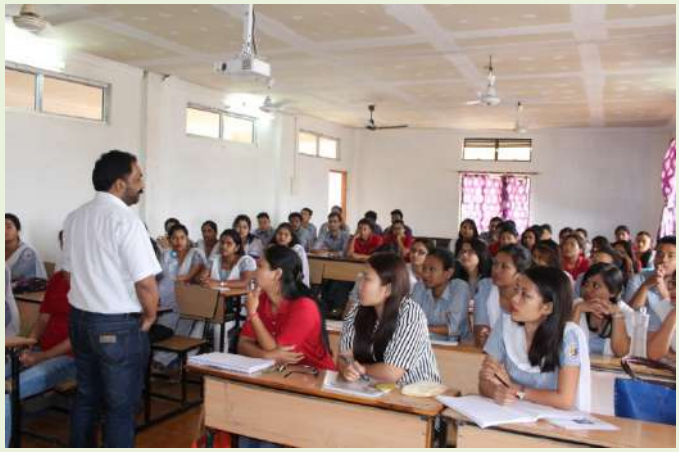
Brief overview of plastic materials and issues surrounding plastic materials in today's society. Terminology and early history of plastics. Different classes of plastic materials and industrial uses. Classification and Structure of various types of polymers. Plastic Materials and Applications.

Unit II: Processing of Plastics **[10 hrs]**

Basic Principles of Melt Processing of Thermoplastics – Effect of Polymer Properties on Processing - Thermal Behavior of Polymer Melt - Rheology of Ideal Fluids and Polymers – Newtonian & Non-Newtonian fluids - Processing of Thermoset Plastics - Different Types of Processes - Description and Limitation - Processing Flow Chart - Selecting a Process – Degradation - Orientation – Process Advantage of Plastics over Conventional Materials. A brief description on different processing techniques of plastics.

Unit III: Testing of Plastics as per ISO Standards **[10 hrs]**

Basic concepts of testing - Specification and Standards - National and International Standards - Test specimen preparation - Pre-conditioning and test atmosphere. Identification of plastics by simple tests - Visual examination - Density - Melting point - Solubility test - Flame test - Chemical tests, Density by Density-gradient column Particle size by sieve analysis and moisture content analysis.



Unit IV: Fundamentals of Plastic Product and Mould design **[10 hrs]**

Product Design Concepts – shape and size, function, aesthetics, life, tooling aspects on product design – process variables Vs product design - product design thumb rules for plastics - cost reduction through product design concepts - design of external, internal undercuts - side openings - hinges - assembly through resilience properties - case studies. Concept on requirements of different types of moulds and its manufacture process.

Note: Mandatory Hands on laboratory sessions will be conducted based on the contents.

Fundamentals of Green Chemistry **Course Code: VAC-1708**
Duration: 35 hours **Total marks: 50**

Course Outcome: After successful completion of the course students will be able to understand

CO1. The environmental status and need for Green chemistry
CO2. The principles of Green Chemistry
CO3. Green approach for synthesis and Future trends

Contents

Unit I: Introduction to Green Chemistry **[5 hrs]**

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry. Limitations / Obstacles in the pursuit of the goals of Green Chemistry.

Unit II: Principles of Green Chemistry and Designing a Chemical synthesis **[5 hrs]**

Twelve principles of Green Chemistry with their explanations and examples; Designing a Green Synthesis using these principles.

Unit III: Examples of Green Synthesis / Reactions **[10hrs]**

1. Green Synthesis of the following compounds: ibuprofen, paracetamol.
2. Microwave assisted reactions in water: Hofmann Elimination, Hydrolysis (of benzyl chloride, benzamide, n-phenyl benzamide, methylbenzoate to benzole acid), Oxidation (of toluene, alcohols). Microwave assisted reactions in organic solvents: Esterification, Fries rearrangement, Diels-Alder Reaction.

Unit IV: Future Trends in Green Chemistry **[5 hrs]**

Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; on covalent derivatization; Green chemistry in sustainable development.

Unit V: Hands-on Laboratory Sessions **[10hrs]**

The following experiments are to be performed

1. Synthesis of Paracetamol & Diels Alder reaction in water
2. Preparation of biodiesel from vegetable oil.
3. Installation of relevant equipments in the laboratory to the prospect of Green chemistry.

Industrial Chemistry and Applications **Course Code: VAC-1505**
Duration: 35 hours **Total marks: 50**

Course Outcome: After successful completion of the course students will be able to

CO1. Understand Technologies associated with Chemical Industry
CO2. Understand the hazards and remedy associated with industrial chemicals and gases
CO3. Understand the planning behind the set up of water treatment plants & Perform water quality analysis from different sources.

Contents

Unit I: Chemical Technology **[5 hrs]**

Basic principles of distillation, solvent extraction, solid-liquid leaching and liquid-liquid extraction, separation by absorption and adsorption. An introduction into the scope of different types of equipment needed in chemical technology, including reactors, distillation columns, extruders, pumps, mills, emulgators. Scaling up operations in chemical industry.

Unit II: Industrial Gases and Inorganic Chemicals **[10hrs]**

(a) Industrial Gases: Large scale production, uses, storage and hazards in handling of the following gases: oxygen, nitrogen, argon, neon, helium, hydrogen, acetylene, carbon monoxide, chlorine, fluorine, sulphur dioxide and phosgene. (b) Inorganic Chemicals: Industrial preparation with the help of flowchart, application, analysis and hazards in handling the following chemicals: hydrochloric acid, nitric acid, sulphuric acid, caustic soda, common salt, borax, bleaching powder, sodium thiosulphate, hydrogen peroxide, potash alum, chrome alum, potassium dichromate and potassium permanganate.

Unit III: Environmental Concerns **[10 hrs]**

(a) Air Pollution: Pollutants and their sources, pollution by SO2, CO2, CO, NOx, H2S and other foul smelling gases. Methods ofestimation of CO, NOx, SOx and their control procedures. Green house effect and global warming, Ozone depletion by oxides ofnitrogen, chlorofluorocarbons and halogens, Removal of sulphur from coal. Particulate matter and its types.

(b) Water pollution and Water Quality Standards: Pollutants and their sources, Effluent treatment plants (primary, secondary and tertiarytreatment). Industrial effluent from the following industries and their treatment: electroplating, textile, tannery, dairy, petroleum andpetrochemicals, agrochemicals, fertilizer. Sludge disposal. Industrial waste management, incineration of waste. Water treatment and purification (reverse osmosis, electro dialysis, ion exchange). Water quality parameters for waste water, industrial water and domestic water.

Unit IV: Hands-on Laboratory Sessions & Industrial Visits [10 hrs]

The following experiments are to be performed

1. A survey based study on common bio-indicators of pollution and SPM in air samples.
2. Determination of dissolved oxygen in water.
3. Determination of Biological Oxygen Demand (BOD) & Chemical Oxygen Demand (COD)

Note: A compulsory visit to an Industry is to be organized for practical exposure and experience.

Recent Trends in Polymer Technology with Special Emphasis on Fabrication, Molding and Processing of Plastics

Course Code: VAC-1808
Duration: 35 hours **Total marks: 50**

Course Outcome: After successful completion of the course students will be able to

CO1.Understand different plastic materials and applications
CO2. Understand processing and testing of plastic products as per ISO standards
CO3..Understand designing of plastic products and mould design

Contents

Unit I: Introduction [5 hrs]

Brief overview of plastic materials and issues surrounding plastic materials in today's society. Terminology and early history of plastics. Different classes of plastic materials and industrial uses. Classification and Structure of various types of polymers. Plastic Materials and Applications.

Unit II: Processing of Plastics [10 hrs]

Basic Principles of Melt Processing of Thermoplastics – Effect of Polymer Properties on Processing - Thermal Behavior of Polymer Melt - Rheology of Ideal Fluids and Polymers – Newtonian & Non-Newtonian fluids - Processing of Thermoset Plastics - Different Types of Processes - Description and Limitation - Processing Flow Chart - Selecting a Process – Degradation - Orientation – Process Advantage of Plastics over Conventional Materials.

Unit III: Testing of Plastics as per ISO Standards [10 hrs]

Basic concepts of testing - Specification and Standards - National and International Standards - Test specimen preparation - Pre-conditioning and test atmosphere. Identification of plastics by simple tests - Visual examination - Density - Melting point - Solubility test - Flame test - Chemical tests, Density by Density-gradient column Particle size by sieve analysis and moisture content analysis.

Unit IV: Fundamentals of Plastic Product and Mould design [10 hrs]

Product Design Concepts – shape and size, function, aesthetics, life, tooling aspects on product design – process variables Vs product design - product design thumb rules for plastics - cost reduction through product design concepts - design of external, internal undercuts - side openings - hinges - assembly through resilience properties - case studies. Concept on requirements of different types of moulds and its manufacture process.

Note: Mandatory Hands on laboratory sessions will be conducted based on the contents and recycling of plastics

Symmetry Elements Through Model Preparation

Course Code: VAC-1606
Duration: 35 hours **Total marks: 50**

Course Outcome: After successful completion of the course students will be able to

CO1. To recognize the symmetry elements and their associated operations
CO2. Understand point group concept and molecular symmetry
CO3. Assignment of point group to a molecule & Relate the symmetry with the spectroscopic properties of a molecule

Contents

Unit I: Introduction to the concept of Symmetry **[5 hrs]**

Symmetry around us; shapes and patterns of some pleasing designs found in nature; Symmetry elements (point, line and plane) and Symmetry operations; rotations & reflections, inversion. Proper axis & improper rotations. Classification of molecules and Illustrative examples.

Unit II: Point groups and Molecular Symmetry **[7 hrs]**

Assignment of point groups to different molecules of various molecular symmetry. Groups with very high symmetry, groups with low symmetry, groups with n-fold rotational axis. Examples of molecules and illustration. Preparation of flow chart for assigning appropriate point group to a molecule.

Unit III: Irreducible, reducible representations and character tables **[8 hrs]**

Representative and matrix representations of operations. Reducible and irreducible representations. Construction of character tables of different point groups. Related discussions on the behavior of molecules with respect to spectroscopic properties.

Unit IV: Hands on training Sessions on model preparation **[15 hrs]**

Preparation of different molecules of different symmetry using paper (Ball and Stick model). Construction of tetrahedral model and octahedral model with chart paper. Demonstration of various rotational axis (C_2, C_4, C_3), various plane of symmetry in all these high symmetry molecules. Demonstration of Improper rotation and inversion.

Department of Commerce

Goods and Services Tax: Registration, e-filing and Compliance **Course Code: VAC 1709**
Duration: 32 Hrs **Total marks: 50**

Course Outcomes: The outcomes of the course are as follows-

CO1. This course will enable to acquire the basic concept of accounting and asset than to prepare the necessary books of accounts
CO2. This paper will enable to learn the computer-based accounting
CO3. Gain knowledge of the mechanism of e-filing tax return
CO4. Understand the process of registration and e-filing of GST return
CO5. Develop the skill of computer-based accounting for employability of learners

Course Content:

Unit 1: Basics of Accounting **10 hrs**

Basic accounting concepts and conventions, journal entries, books of accounts and preparing ledger, preparation of trial balance and final accounts.

Unit 2: Tally and Computerised Accounting **10 hrs**

Introduction to Tally, creating, selecting, altering, deleting and shutting up of company, gateway of Tally and user interface, creating, altering and deleting groups and ledgers, voucher entries, integrating accounts and inventory, activating Tally in GST, setting up GST (company level, ledger or inventory level), creating GST masters and generating reports.

Unit 3: Overview of GST and its e-filing **12 hrs**

Overview of GST, importance of GST, registration of a firm, different forms of GST,
E-filing of GSTR-1 to GSTR-11

E-Filing: Income Tax and GST **Course Code: VAC 1710**
Duration: 40 Hrs **Total marks: 50**

Course Outcomes: The outcomes of the course are as follows-
CO1. This course will enable to acquire the basic concept of accounting and asset than to prepare the necessary books of accounts
CO2. This paper will enable to learn the computer-based accounting
CO3. Gain the knowledge of computation of income and different sources of income, mechanism of e-filing tax return
CO4. Understand the process of registration and e-filing of GST return
CO5. Develop the skill of computer-based accounting for employability of learners

Course Content:
Unit 1: Basics of Accounting **10 hrs**
Basic accounting concepts and conventions, journal entries, books of accounts and preparing ledger, preparation of trial balance and final accounts.
Unit 2: Tally and Computerised Accounting **10 hrs**
Introduction to Tally, creating, selecting, altering, deleting and shutting up of company, gateway of Tally and user interface, creating, altering and deleting groups and ledgers, voucher entries, integrating accounts and inventory, activating Tally in GST, setting up GST (company level, ledger or inventory level), creating GST masters and generating reports.
Unit 3: Overview of Income Tax and Filing of Income tax return **10 hrs**
Definition of income tax, sources of income, agriculture income, steps of income tax, provision of Income Tax Act, 1961 related to income tax, e-filing of income tax return (ITR)
Unit 4: Overview of GST and its e-filing **10 hrs**
Overview of GST, importance of GST, registration of a firm, different forms of GST,
E-filing of GSTR-1 to GSTR-11

Management of Financial Services **Course Code: VAC 1511**
Duration: 35 Hrs **Total marks: 50**

Course Outcomes: The outcomes of the course are as follows-
CO1. This course will enable to gain knowledge on the emerging scenarios and changes in the banking industry.
CO2. This paper will enable to learn how a bank operates and functions.
CO3. This paper will help to understand the credit policies of NPA management system.
CO4. This paper will introduce the whole range of products currently being offered by the banks.
CO5. Develop the skill of computer-based accounting for employability of learners.
CO6. To know about the various career prospects and future growth with the banking industry.

Course Content:
Unit 1: Banking Scenario in India-An overview **5 hrs**
Origin and growth of commercial banks in India, Financial Services offered by banks, changing role of commercial banks, Role of banks in economic growth of the nation, Bank mergers and its implication.
Unit2: Banking System: Operations and Functions **6 hrs**
BASEL Committee norms, liquidity management, RBI guidelines, credit policy, prudential norms, IRAC, CAR, SARFAESI Act, Insolvency and Bankruptcy code.
Unit 3: Credit and NPA Management **6 hrs**

Credit management, principles of good lending, priority sector lending, credit appraisal techniques, credit rating agencies, CIBIL procedures, classification of sub-standard, doubtful or loss assets NPA trends.

Unit 4: Banking Products and Services **6 hrs**

Various types of Deposit/Loans/credit product/ facilities and different types of securities available to bank & FI and modes of charging them. Banking products, concept of CASA, KYC guidelines, demat account, electronic facilities, investment options with banks, ancillary services of banks, merchant banking, modes of charging for financial services.

Unit 5: Use of Technology in Banking **6 hrs**

Delivery channels, ATM, mobile banking, internet banking, USSD, UPI, BHIM, Payment Gateways, /card technologies, Electronic Fund Transfer, RTGS, NEFT, IMPS, Issues in banking technology.

Unit 6: Career Prospects in Banking and Financial Sector **6 hrs**

Career opportunities in banking and financial sector in India, Financial analysts, loan officers, teller, investment banking, credit risk manager, value added courses, factors in improving employability.

Rural Marketing **Course Code: VAC-1711**
Duration: 40 Hrs **Total marks: 50**

Course Outcomes: The outcomes of the course are as follows-

CO1. The course will make learners aware about the opportunities and challenges of rural economy in context in the North East India.

CO2. The course will enhance learners' knowledge on Segmentation, Targeting and Positioning Strategies in rural economy.

CO3: The course will enhance the decision-making ability of the learners with respect to product strategy and pricing strategy.

CO4: The course will augment the ability of the learners in Promotion and Distribution Mix decision-making.

CO5: The course will acquaint learners with the latest happenings and changing trends in the rural economy.

Course Content:

Unit I: Rural economy and market: **5 hrs**

Concept, Characteristics, Opportunities and Challenges in context of North East India, rural market vs urban market.

Unit II: Concept of Rural Marketing: **10 hrs**

Scope and Importance of Rural Marketing; Segmentation: concepts, basis and strategy; Targeting: concepts and rationality; Positioning: concept and strategy.

Unit III: Rural Marketing Mix I: **10 hrs**

Product Mix: Concept, Product Strategy; Pricing Mix: Concept, Pricing Policies, Objectives and Strategy

Unit IV: Rural Marketing Mix II: **10 hrs**

Promotion Mix: Concept, Elements, and Strategy; Distribution Mix: Concepts, Process, Levels, Channels, and Strategy

Unit V: Emerging Issues: **5 hrs**

Rural Marketing Information system: Elements and Relevance; Changing Trends: Demography, Technology, Attitude and perception

Brand Management **Course Code: VAC-1811**
Duration: 35 Hrs **Total marks: 50**

Course Outcomes: The outcomes of the course are as follows-
CO1. The course will enhance learners' knowledge on brand functions, importance and types. Learners will also come to know about the brand as intellectual property.
CO2. Learners will be able to develop and implement branding strategies.
CO3. The course will equip the skills necessary for developing brand communication.
CO4: The course will increase the decision-making ability of learners in the area of brand adoption and brand extension. It will also aware learners about the challenges in managing brands.

Course Content:

Unit I: introduction To Brand Management: **7 hrs**
Definitions of brand, its functions, importance, types and dynamics; Brand and Intellectual Property Rights.

Unit II: Brand Strategies: **7 hrs**
Fundamental principles of brand design, Strategic Brand Management process, factors influencing branding, Brand positioning: Establishing Brand values, vision

Unit III: Brand Communications: **7 hrs**
Brand image Building: Brand Loyalty programmes, Brand Promotion Methods, Role of Brand ambassadors, Brand image and its relationship with marketing mix strategy.

Unit IV: Brand Extension: **7 hrs**
Brand Adoption, brand extension, re-branding and re-launching

Unit V: Brand Performance: **7 hrs**
Brand Equity, Brand Audit, Brand Leverage, Branding challenges & opportunities; Challenges of managing brands over both short and long-term time horizons.

Department of Computer Science & Electronics

Advanced Web Design **Course Code: VAC-1712**
Duration: 42 hrs **Total marks: 50**

Course Outcomes (CO):
Upon completion of the course, students will be able to:

- **CO1.** Understand the major areas and challenges of web programming.
- **CO2.** Use a server-side scripting language, PHP
- **CO3.** Distinguish web-related technologies.
- **CO4.** Use PHP to access a MySQL database.
- **CO5.** Design and implement typical static web pages and interactive web applications.

Unit I **(15 hrs)**
Styling the Web-CSS, Introduction, Syntax, Inclusion, Measurement Units, Colours, Backgrounds, Fonts, Text, Images, Links, Margins, Padding, Border, Visibility, Positioning, JavaScript Overview,

Syntax, Placement, Variables, Operators, Control Statements, Control Loops, Functions, Events, Cookies, Dialog Boxes.

Unit II **(9 hrs)**

Introduction to Apache Web Server, Install Apache, Install Apache from Source, Virtual Host, Types of Apache Virtualhost, Configure Apache, Introduction to MySql and MariaDB, MySql and MariaDB Installation, Administration, Configuration.

Unit III **(6 hrs)**

Database design using MySql and MaraiDB, Drop database, Select Database, Data Types, Create Tables, Drop Tables, Other important Queries.

Unit IV **(5 hrs)**

Introduction to Freelancing and Hosting Platforms, Windows hosting servers, Linux hosting servers, hosting types, Implementation of hosting, Introduction to new trend in website development, CMS, PHP framework etc.

Unit V **(3 hrs)**

Introduction to JSP and Servlet, Website design using JSP, Introduction to server side programming, servlet configuration and implementation

Unit VI **(4 hrs)**

Basic of Python language, installation, environment, syntax, data types, operators, variables, statements, loops, function, python as object oriented language.

Advanced Industrial Course on Android Development

Course Code: VAC-1509
Duration: 42 hrs
Total marks: 50

Course Outcomes(CO):

Upon completion of the subject, students will be able to:

- **CO1.** Demonstrate their understanding of the fundamentals of Android operating systems
- **CO2.** Demonstrate their skills of using Android software development tools
- **CO3.** Demonstrate their Demonstrate their ability to develop software with reasonable complexity on mobile platform
- **CO4.** ability to deploy software to mobile devices
- **CO5.** Demonstrate their ability to debug programs running on mobile devices

Unit 1 **(12 hrs)**

What is Android, History and Version, Installing software, Setup Android studio, Hello Android example, Internal Details, Android Core Building Blocks, Android Emulator, AndroidManifest.xml, R.java file, Screen Orientation, Working with Button, Toast, Button, Toggle Button, Switch Button, Image Button, CheckBox, AlertDialog, Spinner, TextView, EditText, DatePicker, TimePicker, ProgressBar, Working with hardware Button.

Unit 2 **(9 hrs)**

Option Menu, Context Menu, Popup Menu, Relative Layout, Linear Layout, Table Layout, Grid Layout

Unit 3 **(9 hrs)**

Array Adaptor, ArrayList Adaptor, Base Adaptor, GridView, WebView, ScrollView, SearchView

Unit 4 **(7 hrs)**

Android Service, Android Service API, Android Started Service, Android Bound Service, Android Service Life Cycle, Android Service Example, Internal Storage, External Storage, SQLite API, SQLite Spinner, SQLite ListView.

Unit 5 **(5 hrs)**

Notification API, Creating Notification Builder, Setting Notification Properties, Attaching Actions, Issuing Notification NotificationCompat.Builder class, Android Notification Examples

Computer Networking & Interfacing **Course Code: VAC-1408**
Duration: 36hrs **Total Marks: 50**

Course Outcomes(CO):
Upon completion of the course, students will be able to:

- **CO1.** To be familiarized with the requirements of an enterprise and address its major design areas
- **CO2.** To recognize the hierarchical network model for the enterprise
- **CO3.** Identify the networking devices and their configurations required for the design and also prepare a bill of materials
- **CO4.** Propose a design for the Server Farm of an enterprise network and discuss up gradations if needed.

Unit 1 **(9 hrs)**
Introduction to computer network, The TCP/IP and OSI networking models, fundamentals of LANs and WANs, An overview of modern Ethernet LANs, Ethernet UTP cabling, UTP cable and RJ-45 connector, transmitting data using twisted pair, fundamentals of IP addressing and routing, fundamentals of TCP/IP transport, application & security.

Unit 2 **(10 hrs)**
Introduction to computer network, The TCP/IP and OSI networking models, fundamentals of LANs and WANs, An overview of modern Ethernet LANs, Ethernet UTP cabling, UTP cable and RJ-45 connector, transmitting data using twisted pair, fundamentals of IP addressing and routing, fundamentals of TCP/IP transport, application & security.

Unit 3 **(8 hrs)**
Introduction to computer network, The TCP/IP and OSI networking models, fundamentals of LANs and WANs, An overview of modern Ethernet LANs, Ethernet UTP cabling, UTP cable and RJ-45 connector, transmitting data using twisted pair, fundamentals of IP addressing and routing, fundamentals of TCP/IP transport, application & security.

Unit 4 **(9 hrs)**
WAN concepts, OSI layer 1 for point-to-point WANs.WAN connections, WAN cabling standard, the PPP protocol field, PPP link control protocol, PPP configuration. OSI layer 2 for point-to-point WANs, frame relay and packet-switching services, frame relay configuration and verification.

Title of the Course: Data Analytics and Machine Learning **Course Code: VAC-1714**
Duration: 36 hrs **Total marks: 50**

Course Outcomes(CO):
Upon completion of the course, students will be able to:

- **CO1.** To introduce students to the basic concepts and techniques of Machine Learning.
- **CO2.** To become familiar with regression methods, classification methods, clustering methods.
- **CO3.** To become familiar with Dimensionality reduction Techniques.
- **CO4.** To be familiar with a set of well-known supervised, semi-supervised and unsupervised learning algorithms.

Unit 1 **(9 hrs)**
Introduction to data science. Frame the problem, Understanding data- data wrangling, exploratory analysis, extract features, Presents results, Programming languages- A survey of programming languages for data science – Python, R, MATLAB, Octave, SAS, Scala, Data Munging – String manipulation, Regular expression, and data cleaning.

Unit 2 **(8 hrs)**

Data analysis and visualizing data in R and Python programming languages. Different charts, Means, standard deviation, median, quantiles, scatterplots, scatter matrices, correlations, Application of Statistics and predictive analytics in a business environment.

Unit 3 **(10 hrs)**

Introduction to machine learning. Different types of learning. A formal model The statistical learning framework, empirical risk minimization, A Formal Learning model - PAC learning, releasing and realizability assumption agnostics PAC learning, Learning via uniform convergence, The Bias-complexity tradeoff. The VC-dimension, Infinite-size classes can be learnable, The Fundamental theorem of PAC learning, Nonuniform learnability. The Runtime of learning, implementing ERM rule

Unit 4 **(9 hrs)**

Linear predictor – Halfspaces, linear regression, logistic regression, Boost – weak learnability, AdaBoost, AdaBoost for face recognition, Model selection and validation, model selection using SRM, convex learning problem- convexity, lispchitzness and smoothness, surrogate loss function, Regularaization and stability, Thikhonov regularization as a stabilizer, Controlling the fitting stability tradeoff, stochastic gradient descent, support vector machine, Kernel method, multiclass, ranking, complex prediction problem, decision trees, nearest neighbor, neural networks.

Implementation of Digital VLSI design using Tanner EDA tool **Course Code: VAC-1812**
Duration: 42 hrs **Total marks: 50**

Course Outcomes(CO):

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

CO1: Express the layout of simple MOS circuits, combinational logic circuits such as adders and multiplexers using Lambda based design rules.
CO2: Apply the Lambda based design rule for subsystem design and measurement of delay and power.
CO3: Integrate design flow from schematic capture through simulation and waveform viewing using tanner EDA tools.
CO4: Differentiate various FPGA architecture and simulation of CMOS combinational and sequential circuits using SPICE simulator.

Unit 1 **(11 hrs)**

Introduction to VLSI Systems, Basics of MOS transistors, Design of Combinational logic circuits such as half adder, full adder, Multiplexers etc.

Unit 2 **(10 hrs)**

CMOS Transmission gate , Pseudo-nMOS logic, Various CMOS logics, Delay and power measurement of VLSI digital circuits, Design of Low power , low delay VLSI circuits

Unit 3 **(10 hrs)**

Introduction to SPICE (Operating point analysis, DC sweep, Transient analysis, Transfer function analysis), An overview of Tanner EDA tools,

Unit 4 **(11 hrs)**

Dynamic Characteristics of CMOS inverter, NAND, NOR and XOR gates, Parametric analysis, Measurement of Propagation delay and power dissipation, Schematic entry/Simulation of CMOS combinational and sequential circuit.

Department of Earth Science

Applications of GIS in Forest Resource Management **Course Code: VAC-1409**
Time: 32 hours **Total Marks: 50**

Background: Geographic Information System (GIS) offers an array of tools to assist forestry professionals with data management, analysis, decision-making, and monitoring. GIS software applications and extensions offer managers options for the use and management of spatial data on mobile devices, internal networks, and Web-based systems. Forestry involves the management of a broad range of natural resources within a forested area. In addition, forests provide such resources as grazing land for animals, timber, wildlife habitat, water resources and recreation areas. To balance the competing resource conservation and resource use, activities must be accommodated. Accessing the feasibility of these multiple uses is greatly enhanced by the use of GIS techniques.
With GIS technology, the average age of the information in the forest data base could be reduced from 20 years to only a few weeks. GIS can also store and analyze the forest information in ways that could not be previously done. It can be used to calculate the harvestable timber in the forest or model the spread of a forest fire. Main objective of the course is to give practical knowledge on use of GIS tools in forest resources management.

Course Outcomes (COs):
CO1. To give practical knowledge on use of GIS tools.
CO2. To give knowledge on GIS data management.
CO3. To impart practical knowledge on mapping of forest resources and deforestation.
CO4. To give knowledge on use of GIS tools in environmental management.

Course Content:

Unit I: Introduction and key concepts **(8 hrs)**
- Introduction to GIS software
- Introduction to GIS and remote sensing in Forestry
- Planning for a GIS system installation
- Working with a GIS software
- GPS data collection
- GPS data download
- Introduction to GPS

Unit II: GIS data management **(8 hrs)**
- GIS Data sources and types for forestry
- Gathering data using mobile phones
- Working with data from different sources
- Geo database creation and maintenance
- Integrating GPS data into GIS
- Attributes manipulation in GIS
- Tabular data in GIS –import/add and editing tables in GIS
- Facilitated practical exercises in working with tabular data in Excel format

Unit III: Forest resource mapping **(8 hrs)**
- Species level classification and biodiversity forestry mapping
- Change detection mapping of forest cover
- Forestry mapping of plantations and zonal mapping
- Deforestation mapping

- Fire and emergency mapping

Unit IV: Environment impact assessment **(8 hrs)**

- Identifying sites for eco-restoration
- Vegetation analysis
- Monitoring emergencies
- Satellite imagery and participatory GIS
- Satellite Imagery Interpretation and Classification
- Classification-supervised and unsupervised
- Public participation in forest management

Climate Change: Science and Impacts **Course Code: VAC-1510**
Time: 32 Hours **Total Marks: 50**

Background: Climate change is a long-term change in the average weather patterns that have come to define Earth's local, regional and global climates. These changes have a broad range of observed effects that are synonymous with the term. Changes observed in Earth's climate since the early 20th century are primarily driven by human activities, particularly fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere, raising Earth's average surface temperature. These human-produced temperature increases are commonly referred to as global warming. Natural processes can also contribute to climate change, including internal variability and external. Impacts from climate change are happening now. These impacts extend well beyond an increase in temperature, affecting ecosystems and communities. Things that we depend upon and value — water, energy, transportation, wildlife, agriculture, ecosystems, and human health — are experiencing the effects of changing climate.
North East India is vulnerable to climate change impacts due to its location in Eastern Himalayan periphery and fragile ecosystem. The certificate course on climate change aims at providing concept and knowledge on science of climate change and its impacts at global, national and regional level. The course will cover various challenges posed by climate change, and how to respond, adapt and plan to implement solutions for environmental conservation and sustainable development.

Course Outcomes (COs):
CO1. To provide concept and knowledge on science of climate change.
CO2. To understand climate change impacts at global, national and regional level.
CO3. To give knowledge various challenges posed by climate change.
CO4. To give knowledge on how to respond, adapt and plan to implement solutions for environmental conservation and sustainable development.

Course Content
Unit I: Introduction to Climate Change Science **(8 hrs)**
Concept of weather and climate, greenhouse effect and global warming; indicators of climate change; greenhouse gases in the atmosphere: sources, levels and mechanisms of action.
Unit II: Impact of Climate Change **(8 hrs)**
Climate change effects on forests, agroecosystems, freshwater and marine ecosystems, rainfall pattern; socio-economic and public health consequences of climate change; Projected impact of climate change in India.
Unit III: Climate Change Mitigation and Global Responses **(8 hrs)**
Intergovernmental panel for climate change (IPCC) and its role; United Nations framework convention on climate change, CDM and Kyoto Protocol; India's response to climate change; National Action Plan on climate change.

Unit IV: Environmental Management and Sustainable Development **(8 hrs)**
Concept of environmental management, Environmental Planning, Concept of sustainable development and sustainability, Environmental priorities in India for sustainable development, Challenges to meet sustainability, Sustainable Development Goals.

Applications of Remote Sensing and GIS in Hazard Management **Course Code: VAC-1608**
Time: 36 Hours **Total Marks: 50**

Background: North East India is vulnerable to hazards like earthquake floods, river bank erosion, landslide and forest fire due to geographical location and environmental setting. The recurrent occurrences of various natural and manmade disasters in recent time have drawn attention towards safety of one's own life and property. Geographic information system (GIS) and remote sensing (RS) are very useful and effective tools in disaster management. The main objectives of this course is to impart both theoretical and practical knowledge on use of GIS and RS in hazard forecasting, hazard mapping and disaster management.

Course Outcomes (COs):
CO1. To understand concepts of hazards and disaster.
CO2. To know causes and impacts of different hazards particularly in North East India.
CO3. Capacity building in hazard management and disaster mitigation.
CO4. To know use of remote sensing and GIS in hazard management.

Course Content
Unit I: Introduction to Hazard and Disaster **(4 hours)**
• Concept of Hazard, Disaster, Risk and Vulnerability
• Causes and Types of hazards and disasters
• Dimensions of Natural and Anthropogenic Disaster

Unit II: Introduction to Disaster Management **(6 hours)**
• Principles and Components of Disaster Management
• Disaster Mitigation and Management Strategies
• Emerging Trends in Disaster Management.
Unit III: Introduction to Geospatial Technologies **(10 hours)**
• Basic concepts of Remote sensing, GIS and GPS
• Introduction to spatial information
• Applications of Geospatial technologies in Disaster Management
Unit IV: Hazard and Disaster Mapping Using Geospatial Technologies **(16 hours)**
• Exercises on delineation of earthquake zone, flood hazard mapping, landslide mapping, drought mapping in GIS.
• Collection and mapping of GPS and field data.

Hazard Management and Disaster Preparedness in Emergencies **Course Code: VAC-1609**
Duration: 36 Hours **Total Marks: 50**

Background: Due to geographical location and environmental setting, entire North East India is vulnerable to hazards like earthquake, floods, river bank erosion and landslide. The recurrent occurrences of various natural and manmade disasters in recent time have drawn attention towards safety of one's own life and property. Although many emergency situations from hazards like earthquake are often unpredictable, much can be done to prevent and mitigate effects as well as to strengthen the response capacity of communities at risk. Major objective of the course is capacity building in preparedness, prevention, mitigation and recovery in response to emergency situation.

Course Outcomes (COs):
CO1. To understand concepts of hazards and disaster.
CO2. To know causes and impacts of different environmental hazards particularly in North East India.
CO3. To know causes and impacts of different man-made hazards.
CO4. To understand topics of Rehabilitation, Reconstruction and Recovery.

Course Content
UNIT I: Understanding Hazards and Disaster (6 hrs)
Hazard and Disaster; Natural and Human-induced disasters – Introduction, Conceptual framework; difference between Hazard and Disaster, different stages involved in Disaster; Disaster phenomena and events
UNIT II: Environmental and Human Induced Disasters (14 hrs)
Earthquake and associated impacts, structural damage and its prevention, dams and earthquakes; Flood; causes, impacts and mitigation; Drought: causes, impacts, precautions and mitigation; Landslide and river bank erosion: mechanism and control; Occupational hazards.
UNIT III: Disaster Management and Disaster Mitigation (8 hrs)
Concept of disaster management; Community Based Disaster Management; Concept of mitigation and preparedness, Institutional framework for disaster preparedness and mitigation- Global and Indian scenario; Training and Human Resource Development Plan, Family disaster plan.

UNIT IV: Rehabilitation, Reconstruction and Recovery (8 hrs)
Recovery aspects- long term and short term, Physical and social infrastructure: Relocation and reconstruction of structural and non-structural components, Social and economic rehabilitation: Capacity building and skill enhancement for disaster preparedness in emergency situations (with reference to North East India).

Data Analysis Using Statistical Tools **Course Code: VAC-1715**
Duration: 32 Hrs **Total Marks: 50**

Background: Statistics can be defined as a branch of applied research which is concerned with the development and application methods for collecting, organizing, presenting, analyzing and interpreting quantitative data. The statistical methods and procedures are useful for socio-economic development. Statistical methods are applied to enormous numerical facts with an objective that "behind every figure there's a story". The value added course is intended to impart both theoretical and practical knowledge of statistical tools particularly MS Excel and SPSS.

Course Outcomes (COs):
CO1.To understand the basic concepts of statistics.
CO2. To give knowledge on descriptive statistics, correlation and regression analysis.
CO3. To give knowledge on use of statistical software (MS Excel and SPSS) for data analysis and interpretation.
CO4. To impart both theoretical and practical knowledge which will help students and researchers in collecting and analysing data to get useful results.

Course Content
UNIT I: Introduction to Basic Statistics (6 hrs)
General concepts and significance of statistics to applied sciences, Variables; Data collection methods; Sampling techniques; Tabulation and graphical representation of data
UNIT II: Descriptive Statistics (6 hrs)
Measures of central tendency- mean, mode and median; Measures of dispersion- variance, mean deviation and standard deviation; Standard error.

UNIT III: Correlation and Regression Analysis **(6 Hrs)**
Concept of correlation and regression; Time series analysis.

UNIT IV: Use of Statistical Software **(14 Hrs)**
Data analysis using MS Excel; Data analysis using SPSS: Data entry, editing, transformation and cleaning in SPSS; Using descriptive statistics & charts to summarize data in SPSS.

Department of Economics

Management of Financial Services **Course Code: VAC-1511**
Duration: 30 Hrs **Total marks: 50**

Course Outcome:
CO1: The course will enable to gain knowledge on the emerging scenarios and changes in the banking industry.
CO2: The Course will enable to learn how a bank operates and functions.
CO3: The course will help to understand the credit policies of NPA management system.
CO4: The course will introduce the whole range of products currently being offered by the banks.
CO5: It will develop the skill of computer based accounting for employability of learners.
CO6: The course will expose the students to various career prospects and future growth with the banking industry.

Course Content:
Unit 1: Banking Scenario in India-An overview **5 hrs**
Origin and growth of commercial banks in India, Financial Services offered by banks, changing role of commercial banks, Role of banks in economic growth of the nation, Bank mergers and its implication.
Unit 2: Banking System: Operations and Functions **5 hrs**
BASEL Committee norms, liquidity management, RBI guidelines, credit policy, prudential norms, IRAC, CAR, SARFAESI Act, Insolvency and Bankruptcy code.
Unit 3: Credit and NPA Management **5 hrs**
Credit management, principles of good lending, priority sector lending, credit appraisal techniques, credit rating agencies, CIBIL procedures, classification of sub-standard, doubtful or loss assets NPA trends.
Unit 4: Banking products and Services **5 hrs**
Various types of Deposit/Loans/credit product/ facilities and different types of securities available to bank & FI and modes of charging. Banking products, concept of CASA, KYC guidelines, demat account, electronic facilities, investment options with banks, ancilliary services of banks, merchant banking, modes of charging for financial services.
Unit 5: Use of Technology in Banking **5 hrs**
Delivery channels, ATM, mobile banking, internet banking, USSD, UPI, BHIM, Payment Gateways, /card technologies, Electronic Fund Transfer, RTGS, NEFT, IMPS, Issues in banking technology.
Unit 6: Career Prospects in Banking and Financial Sector **5 hrs**
Career opportunities in banking and financial sector in India, Financial analysts, loan officers, teller, investment banking, credit risk manager, value added courses, factors in improving employability.

Consumer decisions and Financial literacy **Course Code: VAC-1713**
Duration: 32 Hrs **Total marks: 50**

Course Outcome (CO):
CO1: The course will enable the students to understand the financial system and how it performs.
CO2: The course is intended to make sure students will be able to know the benefits of financial system.
CO3: The course is intended to make aware the students about the different financial services and personal financial management.
CO4: The course will enable the students to be aware about various consumer rights and laws.
CO5: The course is designed to acquire the set of knowledge and skills that allows an individual to make informed and effective decisions with all of their financial resources.

Course Content:
Unit 1: Instruments of Finance **6 hrs**
Personal Finance includes source of income, budgeting and Banking, Investment strategies, saving accounts, current account, fixed account and mutual funds.
Unit 2: Consumer rights and decision making **6 hrs**
Financial Decision making, Factors affecting financial decisions, Consumer credit, credit law and Rights; Banking ombusment law; RTI; negotiable instrument
Unit 3: Banking and consumers **8 hrs**
Personal bankruptcy, insurance and income tax, account holder, investment; different types of loans, Banking interest; Different types of banks.
Unit 4: Stock market **8 hrs**
Meaning, working structure; instruments of stock market; Shares, debentures, interest; Method of payments; mode of investment; De-mat account; share holders, benefit and risk.
Unit 5: Other information **4 hrs**
Short term savings; Employee and employer benefit; Social security; Career in banking; online baking.

Recent Developments in Monetary Policy in India **Course Code: VAC-1813**
Duration: 30 Hrs **Total Marks: 50**

Course Outcome (CO):
CO1: To impart a complete and detailed insight of monetary policy in India.
CO2: To educate the students about the contemporary policy reforms taken in to design current monetary policy.
CO3: To inform and aware the students about the use of various instruments of monetary policy.
CO4: To decipher the knowledge among students about the design, implementation and policy assessment of monetary policy practiced by Reserve Bank of India.
CO5: The course will help students to understand how monetary policy affects Indian Economy.

Course Content:
Unit 1: Overview of Monetary Policy **6 hrs**
Overview: Basic concepts, objectives, advantages and disadvantages, design, instruments and implementation of monetary policy in India
Unit 2: Policy Implication of Monetary policy **6 hrs**
Policy implications of monetary policy: Expansionary and Contractionary monetary policy in the context of India; Working of monetary policy with fiscal policy
Unit 3: Reforms in monetary Policy **6 hrs**
Major policy reforms in monetary policy in India after 21st century and their impacts on Indian economy-1: CRR, SLR, Bank Rate, Base Rate, Repo and Reverse Rate.

Unit 4: Monetary policy and Indian Economy **6 hrs**
Impacts on various instruments on monetary policy on Indian economy; other instruments, Liquidity Adjustment Facility (LAF), Marginal Standing Facility (MSF) and Market Stabilisation Scheme (MSS)
Unit 5: Assessment and Evaluation of monetary **6 hrs**
Assessment and Evaluation of monetary policy and the role of monetary policy in economic growth in the context of India economy and problems of monetary policy in India

Jugular vein of Economy: Banking and Finance **Course Code-VAC 1815**
Duration: 32 Hrs **Total Marks: 50**

Course Outcomes
CO1: To enable the students to understand the benefits of financial literacy.
CO2: To give a holistic view of the financial system in India.
CO3: The course will help the students to know the various Contemporary issues on banking, discussion on various researches in banking area.
CO4: The course will help the students to understand the benefits and potential of Micro finance.
CO5: The course will be helpful for students in exploring the various career opportunities in banking sector.

Course Content:
Unit 1: Financial Literacy & Financial Inclusion **6 hrs**
Introduction to the term financial literacy & inclusion, various schemes of financial inclusion, working of clearing house and changes over the time, Various research done in this area.
Unit 2: Financial System: Its over view: **8 hrs**
The Indian financial system, Financial Institutions, Financial Markets, Financial Instruments, and Services.-Functions of the Financial System. Recent changes in Indian financial system.
Unit 3: Micro finance: **6 hrs**
Introduction to the concept, working of Micro finance, Self help Group, Role of banks in microfinance. Various research paper discussions on micro finance.
Unit 4: Career opportunity in Banking and Mutual fund. **6 hrs**
Exposure to various bank exams, preparation methods for exam, introduction to the term mutual fund, risk involve in mutual fund, merits and demerits of investing funds in Mutual fund
Unit 5: Contemporary issues and Research in banking Sector: **4 hrs**
Group discussion on various Contemporary issues on banking, possible research area in banking, various report of RBI, Data management in bank.

GST: an Inclusive Tax Regime **Course Code: VAC-1816**
Duration: 30 Hrs **Total Marks-50**

Course Outcome:
CO1: The course is intended to decipher the understanding of role of GST in designing an inclusive and robust tax regime for India.
CO2: The course will help the students to understand how far the GST has helped to achieve inclusive tax regime in India.
CO3: The course will help candidate's to gain the knowledge of various concepts and historical outlook of GST.
CO4: The course will enable the students to understand the structure in framing a new tax regime and the idea of "One nation one tax structure" both in theoretical& practical way.
CO5: Most importantly, the course will enable students to understand how GST affects the India Economy to Grow.

Course content:

Unit 1: History of Indirect Tax reforms in India **6 hrs**

History of indirect taxes in India, Govt. of India Act, 1935, Introduction of Sales Tax in India, introduction of value added tax (VAT) in India, Modified value added tax (MODVAT) 1986, Central value added tax (CENVAT) 2002, VAT ACT, Reduction in Custom duties 1990, services tax 1994, GST 2017.

Unit 2: Introduction of GST **6 hrs**

GST, History of GST, GST in other countries, Genesis of GST in India, Constitutional Amendment for GST, Legislative Framework.

Unit 3: Structure of GST **6 hrs**

Structure of GST, Benefits of GST,GST rates, rationality of GST rates, Extent of CGST Act/ SGST Act/ UTGST Act/ IGST Act, Applicability of GST in India

Unit 4: Levy and collection **6 hrs**

Levy and collection as per CGST Act, 2017, Levy and collection as per IGST Act, 2017, GST on Alcohol for human consumption, GST on Petroleum, Liability to pay CGST.

Unit 5: Economics of GST **6 hrs**

Revenue and Economic growth, Impact of GST on Indian Economy, Implication on central, state and local governments, GST and Microeconomic Indicators, Tax revenue and GST.

Department of Education

Digital Pedagogies (PGCEDP) **Course Code: VAC-1827**

Course Duration: 36 Hrs **Total Marks-50**

Introduction :

The PCEDP is a professional development programme that focuses on the application of information and communication technologies (ICTs) for pedagogical transformation.

Taking full advantage of available emergent information and communications technologies, the PCEDP represents engaging, and state-of-the-art training in technology-mediated education. It will encourage innovation in both teaching strategies and curriculum design among professional educators in either the K-12 system or in tertiary and vocational education.

Course Outcomes(CO)

CO1. Students will be armed with an in-depth knowledge and understanding of digital pedagogies, informed by current practice, scholarship and research.

CO2. Subject Matter Expertise: Able to apply different ICTs in various competency areas, from teaching to creating engaging and collaborative learning environments.

CO3. General Communication Skills: Able to use a range of ICTs and social media for communication and educational purposes.

Unit 1: Games & Augmented Reality in Education **8 hrs**

- 'Serious games', immersive environments and augmented reality as contexts for learning.
- Visual and experience-oriented engagement with complex ideas, and the role of play in collaborative learning.
- Various game-based learning and augmented reality technologies

Unit 2: Social Media for Education **7 hrs**

- Social media technologies and explore how they can support learning outcomes.
- Models of learning
- Traditional social media tools of blogs, micro blogs and social bookmarking: the future of social media as a communications channel for both pedagogues and students.

Unit 3: Digital Discipline Learning **7 hrs**

- Use of available ICTs in subject-specific disciplines from art and design, to science and philosophy.
- Theories of technology-assisted learning in highly specialized subject areas.
- Case study analysis

Unit 4: Technology Mediated Assessment **7 Hrs**

- Issues for using readily available technologies in assessment scenarios.
- Theories of learning assessment and international assessment standards.
- Students will examine various available and emerging designs for assessment tasks and in management of technology infrastructure

Assessment in Higher Education **Course Code: VAC-1828**
Course Duration: 36 Hrs **Total Marks-50**

Introduction:

Assessment in Higher Education will provide an insight into some basic but fundamental questions about assessment. The term assessment refers to general processes connected with monitoring of the student's learning progress. Classroom assessment plays a very important role in education and there are mainly four reasons why assessment of students is necessary-To compare students with each other, to see if students meet a particular standard,to help the student's learning and to check if the teaching programme is doing its job.

Course Outcomes (CO)

CO1. Design an assessment that is constructively aligned (content, level, methods) with the course objectives and activities

CO2. Apply the quality criteria with respect to validity, reliability and transparency for construction of assessments and assessment items

CO3. Analyze the assessment output and results, assess the quality of the assessment and make decisions about students' grades accordingly

CO4. Formulate future improvements for an assessment

Unit 1: The Assessment Plan **8 hrs**

- Making an assessment plan and select the right testing methods
- An assessment plan with the use of intended learning outcomes
- Developing questions and assignments that exactly match your learning objectives

Unit 2: Feedback & grading design **7 hrs**

- Importance of feedback and how to provide feedback using rubrics.
- Functions of the rubric and its advantages and disadvantages.
- Stage of grading, methods of setting a cut-off score.

Unit 3: Assessment construction **7 hrs**

- Understanding reliability and a valid representation of students' actual abilities
- Construction of assessments and assessment items.
- Impact on the future education and careers of students.

Unit 4: Assessment Analysis and Evaluation **7 hrs**

- Time Management on grading and publishing the results.
- Analyze students' performance on the different tasks or questions.
- Drawing conclusions and make plans for future improvements

Basics in Counselling **Course Code: VAC-1817**
Course Duration: 36 Hrs **Total Marks-50**

Introduction

If we just look around or talk to people, we will find that most of them are undergoing stress, trauma, family disputes, physical or psychological abuse, or violence. There are always minor and major problems at home with children, parents, siblings, in-laws, between couples, problems at school, or stress of life. Change in the lifestyle of people, change in family structure, and high expectations for scoring marks in examination are few of the facts which are leading people to unhealthycompetitions, and somewhere it is affecting their personal, social, emotional, cognitive and psychological well-being. During those hard time people always sought help and advice from the elders of the family, from teachers or friends. But sometimes this help was not sufficient, and we need a trained counsellor who can provide us the needed support and guidance and can help us to realize our goals and achieve maximum in life.

An effective helper may be said to be a professional who is able to facilitate a change in the beliefs, the feelings, the thought processes and the behaviour of an individual, to bring about a positive result-oriented outcome of his/her circumstances or situations. There is a saying that "Helpers help, effective helpers help effectively. Therefore, this course is intended to provide the knowledge of basic counselling.

Course Outcomes (CO)

CO1. To understand the basic skills of counselling
CO2. To practise the skills for effective counselling in all the spheres of mental wellbeing
CO3. To create awareness to become an effective helper
CO4. To sensitize students regarding various issues and training on coping strategies

Unit 1: Introduction to counselling **7 hrs**

- Counselling for Human growth and development and adjustment
- Introduction to Counselling theories
- Basic skills in counselling process
- Role play

Unit 2: Mental health and well-being **10 hrs**

- Concept of Mental Health and Well-being
- Importance
- Measures to improve Mental Health
- Developing self Awareness to be an effective helper (skill workshop)

Unit3: Special concerns in counselling **9 hrs**

- Career counselling – career development
- Organise a Career Talk
- Group counselling
- Organise a Class Talk

Unit 4: Assessment and Appraisal in counselling **10 hrs**

- Application of psychological tests
- Positive Coping Skills
- Developing coping skills
- Learning Review Journal

Aptitude Skill Training And Personality Development **Course Code: VAC-1826**
Course Duration: 36 Hrs **Total Marks-50**

Introduction:
This programme is designed for the benefit of the students as it will enhance their knowledge and understanding for their professional life. Students can make use of this programme to get trained to deliver their best in the selection process of various institutions.

Course Outcomes (CO)
CO1. To build self confidence, enhance self esteem and improve overall personality of the participants.
CO2. It aims in grooming the participants through sensitizing them about proper behaviour, socially and professionally in formal and informal circumstance.
CO3. To impart skills such as aptitude, reasoning and soft skills that would aid in the employability of the student

Unit 1: Quantitative Ability and Reasoning Ability **8 hrs**
- Meaning and Concept
- Applications
- Test Tricks

Unit 2: Verbal Ability and Communications **7 hrs**
- Meaning and Concept
- Applications
- Test Tricks

Unit 3: CV writing skills and Interview Technique **7 hrs**
- Meaning and Concept
- Applications
- Test Tricks

Unit 4: Personalized Attention and Personality Development **7 hrs**
- Meaning and Concept
- Applications
- Test Tricks

Department of English

I. Communication Skills and Personality Development **Course Code: VAC- 1411**
Duration: 36 hrs **Total marks: 50**

Course Outcomes:
CO1- To acquaint the students with the necessary communication skills to exhibit a strong personality.
CO2- To train the students to cultivate a positive and an impressive personality with an attempt to acquire some soft skills in order to be engaged with interactive activities
CO3- To facilitate the students to appear in public platform by inculcating skills of good public speaking thereby awakening the dormant leadership quality inherent.
CO4- To encourage the students to be engaged in effective interaction with persons of various fields in the society in order to contribute towards building up harmonious and peaceful society.

Offered to:
Students of all streams

Course Contents:
Module I: Introduction to Communication Skills **[6 hrs]**

Communication, Major types of Communication, Process of Communication.

Module II: Personality Development **[6 hrs]**

Meaning and various Aspects of Personality Development

Module III: Soft Skills **[6 hrs]**

Introduction, General mechanisms to develop Soft Skills.

Module IV: Facing an Interview **[6 hrs]**

Basic Preparatory skills, Facing an interview, Common mistakes committed and Ways to overcome mistakes, Interaction.

Module V: Public Speaking **[6 hrs]**

Importance of Public Speaking skills in the present scenario, Leadership quality, Activities conducted to develop the skills.

Module VI: Interpersonal Communication **[6 hrs]**

Interpersonal Communication , Understanding the Basic Communication Skills-Reading, Writing, Listening, Speaking.

II. Creative Writing-Short Story

Course Code: VAC-1513
Duration: 36 hrs
Total marks: 50

Course Outcomes:

CO1-To acquaint the students with the art of Story telling as a part of Oral and Written communication
CO2- To acquaint the interested students with the art of Creative Writing and appreciation of Fiction
CO3- To inculcate in the students a spark of Creativity associated with skillful maneuvering of technique of Story telling
CO4- To acquaint the students with the history of Fiction and various phases of historical developments taking place in different parts of the world in different languages.

Offered to:
All the Post Graduate students of the department

Course Contents:

Module I: Introduction to Short Story **[6 hrs]**

Definition and Nature of Short story, History and Genealogy,

Module II: Elements of Short Story **[6 hrs]**

Narrative and Narration, Point of view and Perspectives, Character and Theme

Module III: Use of Figurative language **[6 hrs]**

Metaphors, Figures of Speech, Literary Devices used in writing a Short Story

Module IV: Reading of the work of Renowned story tellers around the Globe including the authors from the NorthEast **[6 hrs]**

Guy de Maupassant, O, Henry, Anton Chekhov, Humayun Ahmed , Sourabh Kumar Chaliha

Module V: New grounds and developments in Story telling **[6 hrs]**

.Module VI: Reading of Folk Tales and Oral Literature **[6 hrs]**

Interpersonal Communication , Understanding the Basic Communication Skills-Reading, Writing, Listening, Speaking.

III. Theatre and Stagecraft

Course Code: VAC-1514
Duration: 36 hrs
Total marks: 50

Course Outcomes:

CO1- The chief aim is to introduce the students with the basic skills of theatrical performances
CO2- To help the students to read plays within the contexts of Dramaturgy
CO3- To help the students to find a platform for acting and writing plays within the current social milieu

CO4- To introduce the students with the art of stagecraft including Setting, Lighting and Production

Offered to:
All the Post Graduate students of the department

Course Contents:
Session 1: Lecture on Theatre and Stagecraft
Module I: Dramaturgy, Theatre, Stagecraft **[6 hrs]**
Definition, Different types of Theatre- Absurd theatre, Epic Theatre, Theatre of Cruelty, etc
Module II: Theatre and Audience **[6 hrs]**
The role of audience in the appreciation of Drama , Theatre of Catharsis; Act of Alienation
Module III: Production of a play with diverse techniques of Naturalism and Expressionism **[6 hrs]**
Module IV: Theatre and Society **[6 hrs]**
Experimental/Brechtian theatre- Epic theatre, Self and Identity, Alienation, Audience as analyst
Module V: Masters of Indian Theatre: **[6 hrs]**
Theatre of Roots of RatanThiem, Habib Tanvir, K.N. Pannikar, B.V. Karanth and H. Kanhailal
Module VI: Masters of European Theatre: **[6 hrs]**
Ibsen, Miller ,Beckett , Brecht
Session 2: Enactment and Demonstration. This session will contain demonstration where students are given certain themes, situations ,small stories to enact under the supervision of the resource person.

IV. Creative Writing-Poetry **Course Code: VAC-1717**
Duration: 36 hrs **Total marks: 50**

Course Outcome:
CO1: The students of the course will be acquainted with the art of writing and interpreting poetry-the most gracious of all arts.
CO2: The course will also equip the learners with the ability to convert human emotions into powerful expressions which can rhyme with the concert of voices and music.
CO3: The students of the course will also get equipped with the abilities of poetic composition in multiple ways.
CO4: To acquaint the students with the rich heritage of Poetry in England and Europe with special emphasis of Modernist style of Writing

Offered to:
All the Post Graduate students of the department

Course Contents:
Module I : Origin of Poetry and Poetry in Various Ages **[6 hrs]**
Introducing students with poetry and its feature through ages
Module II: British, American, Assamese Poetry **[6 hrs]**
Introducing representative poetry and poets from British, American , Assamese and Northeastern poetic tradition, A brief introduction on Indian poetry written in English.
Module III: Modernist Art Movements and Transition at poetry **[6 hrs]**
Imagist Poetry, Symbolism in Poetry
Module IV: Socio-Political and Cultural Influences in Poetry **[6 hrs]**
Tracing the impact of society, socio-political events in poetry as an art and form.
Module V: Poetry from the North-East **[6 hrs]**
Discussion on the trend, History and representative figures of NorthEastern poetry.
Module VI: Writing Poetry **[6 hrs]**
Engaging students with writing poetry by offering themes, topics etc.

V. Public Speaking, Anchoring and News Reading **Course Code: VAC-1818**
Duration: 36 hrs **Total marks: 50**

Course Outcome:
CO1. The students of the course will be equipped with the art of public speaking, anchoring and news reading
CO2. The students of the course will have the chance to develop the skills of eloquence, public speaking, confidence building and communication with masses along with some other basic technical aspects of the media world
CO3. To introduce the students with the effective system of Print and Electronic media with special emphasis on ethics of Journalism
CO4. To acquaint the students with the emerging challenges in the days of Digital media, television and TRP.

Offered to:
All the Post Graduate students of the department

Course Contents:
Module I: Definition of Media and Communication **[6 hrs]**
Communication, Public Speaking , Journalism and Public responsibility
Module II: Television and News reading **[6 hrs]**
News reading and Anchoring
Module III: Famous Media Personalities in India and Abroad **[6 hrs]**
Module IV: Responsible News Coverage & Anchoring **6 hrs]**
Module V: Ethics, TRP and Popular media **[6 hrs]**
Module VI: Digital Media **[6 hrs]**
News portal, blogs, Youtube, Netflix etc

Department of Library and Information Science

Information Retrieval Techniques from Academic and Scholarly Databases **Course Code: VAC-1412**
Course Duration: 34 hrs **Total marks: 50**

Course Outcomes (CO)
CO1 To give students an understanding and knowledge of different academic databases
CO2 To provide them the skills to search form different search engines and digital libraries by using various search strategies
CO3 To enable the students to Identify and retrieve Primary and Secondary data for research purpose
CO4 To familiarise the students with latest trends of information retrieval in context of Digital and Virtual libraries

Unit-I Search Techniques **(6hrs)**
-Search Strategies- Introduction, definition, meaning, function
-Types of Search Strategies- Boolean search, Phrase searching, Truncation search and Proximity search
Unit-II Databases and Networks **(12hrs)**
-Academic Databases- Introduction, needs and Importance
-Type of Academic Databases- Subscription based, Open access,

Bielefeld Academic Search Engine (BASE) & Reference works, Google Scholar etc.
-Academic databases and Networks in India-
INFLIBNET, Shodhganga, Shodhgangotri, Vidyanidhi, E-Gyankosh, Indian Citation Index
-Publishing and Media Houses- Online publications, E-Publishing

Unit-III Searching Tools **(10hrs)**

-Search tools- Web search engines, Meta search engines, Web directories
-Web search software- Web crawler

Unit-IV Recent Trends in Repository and Library **(6hrs)**

-Virtual Library- Google Books, Internet Archive, LibriVox, ProQuest etc.
-Digital Library- World Digital Library, National Digital Library (India), China Digital Library etc
-Internet Archive

An Advanced Approached to Web Designing **Course Code: VAC- 1613**
Duration: 34 hrs **Total marks: 50**

Course Outcomes (CO)

CO1 To make the students to understand the principles of creating an effective web page, including an in-depth consideration of information architecture
CO2 To familiarise the students with graphic design principles that relate to web design and learn how to implement theories into practice
CO3 To develop their skills in analysing the usability of a web site
CO4 To make the students to understand how to plan and conduct user research related to web usability

Unit-I Web Technology Tools **(9hrs)**

-Introduction to Web Technology- Definition, meaning, importance
-Tools- HTML: The Foundation of any Web Site, DHTML (JavaScript ,CSS and CSS-P,DOM), The Backend: PHP and Perl, The Future: SVG and XML

Unit-II Content Management Software: Drupal **(9hrs)**

-Basic Concepts of Drupal- Getting Started with the Drupal 8 UI, Creating Basic Content,
-Drupal 8 Structure and Site Organization- Working with Advanced Content
-System and Site Configuration- User and Access Control, Extending Drupal, Drupal 8 and Themes

Unit-III Content Management Software: JOOMLA **(8hrs)**

-Introduction and Installing Joomla- 3.x
- Joomla 3.x Backend Control Panels,
-Building Site Basics,
- Content Organization,
-Setting General Preferences for Articles,
- The Joomla 3.x Frontend Site,
- Working with Templates,
- SEO Tips and Tricks in Joomla 3.x

Unit-IV WORDPRESS **(8hrs)**

-Introducing Wordpress
- Creating Blog Content,
- Importing/Exporting Content

Advanced Library Software Training **Course Code: VAC- 1515**
Course Duration: 36 hrs **Total Marks: 50**

Course Outcomes (CO)

CO1. To provide advanced concepts and skills in Information Technology in library system

CO2. To develop required Information Technology handling skills as well as hardware and software handling skills
CO3. To be aware about latest developments of Library Automation and Open Source

UNIT-I Library Software and its Implementation **(5hrs)**
-Development of Library Automation Software –its Function and requirements
-Systems requirements - Function and requirements
-Implementation of Library Automation Software
UNIT –II Library Software Packages: Recent Trends **(10hrs)**
-Available Library Software Packages in India
-Trends and future development of Library Automation Software
UNIT-III Selection and Evaluation of Library Automation Software **(11hrs)**
-Evaluation of Library Automation Software
-Selection criteria for hardware and software
-Library Automation Software – Open source / Commercial
-Automation Identification Methods: Bar coding, RFID
UNIT-IV Practical Application **(10hrs)**
-Practical Classes

Effective Academic Writing and Preservation **Course Code: VAC- 1516**
Course Duration: 38 hrs **Total Marks: 50**

Course Outcomes (CO)
CO1. communicate effectively in specific writing situations, which may include various academic, professional, or civic situations;
CO2. understand and respond appropriately to the critical elements that shape communication situations, such as audience, purpose, and genre;
CO3. critique their own writing and provide effective and useful feedback to enable other students to improve their writing;
CO4. demonstrate critical and evaluative thinking skills in locating, analyzing, synthesizing, and using information in writing activities.

UNIT-I Introduction of effective academic writing and presentation **(6 hrs)**
-Need and purpose of academic writing
-History of academic writing
-Genre
-Audience and purpose in texts

UNIT-II Paragraph Writing **(8hrs)**
-Paragraph structure
-Basic rhetorical modes (narration, description, exposition)
-Writing process (pre-writing, writing, re-writing)
-Stylistics (vocabulary, conciseness)
UNIT-III Summary writing **(8hrs)**
-Analyzing text structure
-Topic,
-Main points
-Thesis formulation
UNIT-IV APA requirements **(8 hrs)**
-Quoting and paraphrasing,
-Summarizing.
-Plagiarism.

- In text referencing and reference lists
-Citation of sources.

UNIT-VSynthesis writing. **(8 hrs)**

-Topics for writing.
-Finding and evaluating relevant sources

Department of Mathematics

Title of the course : **LaTex** **Course Code : VAC- 0301**
Course Duration : **33hrs.** **Total Marks: 50**

Course Outcomes:
CO 1 : It will help the students to comprehend the successfully install Latex.
CO 2 : It will give an understanding on how its related components on a home/personal computer.
CO 3 : Students use LATEX and various templates acquired from the course to compose mathematical documents, presentations and report.
CO 4 : It will help to access CTAN and other resources to obtain additional packages.
CO 5 : It offers techniques for writing documents, mathematical formulas, preparing beamer presentation, import graphics as well as building diagrams and enhancing figures etc.

Course Details:
Unit 1: Introduction to LaTex, history, Its merits and demerits. Installation of the software LaTex. **10 hrs**
Unit 2: Understanding LaTex compilation Basic Syntex, Writing equations, Matrix, Tables etc. Page Layout – Titles, Abstract, Chapters, Sections and subsections, References, citation. List making environments, Table of contents, Generating new commands, Figure handling numbering, List of figures, List of Tables, Generating index. **10 hrs**
Unit 3: Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, alogorithmic graphic, color, tilez listing.Classes: Article, book, report, beamer, slides, IEEtran
Writing Resume, question paper, article and research papers. **10 hrs**
Unit 4: Presentation using beamer. Reference writing using bibTex. Practical based on the above concept **4 hrs**

Mathematica **Course Code: VAC -0303**
Duration: 31 hours **Total Marks: 50**

Course Outcomes:
CO 1: It will help the students to allow a web browser to act as a front end to a remote mathematica server.
CO 2: It is designed to allow a user-written application to be remotely accessed via a browser on any platform.
CO 3: Due to bandwidth limitations interactive 3D graphics is not fully supported within a web browser.
CO 4: Wolfram Language code can be converted to C code or to an automatically generated DLL.
CO 5: This course is an application-oriented introduction to the two languages.
CO 6:The student will be exposed to simple math computations, modeling and simulation problems, data analysis and processing, as well as visualization techniques.

Course Details:

Unit1: Introduction to Mathematica and to the Wolfram Language (knowledge-based language, built-in support for real-world entities, Wolfram Alpha and the Wolfram Demonstrations Project). **5 hrs**

Unit2: Typesetting and presenting your work and data (2D typesetting and LaTeX output, 2D/3D charts,deploying interactive documents, 100+ supported file formats for import and export). **5 hrs**

Unit3: Numerical and symbolic computations (arbitrary-precision arithmetic and automatic precision tracking, dynamic interactivity). **5 hrs**

Unit4: Lists, strings, rules, patterns and pattern matching.Different programming paradigms (procedural, functional and rule- based) **5 hrs**

Unit5: Graphics and image manipulation (the 30+ members of the plot family, pixels and voxels, the built-inimage editor). **5 hrs**

Unit6: Linear and polynomial algebra. Exact and numerical optimization. Calculus and differential equations (analytic and numerical solutions of ODEs and PDEs). Plane and solid geometry. Probability andstatistics (descriptive statistics, built-in support for 100+ distributions). **6 hrs**

Matlab **Course Code: VAC-0302**

Duration: 32 hours **Total Marks: 50**

Course Outcomes:

CO 1: It will help the students to understand computer programming.

CO 2: It will give an understanding programming system to learn, versatile and very useful for engineers and other professionals.

CO 3: The design of the language makes it possible to write a powerful program in a few lines.

CO 4: MATLAB is being used in a wide variety of domains from the natural sciences, through all disciplines of engineering, to finance, and beyond, and it is heavily used in industry.

CO 5: Matlab is a powerful coding language in science and engineering computing. This course is an application-oriented introduction to the two languages.

CO 6: It is a powerful tool for simple math computations, modeling and simulation problems, data analysis and processing, as well as visualization techniques.

Course details:

Unit 1: Starting with Matlab: arithmetic operations with scalars, display for- mats, elementary built-in functions,scalar variables. Creating, manipulating and operating arrays.Creating and running script files. Global variables. Input and output. **6 hrs**

Unit 2: Two-dimensional plots. **5 hrs**

Unit 3: Functions and function files. Local and global variables. Inline functions. **5 hrs**

Unit 4: Programming in Matlab: relational and logical operators, conditional statements, loops and nested, loops. **5 hrs**

Unit 5: Polynomials and interpolation. Linear algebra. **5 hrs**

Unit 6: Applications in numerical analysis: solving a one-variable equation, optimization, integration andordinary differential equations. **6 hrs**

Department of Physics

Recent Developments in Nanotechnology **Course Code: VAC-1615**
Duration: 32 hrs **Total marks: 50**

Course Outcomes:

CO 1. After due completion of the course students will learn the basic properties of Nanostructures.
CO 2. Students will gather knowledge on synthesis, fabrications and characterization process of nonmaterial.
CO 3. Students will extract the knowledge on carbon nanotubes, their importance and applications in various fields.
CO 4. Students will gain the laboratory safety measures in handling instruments and chemicals, process of characterization of materials etc.

Unit I: Introduction and basics **9 hrs**

History and introduction to nanoscience and nanotechnology, Nanostructures and nanomaterials, Difference with bulk and microstructures, Properties of nanostructures, Nanomaterials of different dimensions, Evolution of density of states with size, Excitons and quantum confinement, Band gap engineering in semiconductor nanostructures, metal nanostructures and plasmon resonance, Magnetic nanostructures and super-paramagnetism

Unit II: Synthesis and fabrication of nanostructures and their characterization **7 hrs**

Top down and bottom up approaches, Various chemical and physical methods of synthesis of nanostructures, Photolithography & Electron-beam lithography for fabrication of nanostructures, Morphological, optical, electrical and magnetic characterization tools of nanomaterials

Unit III: Carbon nanotubes **4 hrs**

Crabon nanotubes and their various types, Synthesis of nanotubes by physical and chemical methods, Importance and applications of nanotubes in various fields

Unit IV: Applications **4 hrs**

Semiconductor nanostructures and their applications, Metal nanostructures and their applications, Nanostructures and their biological applications, Future outlook

Unit V: Hands on training at Nanotechnology lab **8 hrs**

Introduction to laboratory safety rules and chemicals handling, Use of digital balance, Handling and working with magnetic stirrers and hot air ovens, Semiconductor and metal nanoparticle synthesis demonstrations, UV-visible spectrophotometer: introduction, application and use in characterization of nanostructures

Advanced Computational Physics **Course Code: VAC-1712**
Duration: 32 hrs **Total marks: 50**

Course Objectives:

CO 1. In completion of the course the students will be able to know the basics of Python
CO 2. The working with different statements, like ‘if-else’, working with ‘arrays’ etc. can be learned by the students
CO 3. The students after the completion of the course will be able to understand the tools used in scientific computations
CO 4. The students will gather knowledge on the applications of Python through practical examples.

Python

Unit 1: Python Basics **12 hrs**

Introduction, Get Started, Syntax , Comments, Variables, Data Types, Numbers, Casting, Strings, Booleans, Operators, Lists, Tuples, Sets, Dictionaries, If...Else , While Loops, For, Loops, Functions, Lambda, Arrays, Classes/Objects, Inheritance , Iterators , Scope, Modules, Try...Except, User Input, String Formatting.

Unit 2: Python Tools **10 hrs**

Introduction to tools used in Scientific Computation

1. NumPy
2. Matplotlib

Unit 3: Application of Python. **10 hrs**

Practical Examples.

Astrophysics and Astronomical Instrumentations **Course Code: VAC-1819**
Duration: 35 hrs **Total marks: 50**

Course Objectives:

After successful completion of the course the students will acquire

CO 1. The knowledge of identification of stars by naked eye viewing,
CO 2. The idea of celestial sphere and coordinate system,
CO 3. The knowledge of optical techniques for observing the stars, radio data acquisition
CO 4. The idea of stellar evolution and milky way galaxy and the use of Astronomical Instrumentations

Unit I: Introduction to naked eye Astronomy **5 hrs**

The constellations and their identification, Identification of some individual stars, A sense of scale and time, A historical perspective and Copernican revolution, Earth's rotation and other motions, Eclipses, Interesting objects in the night sky, A general perspective of the universe, The value of Astronomy

Unit II: Celestial sphere and the coordinate systems **3 hrs**

Geometry of celestial sphere, alt-azimuth and equatorial coordinate systems, ecliptic, sunset and sunrise, solar and sidereal time.

Unit -III: Optical techniques for observing the stars **4 hrs**

Optical telescopes, Light gathering power, Observing in different spectral regions, Magnifying power, Resolving power, Measurement of stellar distances, Stellar magnitudes, Stellar parallaxes, Stellar photography.

Unit IV: Radio Techniques **4 hrs**

Radio telescopes, power, spectral power, brightness distribution, flux density, resolution, effective collecting area, nearby radio sources in the sky.

Unit V: Stellar Evolution and Milky Way galaxy **4 hrs**

Formation of stars, stellar energy generation, stellar prime of life, stellar structure, galaxies, dying stars, nebulae and supernovae remnants, pulsars, neutron stars and black holes.

Module-VI: Hands on training on Astronomical Instrumentation **15hrs**

- Distance of ground objects by parallax method.
- Handling of Eyepieces
- Understanding Alt-Azimuth and Equatorial mounts
- Assembling of a telescope
- Introduction to Astrophotograph

Department of Political Science

Changing Paradigm of Citizenship in North-East India **Course Code: VAC -1722**
Duration: 34 hrs **Total marks: 50**

Introduction

Political Science is a part of Social Sciences which is concerned with the theory and practice of politics, political systems and political behavior. The Department of Political Science, University of Science and Technology, Meghalaya as a part of greater Political Science family will organize a value added course on *Changing Paradigm of Citizenship in Northeast India.* The issue of citizenship has become very relevant as people of the region revolted against the continuous migration to the region. As an outcome of such movement Government of India initiated ideas to look into the issues of citizenship and Assam is the first place where it is implemented. The National Register of Citizen (NRC) is the first initiative to define citizenship and on the other hand Citizenship Amendment Bill (CAB) 2016 is also under consideration. The conflict over the issue of citizenship is very relevant in the present context and it a burning problem.

Course Outcomes (COs):

The following are the broad outcomes of this course:

CO1: To impart proper knowledge of citizenship and the contemporary debate on citizenship.
CO2: To understand the constitutional provisions for citizenship and the classification of present problems and issues on citizenship.
CO3: To explore merits and demerits National Register of Citizen and Citizenship Amendment Bill 2016.
CO4: Critical and creative thinking on the issue and emerging ideas of citizenship.
CO5: To provide exposure about the ongoing conflicts of NRC and CAB in Northeast India.

Course Contents:

- Citizenship: Approaches and Theories **(2 hrs)**
- Different Facets of Citizenship in North-East **(3 hrs)**
- Customary Laws and the Citizenship in North-East **(3 hrs)**
- Impact of Regional Differences over the Concept of Citizenship **(4 hrs)**
- Local Administration: Provisions, Challenges and Citizenship **(4 hrs)**
- Issues of NRC in North-East **(4 hrs)**
- Party Politics and Citizenship in North- East **(4 hrs)**
- Issues of Human Rights and the Concept of Citizenship **(4 hrs)**
- Citizenship Amendment Bill (2016): How Relevant in North-East **(4 hrs)**
- Citizenship: Way ahead in North-East **(2 hrs)**

"Why Do People Migrate: Theories and Approaches" **Course Code: VAC-1820**
Duration: 39 hrs **Total marks: 50**

Introduction

This course attempts to explore the theories about migration in greater depth and try to highlight how migration is a constant phenomenon throughout human history. In this course, the student will learn about different theoretical models that seek to explain why migration starts and why it continues. Student will explore migration as a structural feature of our societies and will examine individual's choices to migrate. They will consider the role networks and institutions play in the movement of people. The student will also hear from experts about how migration theories

can help us understand cases of labour migration in different regions.

Course Outcomes (COs):
The following are the broad outcomes of this course:
CO1: To identify the fundamental terminology used in theoretical debates on migration
CO2: To explore the main theoretical approaches and to understand migration as a global phenomenon
CO3: To explain the motivation for people to move and settle outside their home countries
CO4: To apply the main theories to the interpretation of real case-studies and theoretical approaches in practice

Course Contents:

- Crisis and Migration: A Humanitarian Perspective **(2 hrs)**
- Political Crisis: Impact of Migration in North East India **(3 hrs)**
- Migration problem in Urban Areas of India: A Special Reference to Assam **(3 hrs)**
- Issue of Migration from Myanmar to India: A Critical Analysis **(4 hrs)**
- Theoretical Understanding of Migration: An Indian Perspective **(4 hrs)**
- Migration problem from the USA Standpoint: Issues and Challenges **(4 hrs)**
- A Case Study on the Living Condition of Migrant: Special Reference to North East India **(4 hrs)**
- Migration and Human Rights: An Analysis from Global Perspective **(4 hrs)**
- Impact of Migration and Identity Crisis in India: A historical perspective **(3 hrs)**
- Impact of Migration, Threat on Culture and Tradition of the Indigenous People in India **(4 hrs)**
- Migration to Refugee: A global perspective **(4 hrs)**

How to Write Research Project Proposals **Course Code: VAC- 1821**
Duration: 34 hrs **Total marks: 50**

Introduction

Research is the fundamental basis of higher learning and innovation. The society develops through the strength of science and technology in various socioeconomic and political fields. It is a cumulative part of curriculum to train the students in research and innovation that provides ample opportunities for early career. Around the world, various agencies work with those research projects having abundant possibility to contribute for the promotion of modern approaches in the socio-political life. Institutions of higher studies are having specialised units to guide the young minds with lots of ready-to-use resources upto the maximum productive aspirations. This course will enable the young mind to explore their world of early career through funding agencies around the world.

Course Outcomes (COs):
The following are the broad outcomes of this course:
CO1: To encourage the students toward research oriented studies and orient them towards taking up research as a Career.
CO2: To promote early career ethics and equip them with the skill to prepare project proposals for funding from Government and Non-government organizations.

CO3: To improve the career prospects of the curriculum and providing wider scope beyond the curriculum for the enhanced employability.
CO4: Exploring national and international funding agencies in the domain of Social Sciences

Course Contents:

- Equipping One-self to Face the Academic Challenges of 21st Century **(2 hrs)**
- Research Projects as an Alternate to Early Job Seekers **(3 hrs)**
- Positioning Research in Higher Studies **(3 hrs)**
- How to Find External Funding Agencies for Research Projects **(4 hrs)**
- Tips to write Good Research Proposal **(4 hrs)**
- Developing Standard Research Methodology for Study Area **(3 hrs)**
- Tips to Effectively Communicate the Funding Agencies to Provide Fund for Research Study **(4 hrs)**
- Agencies Providing Funds for the Young Scholars of Social Sciences **(4 hrs)**
- How to enhance the Research Prospect of the Proposal at the Initial Stage **(3 hrs)**
- Thinking beyond the Paradigm to Develop the Research Interest **(4 hrs)**

Department of Rural Development

Rural Technology **Course Code: VAC 1413**
Course Duration: 33 hrs. **Total marks: 50**

Course Outcomes
CO1. This course will give an opportunity to the students to learn about different aspects of Dairy Farming
CO2. Students of this course will have the chance to learn about the scientific process of Pig Farming and its Scientific Management.
CO3. Students of this course will also have the chance to learn about different aspects of Organic Farming after the completion of this course.

Unit 1: Management of Dairy Farming **(10 hrs.)**
Management of Dairy Farming- Scientific Settlement Pattern of Dairy, Health and Hygiene, Sanitation in Dairy
Unit 2: Pig Farming and its Scientific Management **(10 hrs.)**
Pig Farming and its Scientific Management- Scientific Settlement Pattern of Dairy, Health and Hygiene, Sanitation in Piggery
Unit 3: Organic Farming **(8 hrs.)**
Organic Farming- Concept, Principles and Methodology, Preparation and use of Low Cost Input- Vermicompost
Unit 4: Food Processing and Preservation **(5 hrs.)**
Food Processing and Preservation- Food Preservation, Food Processing: Packaging, Labeling, Grading

Forest and Tribal Livelihood Development **Course Code: VAC-1517**
Course Duration: 40 hrs. **Total marks: 50**

Course Outcomes
CO1. Students after completion of the course will learn about the Constitutional definition and characteristic features of North-Eastern Tribes of India
Co2. After completion of the course the students will have an idea about forest policy, tribal policy and the biodiversity of India
Co3. After completion of the course students will equally have the idea about Social and political problems of Tribes and different tribal movements of South Asia

Unit 1: Tribe **(5 hrs.)**
Tribe- A conceptual background, Constitutional definition of a tribe, Characteristics features of tribes in North East India, Tribal Societies in North East India, Modern Society vs. Tribal Society
Unit 2: Forest Policy **(10 hrs.)**
Forest Policy- Forest Policy, Tribal Policy, Forestry and Bio-diversity, Constitutional safe guards for the forest and tribal livelihood, Tribal Sub Plan.
Unit 3: Problems of Tribal Society **(8 hrs.)**
Problems of Tribal Society- Social, Cultural and Economic Problems, Impact of industrialization and modernization on Tribal Society, Problems of Tribal Women, Ethnicity and Tribalism, Tribal Elites
Unit 4: Tribal Movement **(7 hrs.)**
Tribal Movements- Tribal Movements in India, The Santhal Insurrection, The Munda Rebellion, The Bodo Movement, Jharkhand Movement
Unit 5: Training on Local based Forest minor and major products **(10 hrs.)**
Training on Local based Forest minor and major products- Forest based Cottage Industries- Concept, Sal leaf Plate making, Bamboo and Cane works, Rope making, Oil making

Title of the Course: Technologies in Agriculture and Allied Sector **Course Code: VAC-1616**
Course Duration: 37 hrs. **Marks: 50**
Course Outcomes
CO1. After Completion of the course students will have idea about different animals used in animal husbandry
CO2. After Completion of the course students will have the idea about fishery business and different issues related with them
CO3. This course will also give the exposure to the students about agri-clinic and nutritional gardens

Unit: Animal Husbandry **(20 hrs.)**
Animal Husbandry- Animals and their major breeds, Basic concept of Dairy and Poultry management, important disease and the management, AI in Cattle
Unit 2: Pisciculture **(5 hrs.)**
Pisciculture- Fish Management, Fish Breeding, Ornamental Fishery
Unit 3: Agri Clinic and Agri Business Centre **(5 hrs.)**
Agri Clinic and Agri Business Centre- Concept, Objectives and Activities
Unit 4: Nutritional Garden **(7 hrs.)**
Nutritional Garden- Concept, Basic Technologies

Department of Social Work

Project Proposal and professional report writing **Course Code: VAC-1519**
Duration: 36 hrs **Total marks: 50**

Course Outcome (CO):

CO1: To understand the concept of Project Proposal
CO2: To understand and develop the skill of project proposal making
CO3: To enhance the skills of professional report writing among the students
CO4: To understand a project's value as a tool to achieve and further the organization's Mission

Course Contents:

Unit I Understanding Project proposal **6 hrs**

- Project proposal: Concept, Importance, Necessity and Scope
- Enhancing the Skills of Proposal Making
- How to become an Expert in Proposal Making?

Unit II Logical Framework Approach (LFA) **12 hrs**

- Concept and Role of LFA in project design
- Result Based Management (RBM)
- Elements of the Logical Framework
- Strengths and weaknesses of the LFA, Assumptions, Risks and Indicators

Unit III Monitoring, Evaluation, Budgeting and Sustainability **12 hrs**

- Relevance of Monitoring and Evaluation in Project Management
- Strategies for Monitoring and Evaluation
- Tools for monitoring and evaluation
- Budgeting and Project sustainability

Unit IV Project Proposal Formulation and Report writing **6 hrs**

- Concept of professional report, Types of report, Importance of report
- Participants will prepare Project Proposal

Social Entrepreneurship **Course Code: VAC- 1724**
Duration 36 hrs **Total Marks: 50**

Course Outcomes (CO):

CO1: To understand the concept of Social Entrepreneurship
CO2: To understand and develop the skill of Entrepreneurship
CO3: To develop the understanding of Entrepreneurship in global context

CO4: To orient on opportunities of Social Entrepreneurship

Course Contents:

Unit I Understanding Entrepreneurship and Social Entrepreneurship **12 hrs**

- Who is an entrepreneur? How to become an Entrepreneur?
- Social Entrepreneurship: Concept, Importance, Necessity and Scope

- Social Entrepreneurship in India, Entrepreneurship in global context
- The four distinctions of social entrepreneurship

Unit II: The Entrepreneur and Entrepreneurship Skills **12 hrs**

- The characteristics of social entrepreneurs, factors impacting transformation into social entrepreneur
- Professional Skills, Management and marketing skills
- Creativity, Invention and Innovation
- Goal Setting and Time Management skills

Unit III: Opportunities for Social Entrepreneurs **12 hrs**

- Methods of sensing opportunities and fields of opportunities
- Enterprise launching and its procedures
- start-ups – incubation – accessing venture capital – CSR funds – PPP
- Assessing and prioritizing opportunities

Street Theatre Training **Course Code: VAC- 1520**
Duration: 36 hrs **Total Marks: 50**

Course Outcome (CO):

CO1: To understand the concept of Street Theater
CO2: To understand and develop the skill of Street Theater
CO3: To understand the Different forms of Theater
CO4: To enable the students to use of theatre and drama for community mobilization and conscientization

Course Contents:

Unit I Understanding Theater **6 hrs**

- Different Forms of Theater
- Theater In North East India

Unit II Understanding Theater on Street **6 hrs**

- What comes on Street
- Street a People's place

Unit III Yoga in Street Theater **6 hrs**

- Various forms of yoga practiced in street theater
- Yoga Ashans

Unit IV Lets Act **6 hrs**

- Extempore
- Mono Act

Unit V Understanding Acting **6 hrs**

- What is a Character
- Understanding a Character
- Being a Character in the play

Unit VI Practical Session **6 hrs**

- Writing a play
- Developing character

Public Health and Emergency **Course Code: VAC-1824**
Duration: 36 hrs **Total Marks: 50**

Course Outcomes (CO):

CO1: To understand the concept of Public Health
CO2: To know the issues concerning public health
CO3: To understand the emergency management techniques
CO4: To understand the use of social work intervention for public emergency

Course Contents:

Unit I: Concept of Health and Public Health **9 hrs**

- Concepts and definitions of health
- Dimensions on Health, Determinants of Health, Indicators of Health
- Function of Public Health, Importance of Public Health
- Model of Public Health
- Health Care legislations in India

Unit II: Threat to Public Health **9 hrs**

- Major threats to public health, Communicable and Non-communicable diseases
- Epidemics and disaster
- Vulnerable population
- Health Inequality and Health Care Disparities among Vulnerable Populations
- Public health response in action

Unit III: Emergency Management System **9 hrs**

- Concept of Emergency Management System
- Phases of Emergency Management, Personal and Professional preparedness
- Responding to Emergency situation
- Knowledge of First Aid

Unit IV: Social Worker intervention **9 hrs**

- Key aspects of Public Health Emergency Management
- Community needs assessment, Use of Social Work methods in Public Health and Emergency Management System
- Role of Social Worker: Psychosocial assessment, Family education and crisis intervention, Counselling for individuals, couples and families, Financial assessment and fund management, Information & Referral Services

Leadership and Team Building **Course Code: VAC-1823**
Duration: 36 hrs **Total Marks: 50**

Course Outcomes (CO):

CO1: To enable students learn team building
CO2: To understand OBT (Out Bound Training) methodology
CO3: To know the conflict management skills
CO4: To develop leadership qualities

Course Contents:

Unit I: Interpersonal Skills **7 hrs**

- Pro-activeness
- Getting along better
- Learning to communicate and cooperate – giving and getting

Unit II: Conflict Management **9 hrs**

- Attitudes towards conflict
- Two responses of conflict: fight or flight
- Styles of conflict management – dealing with hot buttons
- Skills of conflict resolution

Unit III: Team Building **11 hrs**

- Principles of team building – getting to know – building trust among people – focusing on other people with awareness – reaching out and helping team members
- Group identity – high level cohesiveness and its dynamics
- Spirit of team work and creativity – working together and performing
- Managing change as a team

Unit IV: Leadership **9 hrs**

- Basics of leadership – leader vs. manager & balancing both
- Understanding competition and power
- Understanding style and strengths
- Problem solving and creativity as sources
- Emotional intelligence for leaders

Department of Sociology

Social Policy and Development Administration **Course Code :VAC 1415**
Course Duration : 32 hrs **Total Marks: 50**

Course Outcomes (CO)
CO1 To introduce the students about the logic and skills of development administration
CO2 To make them to participate in the welfare activities and welfare organizations
CO3 To enable them to appreciate the structure, functions and the role and responsibilities of development organization.

Unit–I Social Policy **(6hrs)**
Social Policy - Definition, meaning, function, scope, purpose, importance of the study of social policy.
Unit–II Social Development **(8 hrs)**
Social Development - Evolution, progress and development - Human needs and quality of life, key issues in development policy
Unit–III Development Organization **(6hrs)**
Development Organization - Structure, functions, their role and responsibilities, recent trends.
Unit–IV Finance & Evaluation **(12 hrs)**
Finance & Evaluation - Budgeting and accounting in social welfare organizations; Financial resources for voluntary organizations, evaluation, types of evaluation and need for evaluation.

Soft Skills and Personality Development **Course Code: VAC-1518**
Course Duration: 36 hrs **Total Marks: 50**

Course Outcomes (CO)
CO1 To train students in soft skills
CO2 To enable them to be professionally competent
CO3 To create interpersonal skills

Unit 1: Fundamentals of Soft Skills and Personality Development (8 hrs)
Soft Skills and Personality Development- Soft Skills: Meaning and Importance - Hard Skills versus Soft Skills - Self Concept: Self Awareness, Self Development and Self Realisation – Power of Positive Attitude – Etiquette and Manners. Listening: Types of Listening, Effective Listening and Barriers to Listening – Assertive Communication.

Unit 2: Communication Skills (6 hrs)
Communication Skills- Oral Communication: Forms, Types of Speeches and Public Speaking – Presentation: Elements of Effective Presentation and Use of Visual Aids in Presentation. Written Communication: Strategies of Writing – Business Letters: Form, Structure and Formats – Types of Business Letters – Memos – Agenda and Minutes. Non-verbal Communication: Body Language and Proxemics.

Unit 3: Interpersonal Skills (6 hrs)
Interpersonal Skills: Relationship Development and Maintenance and Transactional Analysis. Conflict Resolution Skills: Levels of Conflict and Handling Conflict - Persuasion – Empathy – Managing Emotions – Negotiation: Types, Stages and Skills – Counselling Skills.

Unit 4: Employability Skills (10 hrs)
Employability Skills- Goal Setting – Career Planning – Corporate Skills – Group Discussion – Interview Skills – Types of Interview - Email Writing – Job Application – Cover Letter - Resume Preparation.

Unit 5: Professional Skills (6 hrs)
Professional Skills: Decision Making Skills – Problem Solving – Emotional Intelligence – Team Building Skills – Team Spirit – Time Management – Stress Management: Resolving Techniques.

Introduction to Professional Counselling **Course Code: VAC- 1617**
Course Duration: 34 hrs **Total Marks: 50**

Course Outcomes (CO)
CO1 To introduce the students to the concept, definition, need for counselling
CO2 To impart knowledge to the students on the various models of counselling
CO3 To equip the students on the skills, techniques and process of counselling

Unit 1 Counselling foundations (6 hrs)
Definition of Counselling and objectives. Types of counselling (concepts only): Crisis Intervention, Preventive, Problem-solving, Family Counselling, Group Therapy. Concepts of Guidance, Psychotherapy and Psychiatry. Values, Principles and Ethics of Counselling

Unit 2 Counselling Process (10 hrs)
Counselling Process: A. Relationship Building – Empathy, Unconditional positive regard, Genuineness, Respect. B. Assessment – Standardised methods: Personality tests, Aptitude Tests, Attitude questionnaires, Projective tests; Non-Standardised Methods: Observation- checklists and rating scales,

Self-reporting – Questionnaires, personal essays, journals. C. Goal setting: S.M.A.R.T. Goals, Process and Outcome Goals. D. Interventions : Affective, Cognitive, Behavioural and Interpersonal. E. Termination and Follow-up

Unit 3 Counselling Skills & Techniques **(6 hrs)**

Skills & Techniques: Active Listening, Paraphrasing, Summarizing, Confronting, Challenging, Clarifying. Interviewing skills - Questioning, Probing. Verbal & Non-verbal communication, Self-disclosure.

Unit 4 Counselling Approaches and Models **(6 hrs)**

Counselling models: Psychodynamic Approaches, Cognitive-behavioural approaches, Humanistic Approaches, Transactional Analysis, Gerard Egan's Model, Eclectic Model. Problems in counselling, Issues of counsellor: Burn out, Stress, Self-care. Record keeping, Supervision.

Unit 5 Counselling in different settings **(6 hrs)**

Family: Marital, Family counselling, Life style Counselling. Health setting: Trauma care, rape victim, AIDS, Hospital setting, Alcoholism and drug abuse, suicide.

Applications of Sociology **Course Code: VAC-1414**
Course Duration: 40 hrs **Total Marks: 50**

Course Outcomes (CO)

CO1 To understand the community and to make situational analysis.
CO2 To enable the students to equip themselves for a career in social welfare agencies
CO3 To equip the students on the skills, techniques and process of fieldwork.

Unit 1. Applications of Sociology **(8 hrs)**

Introduction to applied sociology – sociology and social problems – sociology and social change – sociology and social policy and action – sociology and development – sociology and professions.

Unit 2. Participatory Development **(6 hrs)**

Promoting Participatory Development: Need for Social Participation, Community Development and the Community Organization – Principles and Steps – Group Formation and Social Action – Capacity Building Strategies.

Unit 3. Participatory Development Techniques. **(12 hrs)**

Participatory development – Meaning, Techniques of Participatory Development, PRA techniques.

Unit 4. Counselling **(8 hrs)**

Meaning; need; Types of counselling, Methods of counselling.

Unit 5. Field Survey & Report Writing **(6 hrs)**

Need, meaning of survey, types of survey Steps in conducting survey; Data collection methods; Salient features of report writing

Using Statistical Software in Research **Course Code: VAC 1725**
Course Duration: 32 hrs **Total Marks: 50**

Course Outcomes (CO)

Co1 To introduce the students to the concept, definition, need for using quantitative research software.
Co2 To be able to perform a wide range of data organization tasks in SPSS application
Co3 Understand the basic workings of SPSS, and perform basic statistical analyses for comparisons and correlations.

Unit 1. Introduction to data analysis **(9 hrs)**

Basic features of SPSS, Preparation of SPSS Data set, Measurement scale of variables,

Unit 2. Data management **(4 hrs)**

Selection of data, Recoding of a variable, Computing new variable Merging of data sets, Imports export of data file.

Unit 3. Data analysis **(6 hrs)**

Descriptive statistics, Graph and Charts: Bar, Histogram and Pie, Frequency, histogram, normal curve, Frequency, histogram, normal curve, Cross-tabulation.

Unit 4. Testing of hypothesis **(6 hrs)**

Parametric, Z test, T test, F test, one way ANOVA

Unit 5. Correlation and regression analysis **(7 hrs)**

Two variable regression, Multiple regression and Logistic regression, Modification of outputs and exporting to different formats.

Diversity Management **Course Code: VAC-1726**
Course Duration: 34 hrs **Total Marks: 50**

Course Outcomes (CO)

CO1 To introduce the students about the different diversity issues and prejudices in the society.
CO2 To enable them to appreciate the different categories of diversities and thee problem associated with it.
CO3 To understand different issues related to diverse Diversity Programmes available to cater the issue.

Unit 1. Diversity as journey **(5 hrs)**

Diversity at the personal level (assumptions, stereotypes, prejudices, values and beliefs), Diversity at the inter-personal level (evaluation of impacts of behaviour on others), Diversity at the organizational level (auditing of policies, practices, procedures and organizational culture), The journey from awareness to understanding and appreciation.

Unit 2. Diversity issues and dilemmas **(5 hrs)**

Diversity scenarios, Solving diversity problems in the workplace, Learning to apply principles in context, Appreciation of diverse cultures, An anthropological view

Unit 3. Gender Equity **(4 hrs)**

Stereotypes of women and men in the workplace, Understanding the difference between sex and gender, Are there male and female jobs?

Unit 4. Race and racism **(5 hrs)**

Racial stereotypes in society, The storytelling circle method, Surfacing our attitudes, biases and stereotypes in a context of trust, A racial diversity case study.

Unit 5. Diversity in ability **(5 hrs)**

Definitions of disability, social model approach to difference in ability, Disability and impairment, A working definition of disability, Creating an enabling work environment

Unit 6. Self Reflection **(5 hrs)**

Manage diversity at the personal and inter-personal levels, The exclusionary workplace environment, The inclusive workplace, Evaluation of own attitudes, negative behaviours and constructive behaviours in the workplace.

Unit 7. Diversity Programmes **(5 hrs)**

Conducting a diversity audit, Diversity management programmes – success and failure factors, Mainstreaming diversity, Model to manage cultural diversity**.**

Department of Zoology

Field Survey Techniques On Herpetofauna **Course code: VAC-1416**
Duration-50 Hrs **Total marks: 50**

Course Objectives:
CO1: It will help the students to identify different types of Herpetofauna.
CO2: Students will understand the different varieties of Turtle & Tortoise.
CO3: To understand the conservation methods and importance of wildlife fauna.
CO4: Course will provide the basic understanding about the conservation of wildlife.
CO5: Course provides the career option for the student in different wildlife Institutes.

Course Contents:

Unit-I :Basic Herpetofauna **(5 hrs)**
1. Introduction to Herpetofauna
2. Ecological importance of Herpetofauna
3. Careers in Herpetofauna

Unit-II:Turtles and Tortoises **(10 hrs)**
1. Classification of Turtle and Tortoises
2. Diversity of Turtle and Tortoises of NE India
3. Survey Techniques of Turtle and Tortoises
4. Morphological study and Identification of Turtle and Tortoises
5. Threats of Turtle and Tortoises

Unit-III:Amphibia **(8 hrs)**
1. Classification of Amphibia
2. Diversity of Amphibia of NE India
3. Survey Techniques of Amphibia
4. Morphological study and Identification of Amphibia
5. Threats of Amphibia

Unit -IV: Snakes **(8 hrs)**
1. Classification of Snakes
2. Diversity of Snakes of NE India
3. Survey Techniques of Snakes
4. Morphological study and Identification of Snakes
5. Threats of Snakes

Unit-V: Lizard **(5 hrs)**
1. Classification of Lizard
2. Diversity of Lizard of NE India
3. Survey Techniques of Lizard
4. Morphological study and Identification of Lizard
5. Threats of Lizard

Unit -VI: Census and research techniques **(8 hrs)**
1. Census Technique of Herpetofauna
2. Research Methodology of Herpetofauna
3. Application of Biostatistics in Herpetofauna
4. Photography techniques forHerpetofauna

Unit -VII: Field visit **(6 hrs)**
1. Night Trekking for Amphibian Survey
2. Day Trekking for Turtle & Tortoise, Snakes and Lizard Survey

Wildlife Conservation **Course code: VAC-1618**
Duration-40 Hrs **Total marks: 50**

Course Objectives:
CO1: Students will learn as well as well trained in wildlife conservation techniques.
CO2: Course will provide understanding about the different methods of Survey.
CO3: Student will be understand & well trained in Wildlife rescue and safety.
CO4: Course will provide the basic concept of Eco-development and community conservation.
CO5: Course provides the knowledge about the wildlife crime and poaching.

Course Contents:
Unit-I: Modern concept of Wildlife Conservation **(10 hrs.)**
1. Integrated approaches in wildlife conservation
2. Protected area network – National Park, Wildlife Sanctuary, Conservation Reserve and Community Reserve;
3. Other non-protected areas – Biosphere Reserve, Tiger Reserve, Elephant Reserve etc.

Unit -II: Census and survey techniques **(8 hrs.)**
1. Wildlife Sampling methods
2. Tiger census techniques

Unit-III : Wildlife rescue and rehabilitation **(8 hrs.)**
1. Wildlife rescue and its importance
2. Translocation techniques and IUCN *Guidelines*

Unit-IV : Eco-development and Community conservation **(4 hrs.)**
1. Concept of eco-development and community conservation.

Unit-V : Wildlife Crime and Trade **(10 hrs.)**
1. Status of wildlife crime in India
2. Wildlife Crime detection techniques

Wildlife Research Techniques **Course code: VAC-1521**
Duration-40 Hrs **Total marks: 50**

Course Objectives:
CO1: Students became well understand of the wildlife conservation and methodologies.
CO2: Students will understand the uses of GIS and remote sensing in a landscape.
CO3: The course will provide knowledge about the using of instruments for observation of wildlife fauna.
CO4: Course provides a best option for students to gain knowledge about the Wildlife conservation and for research..
CO5: Students will be benefitted for joining tourism industry and earn livelihood.

Course Contents:
Unit-I: Modern concept of Wildlife Conservation **(5 hrs.)**
1. Integrated approaches in wildlife conservation
2. Protected area network – National Park, Wildlife Sanctuary, Conservation Reserve and Community Reserve; Other non-protected areas – Biosphere Reserve, Tiger Reserve, Elephant Reserve etc.

Unit-II: GIS and Remote Sensing **(5 hrs.)**
1. Basic concept on GPS
2. Application of GIS and Remote Sensing

Unit-III: Wildlife rescue and rehabilitation **(5 hrs.)**
1. Wildlife rescue and its importance, Capture and handling of animals, Restraint techniques.

2. Translocation techniques and IUCN *Guidelines,* Handling of Radio collar and preparation of Carnivore plaster cast

Unit-IV : Eco-development and Community conservation **(5 hrs.)**

1. Integrating wildlife conservation with tourism and alternative community livelihood.
2. Interactive approaches on wildlife conservation: citizen debate, street play, conservation games etc. and case studies

Unit-V :Wildlife crimeand Trade **(5 hrs.)**

1. Identification of original and fake wildlife articles

Unit -VI: Census and research techniques **(5 hrs.)**

1. Wildlife census and Sampling methods
2. Modern technological method in wildlife research
3. Ethology: a tool of research- Focal, Scan and Ad. Libitum methods

Unit -VII: Nature photography and documentation **(5 hrs.)**

1. Principle and ethics of nature photography.

Unit -VIII: Scientific communication **(5 hrs.)**

1. Research grant sources, proposal and paper writing

Recent Development in Pisiciculture for Entrepreneurship Develo. **Course code: VAC-1823**
Duration-50 Hrs **Total marks: 50**

Course Objectives:

CO1: Students will learn and become well trained on the aquaculture and fishery.
CO2: Students will understand the different methods of rearing & management of fishery.
CO3: To understand the conservation methods and important fish fauna.
CO4: Course will provide the basic understanding about the Pisciculture methods.
CO5: Course provides the career option for the student in central inland fishery and institutes.

Course Contents:

Unit-1: Freshwater aquaculture **(10 hrs.)**

1.Aquaculture: definition, scope and importance, concepts of different system of freshwater aquaculture–monoculture, composite pisciculture, pen and cage culture, and paddy cum fish culture; extensive, intensive, semi-intensive and traditional system of fish farmings,
2.Management aspect of fish ponds (Nursery, rearing and stocking ponds). Management of eco-chinese hatchery
3.Physiochemical parameters of soil and water quality for pond culture

Unit–II Fishery Technology. **(5 hrs.)**

1. Fishing gears: nets and crafts of Northeast India
2. Types of fishing gear used in different freshwater bodies.

Unit III: Fish nutrition

1. Fish nutrition —supplementary feeding, different kinds of process of feeds, feed ingredients, and fish feed formulations.
2. Fish food organisms: zooplankton, phytoplankton and their role in fisheries.

Unit–IV:Fishery management **(10hrs.)**

1. Fish health management: Fish Diseases- parasitic and non-parasitic: bacterial, viral and fungal pathogens of fish. Fish pathology: prophylaxis and therapy.

2Fish processing andpreservation.Fish by products and their economic importance. Post harvest technology of fish and fishery products

Unit –V. Fish Genetics **(5 hrs.)**

1. Induced Breeding and Hypophysiation techniques in carps.

2.Genetically Modified organisms,Transgenic fish and their applications in Biotechnology

Unit-VI: Introduction to Aquarium /ornamental Fish **(10 hrs.)**

1. The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium/ornamental Fishes.
2. Scope of ornamental Fish culture and Trade In Northeast India.
3. Maintenance and care of aquarium.
4. Use of live fish feed organisms. Preparation and composition of formulated fish feeds in ornamental /Aquarium fish culture.

Unit : VII : Entrepreneurship in Fisheries. (5 hrs.)

1. Scope of Entrepreneurship development in Fisheries

Unit-VIII : Non- Piscian Fish culture (5 hrs.)

1. Seaweed culture, Pearl culture, Prawn culture, Shrimp culture, Lobster culture, Molluscan culture.

GUIDELINES FOR CONDUCTING VALUE ADDED COURSES

The following guidelines shall be followed while conducting the value added courses by the departments:

1. The value added course offered should not be the same as any course listed in the curriculum of the respective programme / or any other programme offered in University Departments.
2. The courses should be outside the daily class hours. The courses may be also conducted during weekends / vacation period.
3. The approval of any revision and modification of the syllabus of the listed courses as given in the Prospectus should be communicated to the office of the Academic Registrar at least 15 days before the date of commencement of the course. The revision/modification should be approved by the Department Council and forwarded by the Dean of respective schools.
4. The courses may be conducted ideally in the evening along with the NET Coaching Classes which start from 4:30pm onwards. In certain cases the classes can also be held in the weekend or during semester break.
5. The course can be offered only for the students studying from second semester onwards for both UG Programmes and PG Programmes.
6. Preferably Industry experts/eminent academicians from other Institutes may be invited to conduct the value added course.
7. The course can be offered only if there are at least 5 students opting for it.
8. The students may be allowed to take value added courses offered by other departments after obtaining permission from Head of the Department offering the course.
9. The duration of value added courses should be at least 30hrs of theory or a maximum of theory and Laboratory courses and the course can have a maximum of three hours per day.
10. The value added courses shall carry 50 marks and shall be evaluated through internal assessments only.

a. Two Assessments shall be conducted preferably one in the middle and the other at the end of the course by the Department concerned.

b. The duration of assessment is one hour each.

c. The Head of the Department may identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department coordinator, a senior Faculty member and the staff handling the course nominated by the Head of the Department shall monitor the evaluation process. The grades shall be assigned to the students by the above committee based on their performance.

d. The coordinator for the course is responsible for maintaining and processing the records with regard to assessment marks and results.

11. The passing requirement for value added courses shall be 50% of the marks prescribed for the course (Internal assessment only)

a. The grades O, A+, A, B+, B obtained for the two credit shall figure in the Mark sheet under the title 'Value Added Courses'.

b. The credits earned through value added courses shall not be considered for calculating SGPA and CGPA.

DETAILS OF COMPLETION OF VALUE ADDED COURSE

Name of the Department :

Name of the Value Added course offered :

Name of the Faculty : Academic / Industry…….

Name of the Coordinator :

E- mail :

Result Sheet for Vale added course **Annexure: I**

Sl No	Name of the student	Regn No	Programme	Marks obtained	Grade

Total number of students cleared:

Certified that the above students attended the value added courses with requisite number of classes. The Evaluation have been done strictly as per the guidelines for the value added course.

(Faculty handling the course)

(Coordinator) **(Head of the Department)**

(with date & seal)

Dean

School…….

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