COLLEGE OF AGRICULTURAL INFORMATION TECHNOLOGY
ANAND AGRICULTURAL UNIVERSITY
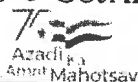ANAND – 388 110 ● GUJARAT ● BHARAT

Dr. D.R. Kathiriya
Principal & Dean

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Read: Minutes of the 60th meeting of the Academic Council held on 04.07.2023, AAU, Anand vide Item No. 60.26

<u>Syllabus revision with amendments/modifications of B. Tech. (AIT) w.e.f. Academic Year 2022-23.</u>
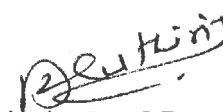
Notification

It is hereby notified to all concerned that vide item no 60.26 in the minutes of the 60th meeting of the academic council of the Anand Agricultural University held on 04/07/2023, the council has resolved as under:

"**The Academic Council approves and accorded post facto permission to implement the amendments/modifications in the proposed syllabus of B. Tech. (AIT) (as per Annexure-I) for implementing from the academic year 2022-23.**"

Encl.: As Above

No. AAU/AIT/ACAD/ 512 - 20 /2023
Date: 13.07.2023

Principal and Dean

Copy F.W.Cs. to.:

1. All members of Academic Council of this university
2. All officers of this university
3. All Deans and Principals, AAU, Anand
4. Head, Department of AIT, CAIT, AAU, Anand
5. Head, Department of Agricultural Science, CAIT, AAU, Anand

Copy to:

1. PS to Vice-Chancellor, AAU, Anand
2. PA to Registrar, AAU, Anand
3. Office of Registrar (Examination), Legal and Academic Branch (10 Copies)
4. Academic file, CAIT, AAU, Anand

Semester wise subjects for B. Tech. (AIT) (w.e.f. 2022-23)

Semester -I					
Course No	Subject Name	TH	PR	CR	HRS
AIT 111	Fundamentals of Computers	2	1	3	4
AIT 112	Programming in C	2	2	4	6
AIT 113	Introduction to Web Scripting	2	1	3	4
AGRI 111	Fundamentals of Agronomy	2	1	3	4
AGRI 112	Introductory Botany	1	1	2	3
AGRI 113	Fundamentals of Horticulture	1	1	2	3
MATH 111	Engineering Mathematics - I	2	1	3	4
ENG 111	Comprehension and Communication Skills in English	1	1	2	3
PE 111	NCC /NSS / PHYSICAL EDUCATION	0	1	1*	
	TOTAL CREDITS	13	9	22	31

Semester –II					
Course No	Subject Name	TH	PR	CR	HRS
AIT 121	Data Structure Through C	2	2	4	6
AIT 122	Introduction to Multimedia	1	2	3	5
AIT 123	Electronic Governance	2	0	2	2
AGRI 121	Environmental Studies and Disaster Management	2	1	3	4
AGRI 122	Principles of Integrated Pest and Disease Management	2	1	3	4
AGRI 123	Soil and Water Conservation Engineering	1	1	2	3
MATH 121	Engineering Mathematics -II	2	0	2	2
EI 121	Basic Electronics	2	1	3	4
PE 121	NCC /NSS / PHYSICAL EDUCATION	0	1	1*	
	TOTAL CREDITS	14	8	22	30

Semester – III					
Course No	Subject Name	TH	PR	CR	HRS
AIT 211	OOP Using Java	2	1	3	4
AIT 212	Relational Database Management System	2	1	3	4
AIT 213	UI/UX Designing	3	0	3	3
AIT 214	Website Development Using PHP	2	1	3	4
AGRI 211	Fundamentals of Agricultural Economics	2	0	2	2
AGRI 212	Fundamentals of Soil Science	2	1	3	4
AGRI 213	Fundamentals of Agricultural Extension Education	1	1	2	3
EI 212	Basic Instrumentation	2	1	3	4
PE 211	NCC /NSS / Physical Education	0	1	1*	
SMNR 211	SEMINAR-I	0	1	1*	
	TOTAL CREDITS	16	6	22	28

Semester –IV					
Course No	Subject Name	TH	PR	CR	HRS
AIT 221	Software Engineering	3	0	3	3
AIT 222	Introduction to .Net Framework and ASP.NET	2	2	4	6
AIT 223	Computer Networks	2	1	3	4
AIT 224	Operating System with Unix/Linux	2	1	3	4
AIT 225	E-Content Development Using Multimedia	1	2	3	5
AGRI 221	Agricultural Meteorology and Climate Change	2	1	3	4
AGRI 222	Entrepreneurship Studies and Business Communication	2	0	2	2
STAT 221	Statistical Methods	2	1	3	4
PE 221	NCC /NSS / Physical Education	0	1	1*	
SMNR 221	SEMINAR-II	0	1	1*	
	TOTAL CREDITS	16	8	24	32

* Non Credit Course

Semester –V

Course No	Subject Name	TH	PR	CR	HRS
AIT 311	Advance ASP.NET	2	1	3	4
AIT 312	Python Programming	2	1	3	4
AIT 313	Elective-I	2	1	3	4
AIT 314	E-Content Development Using Advance Multimedia	1	2	3	5
AIT 315	Fundamentals of Artificial Intelligence	2	1	3	4
AGRI 311	Communication Skills and Personality Development	2	0	2	2
AGRI 312	Elective – II	2	1	3	4
AGRI 313	GIS and Remote Sensing Techniques	2	1	3	4
PRJT 311	Project – I	0	1	1*	
	TOTAL CREDITS	**15**	**8**	**23**	**31**

Semester –VI

Course No	Subject Name	TH	PR	CR	HRS
AIT 321	Web Data Management	2	1	3	4
AIT 322	Machine Learning	1	1	2	3
AIT 323	Application Development in Mobile Technology	2	1	3	4
AIT 324	Data Analysis with MATLAB/Open Source Platforms	2	1	3	4
AIT 325	Image Processing	2	1	3	4
AGRI 321	Elective – III	2	1	3	4
AGRI 322	Elective – IV	2	1	3	4
EI 323	Embedded and IoT system	2	1	3	4
PRJT 321	Project – II	0	1	1*	
	TOTAL CREDITS	**15**	**8**	**23**	**31**

* Non Credit Course

Semester-VII

Course No	Subject Name	TH	PR	CR	HRS
EXPL 411	Educational Tour	0	3	3	6
EXPL 412	Experiential Learning - I	0	6	6	12
EXPL 413	Experiential Learning - II	0	6	6	12
EXPL 414	Experiential Learning - III	0	5	5	10
PRJT 411	Project –III	0	1	1*	
SSD 411	Soft Skills Development	0	1	1*	
	TOTAL CREDITS	**0**	**20**	**20**	**40**

* Non Credit Course

Semester—VIII

Course No	Subject Name	TH	PR	CR	HRS
PRJT 421	Project cum Internship	0	20	20	40

ELECTIVE SUBJECTS

Elective-I	Subject Name	TH	PR	CR	HRS
1	Information Retrieval	2	1	3	4
2	Data Warehouse and Data Mining in Agriculture	2	1	3	4
Elective-II	**Subject Name**				
1	Fundamentals of Crop Physiology	2	1	3	4
2	Nanotechnology and Precision Farming	2	1	3	4
3	Farm Machinery and Power	2	1	3	4
Elective-III	**Subject Name**				
1	Operations Research	2	1	3	4
2	Crop Simulation Models	2	1	3	4
3	Agricultural Marketing, Trade and Prices	2	1	3	4
Elective-IV	**Subject Name**				
1	Protected Cultivation and Green Technology	2	1	3	4
2	Bioinformatics Computing	2	1	3	4

Summary of the Courses

EXISTING SYLLABUS				PROPOSED SYLLABUS	
Sector	No. of Courses	Credits	Sector	No. of Courses	Credits
AIT	31	119	AIT	30	116
AGRI	18	47	AGRI	16	41
Allied	4	11	Allied	7	19
Total	53	177	Total	53	176

Semester –I

Course No	Subject Name	TH	PR	CR	HRS
AIT 111	Fundamentals of Computers	2	1	3	4
AIT 112	Programming in C	2	2	4	6
AIT 113	Introduction to Web Scripting	2	1	3	4
AGRI 111	Fundamentals of Agronomy	2	1	3	4
AGRI 112	Introductory Botany	1	1	2	3
AGRI 113	Fundamentals of Horticulture	1	1	2	3
MATH 111	Engineering Mathematics -I	2	1	3	4
ENG 111	Comprehension and Communication Skills in English	1	1	2	3
PE 111	NCC /NSS / PHYSICAL EDUCATION	0	1	1*	
	TOTAL CREDITS	**13**	**9**	**22**	**31**

* Non Credit Course

Objective(s)

After completing the course the student shall be able to identify capability of computer in terms of characteristics, speed, accuracy and role of computer, importance of Input and Output devices, Understanding System Hardware and storage and Emerging Technologies, importance of networking and number system, Understanding the importance of operating system and multimedia, importance of Computer Security

UNIT I

Introduction, Digital and Analog computer, Characteristics of computer, History of Computer, Generation of Computer, Classification of Computer, Application of Computers, Types of Programming Languages : Machine Languages, Assembly Languages, High Level Languages

UNIT II

Input/ Output Units

Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Scanners, Various types of Monitors, Touch-sensitive screens, Optical Recognition System, Pen based systems, Digitizers, MICR, OCR, OMR, Bar-code Reader, digital camera. Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Non Impact Printers- DeskJet, Laser Printer, Barcode Printers and plotters.

UNIT III

The Computer System Hardware

Introduction, Central Processing Unit, Memory Unit : Memory Introduction, Classifications- Volatile Memory and Non- Volatile , Flash Memory, ROM, RAM, EPROM, PROM, EEPROM other types of memory, Microprocessor, Interconnecting the Units of a Computer, Performance of a Computer, Inside a Computer Cabinet, Introduction to Emerging Technologies

Storage Unit

characteristics of magnetic disks, characteristics of a hard disk, types of miniature, external, and removable hard disks, characteristics of optical disks, Differentiate among various CD and DVD formats, Identify the uses of tape, PC Cards and the various types of miniature mobile storage media

UNIT IV

Number Systems, Number Conversions, Logic Gates

Decimal and Binary Number Systems, Octal and Hexadecimal Number System, Decimal (*Integer*) to Binary Conversion, Decimal to Octal Conversion, Logical Operators, Truth Tables, Boolean Expressions and Logic Gates

Networking Fundamentals

Types of Network, Device and Peripherals, Wire and Wireless Networking, Network topology, Network Protocol, Intranet and Internet Specifications, WWW, Making a Cat5 or Cat6 cable

UNIT V
User-Computer Interface, Applications and Security
Interaction of User and Computer
Introduction, Types of Software, System Software, Application Software
Operating System
Introduction, Objectives of Operating System, Types of OS, Functions of OS
User Interface, Examples of Operating Systems, Introduction to Mobile operating systems
MS-DOS
File naming rules, Wild card characters, Internal & External commands, dir, mkdir, chdir, type, copy, xcopy, delete, rename, format, sys, label, scandisk, attrib, path, prompt, date, time, tree, deltree, defrag, edit, etc. File Allocation Table (FAT), autoexec.bat & Config.sys
Window XP/ 7
Introduction, Features of Windows XP/7, The Desktop, Structure of Windows, Windows XP/7 Explorer, The Search, The Recycle Bin, Configuring the Screen, Configuring the Mouse, Adding or Removing Programs, Adding New Hardware, System Tools, The Scandisk, Windows XP Media Player, Windows XP/7 Help,
Introduction to Multimedia
Introduction, Multimedia: Definition, Characteristics of Multimedia System Elements of Multimedia, Multimedia System, Multimedia Applications
Introduction to Computer Security
Introduction, Security Threat and Security Attack, Malicious Software, Hacking Users Identifications and Authentication

Practical(s)
1. Computer Innards
2. Input and Output Device
3. PC and Laptop Demonstration
4. Computer assembling (using different peripherals)
5. Exploring the Basics of Windows XP/7
6. Dos Commands
7. Introduction to Internet, e-mail, browser, search engines
8. Introduction to Network Component (Switch, Router, Cable, RJ 45, I/O socket, Fibber etc)
9. Draw a network diagram for different places.
10. Cable (Cat5 or Cat6) crimping
11. Installation/Un-installation of System Software in computer
12. Installation/Un-installation of Application Software in windows

Reference Book(s)
1. Fundamentals of Computers, By V. Rajaraman Publisher: Prentice-Hall of India.
2. Computer Fundamentals, Author: Dr. LARRY LONG, Publisher: WILEY India Pvt Ltd
3. Computer Fundamentals by Anita Goel
4. Fundamentals of Computers by E Balagurusamy

Objective(s)

As, C language is koine of programming, a newbie can start their programming journey by understanding and practicing input/output using various control statements and manipulate Array & pointers of various data types.

UNIT I

Basic of programming

Introduction to Flowcharts and Algorithms, need of Computer languages and types of computer languages.

UNIT II

Introduction to C Language and its artifacts

C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants, Operators.

UNIT III

Input/output functions

Basic input/output library functions, control statements, storage types, Defining and accessing, passing arguments, Function prototypes, Recursion, Library functions.

UNIT IV

Arrays & String

Defining and processing Arrays, passing arrays to a function, Multi-dimensional arrays, Define String, Using String, Printing a String.

UNIT V

Pointers, Structures & Union

Define Pointer, Pointer Arithmetic, passing pointer to function, Function data return with a Pointer, define structure, passing structure to a function, Unions, typedef, array of structure and pointer to structure.

Reference Book(s)

1. Let US C –By Yashwant Karnetkar
2. C – programming E.Balagurusamy Tata McGray Hill
3. Schaum's outline of Theory and Problems of programming with C : Gottfried
4. Complete reference with C Tata McGraw Hill
5. The C programming language : Kerninghan and Ritchie
6. Programming in ANSI C : Ramkumar Agarwal
7. Mastering C by Venugopal, Prasad – TMH 8. Sprit of C

Practical(s)

1. Explain & Practice for structure of C program and its basic constructs
2. Explain & Practice for basic input/output library functions 3. Explain & Practice for conditional statement
4. Explain & Practice for Loop statements.
5. Practice for series programs.
6. Explain & Practice for functions.
7. Explain & Practice for Arrays.

8. Explain & Practice for Multidimensional array.
9. Explain & Practice for String manipulation.
10. Explain & Practice for Pointers.
11. Explain & Practice for structures.
12. Explain & Practice for union.

Objective(s)

After completing the course the student shall be able to understand Internet and it's uses, Focus on hypertext mark-up language (HTML) and cascading style sheet (CSS) implementation, Understand relationship of HTML, CSS & JavaScript , Create cascading style sheets (CSS) for device and browser integration, Investigate client-side scripting uses, to familiarize with the coding process including syntax, best practices, and the idea of "code once, re-use many times".

UNIT I
Introduction to Internet

Define: Internet & Intranet, Internet Applications & Services, ISP, Internet Connection Types, IP Address, Domain Name, URL, WWW, Web page, Web Site, Web browser, Web Server, Web Searching.

UNIT II
HTML

Introduction to HTML, Html Document Structure, HTML tags: Document Tags, Text Formatting Tags, Linking tags, Line Breaking Tags, Image and Image Mapping Tags, List creation tags, Table tags, Frame tags, and Form elements tag.

UNIT III
CSS (Cascading Style Sheet)

Introduction of Style sheet, Types of Style sheet, Class & ID, CSS Font Property, CSS Text Property, CSS Background Property, CSS Border Property, CSS Margin Property

UNIT IV
Java Script part -1

Introduction to JavaScript, Operators, Conditional Structure & Looping Structures, Dialog Boxes, Arrays User Define Function, Built-in Functions of String, Date, Math, Array

UNIT V
Java Script part -2

Document Object, History Object, Window Object, Navigator Object, Form Object & Elements Events: onclick, ondblclick, onblur, onfocus, onchange, onkeypress, onkeydown, onkeyup, onMousemove, onmouseout, onsubmit, onreset, onselect, onload, onunload, timer event

Practical(s)

1. Web page design using Document Tags, Text Formatting Tags, Image tags , Line Breaking Tags
2. Web page design using HTML List creation tags, Table tags, Frame tags
3. Web form design using HTML Form elements tag.
4. Web page design using CSS Font Property, CSS Text Property

5. Web page design using CSS Background Property, CSS Border Property, CSS Margin Property
6. Write simple JavaScript using variable, conditional and looping statements.
7. Write a JavaScript using Form Element such as Textbox, button,
8. Write a JavaScript using Form Element such as radio, checkbox and select.
9. Write a JavaScript to check all compulsory fields are fill or not before form submission.
10. Write a JavaScript using Document Object, History Object, Window Object, Navigator Object

Reference Book(s)

1. HTML DHTML JavaScript and Perl CGI By Ivan Bayross
2. Pure JavaScript By Jason Gilliam, Charlton Ting, R. Allen Wyke
3. Sams Teach Yourself Web Publishing with HTML and CSS By Laura Lemay, Rafe Colburn

UNIT I

Agronomy and its scope, seeds and sowing, tillage, land configuration and sub soiling, crop density and geometry. Agro-climatic zones of India and Gujarat.

UNIT II

Growth and development of crops. Classification of field crops and Factors affecting on crop production. Drought – definition – types of drought – effect of drought on crops – management of drought. Cropping systems – monocropping – definition and principles of crop rotation – mixed cropping – intercropping – relay cropping – multistoried cropping – sole cropping. Weeds: definition, classification and characteristics.

UNIT III

Crop nutrition, manures and fertilizers, nutrient use efficiency. Soil fertility and soil productivity – fertility losses – maintenance of soil fertility – soil organic matter. Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

UNIT IV

Irrigation – Introduction, Importance, Definition and Objectives. Physical classification and Biological classification of water. Irrigation efficiency and water use efficiency, conjunctive use of water, field capacity, permanent wilting point, irrigation requirement and hydraulic conductivity. Approaches for scheduling of irrigation; Methods of irrigation including micro irrigation system. Quality of irrigation water and water logging.

Practical(s)

1. Identification of crops, seeds, fertilizers, pesticides and tillage implements,
2. Lay out and types of seed bed preparation.
3. Practice of different methods of sowing
4. Study of yield contributing characters and yield estimation of major crops,
5. Seed germination and viability test,
6. Numerical exercises on plant population and seed rate.
7. Use of tillage implements-reversible plough, one way plough, harrow, leveler,
8. Study of sowing implements/equipment.
9. Measurement of field capacity, bulk density and infiltration rate
10. Field layout of various irrigation methods
11. To work out the labour unit and unit of work for various field operations

UNIT I

Introduction and characteristics of plant; Concept of plant cells, plant tissue and plant organs.

UNIT II

Plant habits: annuals, biennials, perennials; Seed and seed germination; Morphology and Micro-morphology of flowering plants.

UNIT III

Binomial nomenclature and classification of plants; Introduction to plant taxonomy and plant systematic

Practical(s)

1. Study of flowering plants; Root, stem and leaf and their modifications.
2. Inflorescence, flower and fruits.
3. Internal structure of root, stem and leaf;
4. Description of plants:Malvaceae, Fabaceae, Cucurbitaceae, Brassicaceae, Euphorbiaceae, Apiaceae, Solanaceae, Asteraceae, Poaceae and Liliaceae.

UNIT I
Horticulture - Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures;

UNIT II
Seed dormancy, Seed germination, principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators;

UNIT III
Fertilization and parthenocarpy; medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops.

Practical(s)
Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

Unit I
Differential calculus
Indeterminate form, Taylor's and Maclaurin's expansions, function of two or more independent variables, partial differentiation, homogeneous functions and Euler's theorem, Modified Euler's theorem total derivatives. Beta and Gamma function with their properties and duplications formula without proof.

Unit II
Graph Theory
Graphs, Definition & basic concepts of finite & infinite graph, Incidence & Degree, Isomorphism, Subgraph, Walk, Path & circuits, Operations on graphs, connected graph, Disconnected graph & components, Complete graph, Regular graph, Bipertite graph, Euler's graph, Hamiltonian paths & circuits, Weighted graphs, Applications, Directed & Undirected graphs, Connectivity of graphs. Definition & properties of trees, Pendent vertices in a tree, Distance between two vertices Centre, Radius & diameter of a tree, Rooted & binary trees, Representation of Algebraic structure by Binary trees, Binary search trees, Spanning trees & fundamental circuits.

Unit III
Matrices
Elementary row and column transformation, rank of matrix, Linear dependence, consistency of linear system of equations, characteristic equation, Caley –Hamilton theorem, Eigen value, Eigen vector.

Unit IV
Descriptive Statistics
Mean, Median, Mode, Standard, deviation, Skewness, Fitting of Linear, Quadratic, Exponential and Logarithmic curves, Least squares method

Suggested Readings
- Differential Calculus by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi.
- Integral Calculus by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi.
- Higher Engineering Mathematics by Grewal B S. 2004. Khanna Publishers Delhi.
- A Text Book of Vector by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi.
- Rosen K.H., „Discrete Mathematics and Its Applications", McGraw Hill, 6th Ed., 2006.
- Kolman B., Busby R.C. & Ross S., „Discrete Mathematical Structure", Prentice Hall of India Pvt. Ltd, 5th Ed, 2003.
- Tremblay J. P. & Manohar R., „Discrete Mathematical structure with applications to computer science", McGraw Hill, 1999.

ENG 111   COMPREHENSION AND COMMUNICATION SKILLS IN ENGLISH   2(1+1)

UNIT I
War Minus Shooting- The sporting Spirit. A Dilemma- A layman looks at science Raymond B. Fosdick. You and Your English – Spoken English and broken English G.B. Shaw
Reading Comprehension, Vocabulary- Antonym, Synonym, Homophones, Homonyms, often confused words.

UNIT II
Exercises to Help the students in the enrichment of vocabulary based on TOEFL and other competitive examinations. Functional grammar: Articles, Prepositions, Verb, Subject verb Agreement, Transformation, Synthesis, Direct and Indirect Narration.

UNIT III
Written Skills: Paragraph writing, Precise writing, Report writing and Proposal writing. The Style: Importance of professional writing. Preparation of Curriculum Vitae and Job applications. Synopsis Writing. Interviews: kinds, Importance and process.

Practical(s)
Listening Comprehension: Listening to short talks lectures, speeches (scientific, commercial and general in nature). Oral Communication: Phonetics, stress and intonation, Conversation practice. Conversation: rate of speech, clarity of voice, speaking and Listening, politeness &Reading skills: reading dialogues, rapid reading, intensive reading, improving reading skills. Mock Interviews: testing initiative, team spirit, leadership, intellectual ability. Group Discussions.

PE 111   **NATIONAL SERVICE SCHEME**   **1*(0+1)**

Introduction to National Service Scheme – objectives and motto of NSS – programme planning and development – kinds of activities in regular and special camping programmes – aspects of NSS programmes – institutional, rural and urban projects – village/slum adoption – organisational and administrative arrangements of NSS at national, state, university and college levels – each student has to undergo a minimum of 240 hours of regular service in two consecutive and attend one special camp of ten days duration in the following activities to complete the course – environmental enrichment and conservation – plantation of trees, their preservation and upkeep.

Construction of rural roads, cleaning of village ponds, popularisation of bio-gas plants, prevention of soil erosion, health, family welfare and nutrition programmes, mass immunisation, blood donation, integrated child development, population education – programme, aimed at creating awareness for improvement of the status of woman – production oriented programmes – teaching improved agricultural technologies, rodent control and pest management, weed control, soil testing, guidance in animal husbandry and poultry farming and small savings. Programmes of work during emergencies and natural calamities like cyclones, floods and earthquake – assisting the authorities in distributions of rations, medicines and clothes – assisting health authorities in inoculation, supply of medicines etc. – reconstruction of huts, relief and rescue work – adult education, programmes of continuing education of school dropouts, coaching of students from economically weaker sections, organisation of youth clubs, discussions on eradications of social evils like castism, regionalism, corruption, untouchability etc. non-formal education of rural youth – awareness programmes on drug abuse and AIDS – voter awareness campaign.

OR

PE 111   **NATIONAL CADET CORPS**   **1*(0+1)**

Organisation – NCC – Director General, Directorate, group – army – infantry – section – company – battalion, military history various wars – post and after independence of India, introduction to defense services – system of NCC training, foot drill – attention, stand at ease and stand easy – sizing – forming up in three ranks, open and close order march – dressing – getting on parade, dismissing and falling out – saluting – marching, arms drill – shoulder arm – order arm – present arm – guard of honour – ceremonial drill.

Weapon training – rifle – buoyant – light machine gun – sten machine carbine – introduction and characteristics – stripling – assembling and cleaning – loading and unloading – firing, field – craft – visual training – targets – judging distance – fire discipline and fire control orders – battle craft – field signals – description of ground – section formatic – section battle drill – scouts and patrols – ambush – field engineering – map reading – conventional signs – grid systems – use of service protractor – prismatic compass and its use, self-defense – general principles – precautions and training – attacks and counter attacks – marching and searching – first aid – hygiene and sanitation – civil defense – leadership – NCC song.

OR

PE 111   **PHYSICAL EDUCATION**   **1*(0+1)**

Definition, rules and regulations of anyone of the games and Athletic events. Warming up and conditioning exercise are compulsory for each student – conditioning and calisthenics for various Athletic activities. Exercise for strength, agility, co-ordination, flexibility, co-

operation, vital capacity endurance, speed and for various systems of our body and team spirit.

Compulsory skill development in anyone of the following games

Basket Ball, Volley Ball, Ball Badminton, Foot Ball, Kho-Kho, Chess, Kabaddi, Cricket, Table Tennis, Shuttle Badminton, Gymnastics, Athletics viz. Jumps, Throws, Hurdles

Aims and Objectives of Yoga – Asanas: i.e. Padmasana, Pujankasana, Sarvangasana, Chakrasana, Dhanurasana, Halasana, Mayurasana and Savasana. Asanas for Ailments, Back pain, Arthritis, Abdominal problems, Stress, Fatigue, Insomnia, Obesity, Circulation, Hypertension, Varicose veins, Respiration, Heart, Digestion, head Aches, Depression, Addiction and eye problems.

Mental Balance and Importance – Development of concentration Suriyanamaskar – Advance skills of any one of the games which were taught in the I Semester.

Semester –II

Course No	Subject Name	TH	PR	CR	HRS
AIT 121	Data Structure Through C	2	2	4	6
AIT 122	Introduction to Multimedia	1	2	3	5
AIT 123	Electronic Governance	2	0	2	2
AGRI 121	Environmental Studies and Disaster Management	2	1	3	4
AGRI 122	Principles of Integrated Pest and Disease Management	2	1	3	4
AGRI 123	Soil and Water Conservation Engineering	1	1	2	3
MATH 121	Engineering Mathematics -II	2	0	2	2
EI 121	Basic Electronics	2	1	3	4
PE 121	NCC /NSS / PHYSICAL EDUCATION	0	1	1*	
	TOTAL CREDITS	**14**	**8**	**22**	**30**

* Non Credit Course

Objective(s)
The student of this course will get acquainted with different types of data structure and various ways of collecting and organizing data in such a way that operations on these data can be performed effectively and efficiently.

UNIT I Concepts of Data Structure & Algorithm Analysis
Need and importance of data structure, types of Data structure, operations on data structure, complexity analysis of algorithms, recursion.

UNIT II Linear Data structures
Arrays– row and columnar representation of Array–Dynamic memory allocation–Stack and its applications, PUSH POP, PEEP and CHANGE operations–Queues and its applications–Types of Queue– creation, insertion, deletion and search operations in queue.

UNIT III Linked lists
Introduction to linked lists- Singly, doubly and circularly linked lists–sorted linked list, algorithms for creation, insertion, deletion and search.

UNIT IV Searching
Concepts, programming and operations of simple search & binary search– Concepts, programming and applications of hashing technique – Concepts, programming and applications of pattern matching.

UNIT V Sorting
Analysis of simple sorting techniques such as linear sort, shell sort, bubble sort, insertion sort, selection sort, quick sort, heap sort and merge sort.

UNIT VI Trees and Graphs
Introduction to graphs representation – Traversal-Depth first search, Breadth first search - Adjacency matrix and list representation – Tree-Shortest path, minimum spanning tree –Tree- all pairs Shortest Path, Binary Trees - Representation – operations: insert, delete – Traversal – preorder, inorder, postorder. N-ary trees: Balanced tree, B-tree, insertion, deletion and search algorithm of B-trees; B-tree based keyed access to records in a file.

Reference Book(s)
1. Data Structure – By Tanenbaum, Tata McGraw Hill.
2. Data structure Using C –By Yashwant Karnetkar.
3. Data structures and Algorithms: Concepts, Techniques and Applications - G. A. V. PAI.

Practical(s)
1. Explain & Practice of Recursive Functions.
2. Explain & Practice of Array, row and columnar representation of Array.
3. Explain & Practice of pointers and Dynamic memory allocation.
4. Explain & Practice of Stack and its operations.

5. Explain & Practice of Queue and its operations.
6. Explain & Practice of Linked list and its operations.
7. Explain & Practice of Doubly Linked list and its operations.
8. Explain & Practice of Linear search and Binary Search.
9. Explain & Practice of Linear, bubble, Selection, Insertion, Quick, Shell, Merge and Heap sort.
10. Explain & Practice of Trees and traversal methods.

Objective(s)

After completing the course the student shall be able to learning the multimedia elements including image, graphics, sound, and video components, creating Animation, Create quality multimedia titles and design for websites. Understand the technologies behind multimedia applications and master the skills for developing multimedia projects.

UNIT I

Introduction to Photoshop CS4

About Photoshop, Navigating Photoshop, Menus and panels, Opening new files, Opening existing files

Getting Started with Photoshop

Exploring the Toolbox, The New CS4 Applications Bar & the Options Bar, Exploring Panels & Menus, Creating & Viewing a New Document, Customizing the Interface, Setting Preferences

Working with Images

Zooming & Panning an Image, Working with Multiple Images, Rulers, Guides & Grids, Undoing Steps with History, Adjusting Color with the New Adjustments Panel, The New Masks Panel & Vibrance Color Correction Command, The Save for Web & Devices Interface, The Auto-Align Layers Commands, The New 3D Commands

UNIT II

Resizing & Cropping Images

Understanding Pixels & Resolution, The Image Size Command, Resizing for Print & Web, Cropping & Straightening an Image, Adjusting Canvas Size & Canvas Rotation

Working with basic Selection

Selecting with the Elliptical Marquee Tool, Using the Magic Wand & Free Transform Tool, Selecting with the Regular & Polygonal Lasso Tools, Combining Selections, Using the Magnetic Lasso Tool, Using the Quick Selection Tool & Refine Edge, Modifying Selections

Getting Started with layers

Understanding the Background Layer, Creating, Selecting, Linking & Deleting Layers, Locking & Merging Layers, Copying Layers, Using Perspective & Layer Styles, Filling & Grouping Layers, Introduction to Blending Modes, Blending Modes, Opacity & Fill, Creating & Modifying Text

Painting in Photoshop

Using the Brush Tool, Working with Colors & Swatches, Creating & Using Gradients, Creating & Working with Brushes, Using the Pencil & Eraser Tools, Painting with Selections

Photo Retouching

The Red Eye Tool, The Clone Stamp Tool, The Patch Tool & the Healing Brush Tool, The Spot Healing Brush Tool, The Color Replacement Tool

UNIT III

Introduction to color correction

Color Spaces & Color Modes, The Variations Command, The Auto Commands, Adjusting Levels, Adjust Curves, Non-Destructively, with Adjustment Layers, Quick Mask Options, Painting a Selection, Saving & Removing a Selection from the Background

Working with the Pen Tool

Understanding Paths & the Pen Tool, Creating Straight & Curved Paths, Creating Combo Paths, Creating a Clipping Path

Creating Special Effects

Getting Started with Photoshop Filters, Smart Filters, Creating Text Effects, Applying Gradients to Text, creating Timeline and Frame base animation

Exporting your work

Saving with Different File Formats, Saving for Web & Devices, Printing Options

UNIT IV

Introduction to Flash CS4

Flash Basics

Creating a Flash Document, Reviewing the Interface, Managing the Workspace

Getting Started

Creating Shapes, Using the Primitive Tools, Drawing with Pen, Pencil and Line Tools, Editing Shapes, Using the Selection Tools, Managing Color and Gradients, Importing Files

Working with Graphics

Creating Rectangles, Using a Gradient Fill , Making Selections , Drawing Ovals , Creating a Simple Animation, Working with Lines, Manipulating Objects , Masking Objects, Testing a Movie

Creating and Editing Symbols

Importing Illustrator Files, About Symbols, Converting Objects to Symbols, Importing Bitmap Images, Adding Bitmaps to a Movie Clip Symbol, Working with Buttons, Adding Transparency

Creating and Managing content

New Document Settings & Navigation, Drawing & Selecting Simple Vector Shapes, Drawing Curves with the Pen & Pencil Tools, Exploring Other Drawing Tools, Interaction between Shapes, Grouping Objects, Working in Object Drawing Mode

UNIT V

Managing Website Content

Working with Layers, Using Bitmaps, Adding Text, Use the Regular & Primitive Shape Tools to Build a Graphic, Creating & Adjusting a Symbol, Transforming Objects with the Free Transform Tool, Exploring Color Types & Gradients

The Timeline

Timeline Basics, Create a Span of Frames & Control the Playhead, Creating Keyframes, Insert Blank Keyframes & Clear Keyframes, Frame-by-Frame Animation & Onion Skin

Motion Presets

Getting Started with Motion Presets, Modifying a Motion Tween, Stretching Tween Spans, Save Custom Presets & Create Layer Folders, Moving Tween Spans, Setting Static Frames, Building a Test Movie

Creating a Motion Tween

Adding a Motion Tween, Setting Property Keyframes for Scale & Rotation, Creating a Motion Tween from a Shape, Easing Keyframes , Creating a Fade-in by Adjusting the Alpha, Making a Motion Preset

Animation Techniques

Importing Slideshow Content , Working in a Movie Clip Timeline, Animating the First Image in the Slideshow, Non-linear Animation , Swapping Objects, Using the Distribute to Layers Command, Adjust Timeline View Options & Animation Timing

Actionscript & Behaviors

Introducing ActionScript, Adding a Stop Action , Creating Buttons & Setting Button States, Creating Interactive Text Buttons, Adding Site Content, Setting up for ActionScript 2, Adding Behaviors with ActionScript 2, Writing ActionScript 3

Using Sound and Video

Adding a Sound File to the Timeline, Adding Sound to a Button, Encoding Video for Import into Flash, Set Import Options & Choose a Player Skin, The FLVPlayback Component & Component Inspector, Flash Video for ActionScript 2 & Older Players

Publish your site

Overview of Flash Publish Settings, Compression in Bitmaps & Sounds, Other Flash Publish Settings, HTML Settings, Publishing Your Flash Movie, Dreamweaver(R) Integration

Practical(s)

Photoshop:

1. Looks at work area and keyboard shortcut
2. Practice with Toolbox
3. Looks at saving for the web, making selections, blending options and the pen tool.
4. Looks at using adjustment layers, masking and making selections of images.
5. Looks at creating various text effects, including typing along a path etc.
6. Looks at adjustment layers and dodging and burning.
7. Looks at using filters and blending options to create graphics
8. Making a Pattern, Brush, Texture etc.
9. Designing Entire Websites
10. Designing Website Elements
11. Designing different LOGO
12. Creating Headers and Navigation in Website
13. Creating a animation in Photoshop
14. Using Slice tool to create a website.

Flash :

15. Looks at work area and keyboard shortcut
16. Get the practical skills in creating shapes and converting them to other elements, using and understanding the library, get hands-on experience in modification symbols.
17. Get familiar with Animation basics, using the Timeline, and get the hands-on experience in creating frame-by-frame animations.
18. Get the practical skills in utilizing Motion Tweening, Guide Layers in animation, using Shape Tweening, and Mask Layers in animations.
19. Get the practical skills in creating movie clips, using multiple Timelines, understanding Parent and Child objects, and using movie clips on the Stage.

20. Get the practical skills in creating buttons with Flash tools, get familiar with the Button Timeline and States.
21. Get the practical skills in using Frame and Button Actions as well as using Labels on the Timeline.
22. Get the practical skills in importing sound files into Flash and setting compression.

Reference Book(s)

1. Adobe Photoshop CS4 Bible, by Stacy Cates, Simon Abrams, Wiley publishing, Inc.
2. Adobe Flash CS4 Professional Bible (Book/CD) By Robert Reinhardt, Snow Dowd (Paperback) Publisher : Wiley India Pvt. Ltd
3. Learning Flash CS4 Professional, by Rich Shupe. O'REILLY media.
4. Adobe Flash CS4 Professional Classroom in a Book , Adobe Creative Team.

Objective:
This course focuses on Study and analysis of electronic governance systems used by various government departments.

Theory:
Unit I
Introduction to constitutional rights, citizen charter, government human resources hierarchy, Government Planning and Processing, Accounts and Transactional systems

Unit II
Scope of e-governance, Factors affecting e-governance, Citizen centric design, Stakeholders of e-government project, e-government portal types – C2G, B2G, G2G

Unit III
Introduction to the Right to Information Act, Introduction to the IT Act, Transparency, e-democracy, role of print, audio-visual and social media, privacy and security issues. Services to the Citizen through: Utility bill payment, land records, Employment exchange, examination results etc.

Unit IV
Tools and protocols for e-governance -- Biometric, MICR, Barcode, Public Key Cryptography, GIS

Unit V
Study, analysis and evaluation of various e-government projects of India such as:
1. Soil Health Card
2. GSWAN
3. E-dhara
4. Online Admissions
5. OJAS
6. Online Tendering
7. Passport Application
8. Electronic Fund Transfer using NEFT/RTGS
9. Ticket booking through GSRTC and IRCTC
10. E-filing of Taxes
11. Online Judiciary Information System
12. UIDAI/Aadhar Card Project
13. MNREGA
14. PDS (Ration Card)
15. Driving Licence

Reference books:
1. E-governance concepts and case studies, Prabhu C.S.R., PHI India
2. "E-Government: From Vision to Implementation - A Practical Guide With Case Studies" by Subhash Bhatnagar and Milan J. Nakhate

AGRI 121 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT   3 (2+1)

UNIT I

Multidisciplinary nature of environmental studies Definition, scope and importance. Natural Resources: Renewable and non-renewable resources, Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

UNIT II

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT III

Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT IV

Environmental Pollution: definition, cause, effects and control measures of: a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public

awareness. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

UNIT V
Disaster Management
Natural Disasters - Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Practical(s)
Pollution case studies. Case Studies- Field work: Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain, visit to a local polluted site- Urban/Rural/Industrial/Agricultural, study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc.

AGRI 122   PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT 3 (2+1)

Theory

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis. Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module. Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programmes. Case histories of important IPM programmes.

Practical

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators and natural enemies. Mass multiplication of Trichoderma, Pseudomonas, Trichogramma, NPV etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision-making. Crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmers fields.

AGRI 123   SOIL AND WATER CONSERVATION ENGINEERING   2(1+1)

Theory

Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion: Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways and their design. Water harvesting and its techniques. Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.

Practical

General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of grassed waterways. Design of contour bunds. Design of graded bunds. Design of bench terracing system. Problem on wind erosion.

MATH 121   **ENGINEERING MATHEMATICS – II**   **2 (2+0)**

Unit I
Ordinary Differential Equation
Reorientation of differential equation, Exact differential equation and Integrating factors, First order and higher degree odes, solvable for p, y and x, Modelling of Real-world problems particularly Engineering, Spread of epidemic, Spread of new technological innovations, RC and RL network, Formation of partial differential equations, Higher order linear partial differential equations, Classification of Second order pde.

Unit II
Fourier Series
Definition, Fourier series with arbitrary period, in particular periodic function with period 2. Fourier series of even and odd function, Half range Fourier series.

Unit III
Laplace Transform
Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step functions, Dirac – delta functions, Laplace transform of periodic functions, Convolutions theorem, Application to solve simple linear and simultaneous differential equations.

Unit IV
Finite Differences and Interpolation
Finite Differences, Forward, Backward and Central operators, Interpolation by polynomials, Newton's forward, Backward
interpolation formulae, Gauss & Stirling's central difference formulae, Newton's divided and Lagrange's formulae for unequal intervals, Newton-Cotes formula, Trapezoidal and Simpson's formulae, error formulae, Gaussian quadrature formulae.

Suggested Readings
- Higher Engineering Mathematics by Grewal B S. 2004. Khanna Publishers Delhi.
- Engineering Mathematics by Ramana B V. 2008. Tata McGraw-Hill. New Delhi.
- E. Kreyszig : Advanced Engg. Mathematics. 8th Ed, John Wiley & Sons., New York.
- Jain and Iyenger , Advanced Engg. Mathematics, Narosa Publications, New Delhi.
- James Steward, Calculas, Thomson Asia, 5 edition, Singapore, 2003.
- J. N. Kapur , Mathematical Models in Biology and Medicine, Eas t west press.
- F. B. Hilderbrand , Methods of Applied Mathematics, McGraw Hill, New York

EI 121   **Basic Electronics**   **3(2+1)**

Unit I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, ohm's law, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation, Mesh loop analysis, Nodal Analysis, Thevenin, Norton and Superposition Theorems.

Unit II

Diode theory and applications Basic idea about forward bias, reverse bias and VI characteristics, ideal diode, second, surface mount diodes, Zener diode, Testing of diode with multi-meter, half wave rectifier, full wave rectifier, bridge rectifier, Design of un-regulated DC power supply, Clipping circuit, Clamping circuit, Reading datasheet of semiconductor diode.

Unit III

Bipolar junction transistors,construction and working, BJT Common Emitter, Common Base and Common Collector characteristics, BJT Amplifier,Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT

Unit IV

The Amplifier Block, Introduction to Operational Amplifier ,Op-amp Parameters: input offset voltage, and current, input bias current, differential input resistance, input capacitance, offset voltage adjustment range, input voltage range, common mode rejection ratio, supply voltage rejection ratio, slew rate, gain, Ideal Operational Amplifier, Practical Properties of Operational Amplifiers, Inverting and Non-Inverting Amplifier , Summing , scaling, differential ,Integrator ,Differentiator, instrumentation Operational Amplifiers.

Reference Book:

1).Electronics Device and Circuit Theory by Robert Boylestad and Louis Nashelsky.
2).Elements of Electrical Engineering by U.A.Patel.
3).Electronics devices and Circuits by Jacob Millman, Christos C. Halkias, Satyabrata Jit.
4).Electronics devices and Circuits by J.B.Gupta.

Practical(s)

1   To study and verify ohm's Law.
2   To study and verify Kirchhoff's voltage law and Current law.
3   To study and verify Superposition theorem.
4   To study and verify Thevenin's theorem.
5   To study and verify Norton's theorem.
6   To study V-I characteristics of semi-conductor Diode.
7   To study Half-wave Rectifier circuit.
8   To study Full-wave Rectifier circuit.
9   To study Zener Diode Circuit.
10 To study common Base characteristics of BJT.
11 To study common Emitter characteristics of BJT.
12 To study common Collector characteristics of BJT.
13 To study input offset voltage of Op-Amp.

14   To study Op-Amp as Inverting and Non-Inverting Amplifier.
15   To study Op-Amp as Integrator.
16   To study Op-Amp as Differentiator.

Introduction to National Service Scheme – objectives and motto of NSS – programme planning and development – kinds of activities in regular and special camping programmes – aspects of NSS programmes – institutional, rural and urban projects – village/slum adoption – organisational and administrative arrangements of NSS at national, state, university and college levels – each student has to undergo a minimum of 240 hours of regular service in two consecutive and attend one special camp of ten days duration in the following activities to complete the course – environmental enrichment and conservation – plantation of trees, their preservation and upkeep.

Construction of rural roads, cleaning of village ponds, popularisation of bio-gas plants, prevention of soil erosion, health, family welfare and nutrition programmes, mass immunisation, blood donation, integrated child development, population education – programme, aimed at creating awareness for improvement of the status of woman – production oriented programmes – teaching improved agricultural technologies, rodent control and pest management, weed control, soil testing, guidance in animal husbandry and poultry farming and small savings. Programmes of work during emergencies and natural calamities like cyclones, floods and earthquake – assisting the authorities in distributions of rations, medicines and clothes – assisting health authorities in inoculation, supply of medicines etc. – reconstruction of huts, relief and rescue work – adult education, programmes of continuing education of school dropouts, coaching of students from economically weaker sections, organisation of youth clubs, discussions on eradications of social evils like castism, regionalism, corruption, untouchability etc. non-formal education of rural youth – awareness programmes on drug abuse and AIDS – voter awareness campaign.

OR
PE 121   NATIONAL CADET CORPS   1*(0+1)

Organisation – NCC – Director General, Directorate, group – army – infantry – section – company – battalion, military history various wars – post and after independence of India, introduction to defense services – system of NCC training, foot drill – attention, stand at ease and stand easy – sizing – forming up in three ranks, open and close order march – dressing – getting on parade, dismissing and falling out – saluting – marching, arms drill – shoulder arm – order arm – present arm – guard of honour – ceremonial drill.

Weapon training – rifle – buoyant – light machine gun – sten machine carbine – introduction and characteristics – stripling – assembling and cleaning – loading and unloading – firing, field – craft – visual training – targets – judging distance – fire discipline and fire control orders – battle craft – field signals – description of ground – section formatic – section battle drill – scouts and patrols – ambush – field engineering – map reading – conventional signs – grid systems – use of service protractor – prismatic compass and its use, self-defense – general principles – precautions and training – attacks and counter attacks – marching and searching – first aid – hygiene and sanitation – civil defense – leadership – NCC song.

OR

Definition, rules and regulations of anyone of the games and Athletic events. Warming up and conditioning exercise are compulsory for each student – conditioning and calisthenics for various Athletic activities. Exercise for strength, agility, co-ordination, flexibility, co-operation, vital capacity endurance, speed and for various systems of our body and team spirit.

Compulsory skill development in anyone of the following games
Basket Ball, Volley Ball, Ball Badminton, Foot Ball, Kho-Kho, Chess, Kabaddi, Cricket, Table Tennis, Shuttle Badminton, Gymnastics, Athletics viz. Jumps, Throws, Hurdles
Aims and Objectives of Yoga – Asanas: i.e. Padmasana, Pujankasana, Sarvangasana, Chakrasana, Dhanurasana, Halasana, Mayurasana and Savasana. Asanas for Ailments, Back pain, Arthritis, Abdominal problems, Stress, Fatigue, Insomnia, Obesity, Circulation, Hypertension, Varicose veins, Respiration, Heart, Digestion, head Aches, Depression, Addiction and eye problems.

Mental Balance and Importance – Development of concentration Suriyanamaskar – Advance skills of any one of the games which were taught in the I Semester.

Semester – III

Course No	Subject Name	TH	PR	CR	HRS
AIT 211	OOP Using Java	2	1	3	4
AIT 212	Relational Database Management System	2	1	3	4
AIT 213	UI/UX Designing	3	0	3	3
AIT 214	Website Development Using PHP	2	1	3	4
AGRI 211	Fundamentals of Agricultural Economics	2	0	2	2
AGRI 212	Fundamentals of Soil Science	2	1	3	4
AGRI 213	Fundamentals of Agricultural Extension Education	1	1	2	3
EI 212	Basic Instrumentation	2	1	3	4
PE 211	NCC /NSS / Physical Education	0	1	1*	
SMNR 211	SEMINAR-I	0	1	1*	
	TOTAL CREDITS	**16**	**6**	**22**	**28**

* Non Credit Course

AIT 211   **OOP USING JAVA**   **3 (2+1)**

Objective(s)

After completing the course the student shall be able to comprehend the art of programming and, in particular, the structure and meaning of basic Java programs, modify, compile, debug, and execute Java programs, design and build programs using java technology APIs

Unit I

Introduction to Java

Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Unit II

Objects and Classes

Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Unit III

Inheritance and Polymorphism

Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Casting objects, Instance of operator, Abstract class, Interface in java, packages in java, util package.

Multithreading and Exception Handling

Multithreading in java, Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally

Unit IV

Event and GUI programming

Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

Unit V

I/O Programming and JDBC

Text and Binary I/O, Classes for File Reading and Writing, Random Access Files, JDBC Introduction, Types of drivers, Callable Statement, Connection, Prepared Statement, Resultset, DatabaseMetaData, ResultSetMetaData

Reference Book(s)

1. Java Programming Language by Ken Arnold, James Gosling, David Holmes
2. The Complete Reference Java, Herbert Schildt: TMH, New Delhi
3. Black Book: Java Programming, DreamTech Publication, New Delhi
4. Head First Java by Kathy Sierra, Bert Bates
5. Thinking in Java By Bruce Eckel

Practical(s)

1. Writing, Compiling and Executing first java program.
2. Java program exercises for data types, operators.
3. Java program exercises for loop and decision structures.
4. Java program exercises for class, object, method, method and constructor overloading.
5. Java program exercises for build in classes and methods.
6. Java program exercises for Inheritance, Method overriding.
7. Java program exercises for Abstract class and Interface.
8. Java program exercises for Thread creation, Thread Methods.
9. Java program exercises for Thread synchronization.
10. Java program exercises for Exception Handling.
11. Java programming exercises for GUI and Layout Managers.
12. Java programming exercises for Event Delegation Model.
13. Java programming exercises for GUI controls like button, textbox, list, combobox etc.
14. Java programming exercises for File Handling.
15. Java programming exercises for JDBC.

AIT 212   RELATIONAL DATABASE MANAGEMENT SYSTEM   3 (2+1)

Objective(s)

The objective of the course is to present an introduction to database management systems, with an emphasis on how to create, organize, retrieve and update information efficiently and effectively from the database. At the end of this course, the student will get acquainted about the creation of relational databases include storing, retrieving, updating and displaying data using Structured Query Language (SQL) integrated into Stored Procedures, Functions and Triggers.

UNIT I – INTORDUCTION TO DBMS

Introduction of DBMS, Applications of DBMS, Purpose of database, Data, Independence, Database System architecture - levels, Mappings, Database, users and DBA.

UNIT II – RELATIONAL AND E-R MODEL

Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, Relational algebra Queries, Tuple relational calculus, Basic concepts of E-R Model, Design process, constraints, Keys, Design issues, E-R diagrams, Weak entity sets, Extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema.

UNIT III – RELATIONAL DATABASE DESIGN AND QUERY PROCESSING

Functional Dependency – definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization – 1NF, 2NF, 3NF, Decomposition using FD-dependency preservation, BCNF, Multi-valued dependency, 4NF, Join dependency and 5NF, Overview of query processing, Measures of query cost, Selection operation, Sorting, Join, Evaluation of expressions, Transformation of relational expressions, Estimating statistics of expression results, Evaluation plans, Materialized view

UNIT IV – TRANSACTION MANAGEMENT AND SECURITY

Transaction concepts, Properties of transactions, Serializability of transactions, Testing for serializability, System recovery, Two-Phase Commit protocol, Recovery and Atomicity, Log-based recovery, Concurrent executions of transactions and related problems, Locking mechanism, Solution to concurrency related problems, Deadlock, , Two-phase locking protocol, Isolation, Intent locking, Introduction to security, Discretionary access control, Mandatory Access Control, Data Encryption.

UNIT V – SQL AND PL/SQL CONCEPTS

Basics of SQL, DDL, DML, DCL, Structure – creation, alteration, defining constraints – Primary key, Foreign key, Unique, Not null, Check, IN operator, Functions - aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All, view and its types, transaction control commands – Commit, Rollback, Savepoint, Cursors, Stored Procedures, Stored Function, Database Triggers.

Reference Book(s)

1. Database System Concepts, Silberschatz, Korth and Sudarshan, McGraw Hill.
2. An introduction to Database Systems, C J Date, Addition-Wesley.
3. SQL,PL/SQL The programming Language of Oracle, Ivan Bayross – BPB Publications
4. Oracle PL/SQL Programming, Steven Feuerstein, O'Reilly Media.
5. Understanding SQL by Martin Gruber, BPB
6. Oracle – The complete reference – TMH /oracle press

Practical(s)
1. Installation of RDBMS
2. Database and table creation with constraints
3. Insert records into the table
4. Practical based on SELECT, GROUP BY and Having, ORDER BY Clause
5. Practical based on ALTER and DROP table
6. Practical based on operators and functions
7. Practical based on cursor and trigger
8. Practical based on PL/SQL Blocks

UNIT-I
AGILE DEVELOPMENT: Agile Practices, Overview of Extreme Programming, Planning, Testing, Refactoring.

UNIT-II
AGILE DESIGN: What Is Agile Design?, SRP: The Single-Responsibility Principle, OCP: The Open-Closed Principle, LSP: The Liskov Substitution Principle, DIP: The Dependency-Inversion Principle, ISP: The Interface-Segregation Principle.

UNIT-III
UX and UX Design, The Wheel: UX Processes, Lifecycle, Methods and Techniques, Scope, rigor, complexity and Project perspective, Agile lifecycle Processes and the Funnel model of Agile UX.

UNIT-IV
The nature of UX design, Bottom up versus Top-down Design, Generative Design :ideation, sketching, critiquing, Prototype candidate design

UNIT-V
UX evaluation methods and techniques, Empirical UX evaluation :UX goals , metrics and Targets Analytic UX evaluation: Data collection methods and Techniques, Connecting Agile UX with Agile Software Engineering

AIT 214   WEBSITE DEVELOPMENT USING PHP   3(2+1)

Objective(s)

This course benefits the students to effectively learn and use PHP and MySql in creating advanced web applications. In this course, student learns PHP scripting with file handling, database management, session & cookie management, AJAX and Content Management System concept.

UNIT I
Fundamentals of PHP

PHP Installation, Basics of PHP, Variables, Operators, Control structure, Creating arrays, Multi dimensional arrays, Navigating arrays, Manipulating keys, User defined function, Function scope, Function arguments and return values

UNIT II
Working with forms, Built-in Functions

Global and environmental variable, Accessing input from various elements of form, Get and Post method Built-in Functions: Introduction to string and String functions, Variable related Functions, Array Related Functions, Math Functions, Date & Time Functions, Miscellaneous Functions.

UNIT III
Saving State and File handling

Saving state in PHP: Setting a cookie, Deleting a cookie, Creating session cookie, Session function, Session variables etc. File manipulation: Testing files, Opening files, closing files, Reading a file, writing to a file, File Uploading, GD Library functions.

UNIT IV
PHP Database Connectivity

Introduction to MySQL, DML and DDL operation of MySQL using phpMyAdmin, Principles of database programming from PHP, Creating tables, Adding and changing information, Retrieving information from a table and reporting it to a web page, Deleting information and tables, Avoiding potential problems by managing quotes and backslashes in data, server side validation using database.

UNIT V
Advance PHP

Introduction of AJAX, AJAX with PHP, JQuery Introduction, JQuery with PHP, Introduction to CMS, Wordpress [Introduction & Installation]

Practical(s)

1. Write a PHP code to read form submitted data using GET and POST method.
2. Write a PHP code using Form Element such as Textbox, button, radio, checkbox and select.
3. Write a PHP code to read & write file content.

4. Write a PHP code to store user selected font, color and style in cookie variable. When user revisit the web page than content display in selected font, color and style.
5. Write a PHP code to read and write Session Variable.
6. Write a PHP code to read and write text file.
7. Write a PHP code to file uploading.
8. Write a PHP code to create captcha code using GD library function.
9. Write a PHP code to display, add, update and delete operation for MySQL table.
10. Write a PHP code for User Authentication. If user is Authenticated user then display welcome page else display same page with "Invalid User name and Password" message. Username and Password available in USERLIST table.
11. Write a AJAX code with PHP to display information in SPAN area.
12. Write a AJAX code with PHP to fill combo box.
13. Simple form design using JQuery.
14. Program with JQuery and PHP.
15. Develop a website using CMS.

Reference Book(s)
1. Beginning PHP and MySQL By W. Jason Gilmore
2. Beginning AJAX with PHP By Lee Babin
3. PHP Manual

AGRI 211   FUNDAMENTALS OF AGRICULTURAL ECONOMICS   2 (2+0)

UNIT I

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behaviour. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare.

UNIT II

Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. *Demand:* meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale.

UNIT III

Cost: Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. *National income:* Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control.

UNIT IV

Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. *Economic systems:* Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning. Forms of business organizations, international trade and balance of payments. GST and its implication on Indian economy.

AGRI 212   **FUNDAMENTALS OF SOIL SCIENCE**   **3(2+1)**

UNIT I

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Elementary knowledge of soil taxonomy classification and soils of India.

UNIT II

Soil Profile, components of soil; Soil physical properties: soil texture - Methods of particle size analysis, structure, density and porosity, soil colour, consistence and plasticity. Soil water retention, movement and availability; soil air, composition; source, amount and flow of heat in soil; soil temperature and plant growth

UNIT III

Soil reaction - pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; Soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge ion exchange, cation exchange capacity, base saturation. History of soil fertility and plant nutrition. criteria of essentiality, role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

UNIT IV

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects. Problematic soils and its management. Wasteland management.

Practical(s):
1. Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry.
2. Study of soil sampling tools, collection of representative soil sample, its processing and storage.
3. Study of soil profile in field. Study of soil forming rocks and minerals.
4. Determination of particle density and bulk density of soil and computation of porosity.
5. Determination of soil moisture content and maximum water holding capacity and computation of moisture constants.
6. Determination of soil texture by feel and international pipette method.
7. Studies of capillary rise phenomenon of water in soil column and water movement in soil.
8. Study of soil map.
9. Determination of soil colour.
10. Demonstration of heat transfer in soil.
11. Determination of soil pH and electrical conductivity.
12. Determination of cation exchange capacity of soil.
13. Estimation of organic matter content of soil.

AGRI 213   FUNDAMENTALS OF AGRICULTURAL EXTENSION EDUCATION   2 (1+1)

UNIT I

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme planning. Extension systems in India (TOT).

UNIT II

Extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, CDP, NES etc.) various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, IVLP, ORP, ND, NATP, NAIP, etc. --Name, Year with Important Remarks)

UNIT III

Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India viz. Panchayat Raj System, Rashtriya Krishi VikasYojana, Antyodaya Anna Yojana, Deendayal Upadhyaya Gramin Koushalya Yojana, Deendayal Disable Rehabilitation Scheme, Gramin Bandharan Yojana, Rural Housing (Indra Awas Yojana) Integrated Child Development Scheme, Integrated Rural Development Programme, Livestock Insurance Scheme, Mahatma Gandhi National Rural Employment Guarantee Act, National Food Security Mission, National rural Livelihood mission, Pradhanmantri AwasYojana, Swarnjayanti Gram SwarozgaraYojana (Name, Year with Important Remarks).

UNIT IV

New trends in agriculture extension: KVK, ATMA, ATIC in detail , Brief about privatization extension, cyber extension/e-extension, market-led-extension, farmer-led -extension, expert systems, etc. Monitoring and evaluation- concept and definition, monitoring and evaluation of extension programmes. Transfer of Technology-Concept and models

Practical(s):

A visit to understand the problems being encountered by the villagers/farmers. Preparation of Interview Schedule and data analysis for farmers. Study the organization and functioning of Gram Panchayat. Study the organization and functioning of Cooperative. Study the organization and functioning of NGO. To visit and study of KVK. To visit and study of SSK.To visit and study of ATIC. PRA techniques and its application in planning of village development activities. Use of MCDM analysis techniques for survey interpretation. Development of survey Performa for different problems in agriculture and allied fields.

Unit I

Introduction to Instrumentation and Measurements, Types of Measurements, Instrument Characteristics, Sensors and Transducers, GuideLines for Selection of Sensor and Transducers.

Unit II

Measurement of Resistance using Wheatstone bridge, Kelvin's single and Double Bridge, Measurement of Inductance using Maxwell's Inductance bridge, Maxwell's Inductance capacitance bridge and Anderson's bridge, Measurement of Capacitance using Schering Bridge andWien's bridge.

Unit III

Resistive Displacement, Capacitive Displacement and Inductive Displacement sensor, Piezo electric sensor,Light Dependent Resistor, Photo Diode, Photo Transistor and Photo Resistor. Moisture and Humidity sensor.

Unit IV

Temperature Sensor: RTD, Thermistor, Thermo-CoupleTemperature IC, optical and radiation Pyrometer Principal, Construction, practical Working and Limitations. Application to Agriculture.

Unit V

Flow Sensor: Bernoulli's theorem, Venturi flow meter, Flow nozzle, orifice flow meter, propeller flow meter, Electromagnetic Flow meter, and Ultrasonic Flow meter.GPS Sensor: Principal, Construction and Working, Application to Agriculture.

Reference Books:

1).Mechanical and Industrial Measurement: Process Instrumentation and Control by R.K.Jain
2).PC Based Instrumentation, Concepts and Practices by N. Mathivanan
3).Transducers and Instrumentation by DVS Murty
4).Mechanical Measurement and Control by Dr. D.S.Kumar
5).Understanding GPS: Principles and Applications by Elliott D. Kaplan Christopher J. Hegarty

Practical(s)

1   To study Measurement of Resistance using Wheatstone Bridge and Kelvin's double bridge.
2   To study Measurement of self Inductance using Maxwell's Bridge.
3   To study Measurement of self Inductance using Anderson's Bridge.
4   To study Measurement of Capacitance using Schering bridge.
5   To study Measurement of Capacitance using Wien's bridge.
6   To study Linear and Angular resistive Displacement sensor.
7   To study Linear and Angular Capacitive Displacement sensor.
8   To study Linear Variable Displacement Transducer sensor.
9   To study Temperature measurement using RTD.
10   To study Temperature measurement using Thermistor.
11   To study Temperature measurement using Thermocouples.

12   To study characteristics of Light Depending Resistance.
13   To study characteristics of Photo Diode.
14   To study Electromagnetic Flow meter.
15   To study Ultrasonic Flow meter.
16   To study working of GPS.

Introduction to National Service Scheme – objectives and motto of NSS – programme planning and development – kinds of activities in regular and special camping programmes – aspects of NSS programmes – institutional, rural and urban projects – village/slum adoption – organizational and administrative arrangements of NSS at national, state, university and college levels – each student has to undergo a minimum of 240 hours of regular service in two consecutive and attend one special camp of ten days duration in the following activities to complete the course – environmental enrichment and conservation – plantation of trees, their preservation and upkeep.

Construction of rural roads, cleaning of village ponds, popularization of bio-gas plants, prevention of soil erosion, health, family welfare and nutrition programmes, mass immunization, blood donation, integrated child development, population education – programme, aimed at creating awareness for improvement of the status of woman – production oriented programmes – teaching improved agricultural technologies, rodent control and pest management, weed control, soil testing, guidance in animal husbandry and poultry farming and small savings. Programmes of work during emergencies and natural calamities like cyclones, floods and earthquake – assisting the authorities in distributions of rations, medicines and clothes – assisting health authorities in inoculation, supply of medicines etc. – reconstruction of huts, relief and rescue work – adult education, programmes of continuing education of school dropouts, coaching of students from economically weaker sections, organization of youth clubs, discussions on eradications of social evils like castism, regionalism, corruption, untouchability etc. non-formal education of rural youth – awareness programmes on drug abuse and AIDS – voter awareness campaign.

OR

Organization – NCC – Director General, Directorate, group – army – infantry – section – company – battalion, military history various wars – post and after independence of India, introduction to defense services – system of NCC training, foot drill – attention, stand at ease and stand easy – sizing – forming up in three ranks, open and close order march – dressing – getting on parade, dismissing and falling out – saluting – marching, arms drill – shoulder arm – order arm – present arm – guard of honour – ceremonial drill.

Weapon training – rifle – buoyant – light machine gun – sten machine carbine – introduction and characteristics – stripling – assembling and cleaning – loading and unloading – firing, field – craft – visual training – targets – judging distance – fire discipline and fire control orders – battle craft – field signals – description of ground – section formatic – section battle drill – scouts and patrols – ambush – field engineering – map reading – conventional signs – grid systems – use of service protractor – prismatic compass and its use, self-defense – general principles – precautions and training – attacks and counter attacks – marching and searching – first aid – hygiene and sanitation – civil defense – leadership – NCC song.

PE 211   **PHYSICAL EDUCATION**   **1*(0+1)**

Definition, rules and regulations of anyone of the games and Athletic events. Warming up and conditioning exercise are compulsory for each student – conditioning and calisthenics for various Athletic activities. Exercise for strength, agility, co-ordination, flexibility, co-operation, vital capacity endurance, speed and for various systems of our body and team spirit.

Compulsory skill development in anyone of the following games

Basket Ball, Volley Ball, Ball Badminton, Foot Ball, Kho-Kho, Chess, Kabaddi, Cricket, Table Tennis, Shuttle Badminton, Gymnastics, Athletics viz. Jumps, Throws, Hurdles

Aims and Objectives of Yoga – Asanas: i.e. Padmasana, Pujankasana, Sarvangasana, Chakrasana, Dhanurasana, Halasana, Mayurasana and Savasana. Asanas for Ailments, Back pain, Arthritis, Abdominal problems, Stress, Fatigue, Insomnia, Obesity, Circulation, Hypertension, Varicose veins, Respiration, Heart, Digestion, head Aches, Depression, Addiction and eye problems.

Mental Balance and Importance – Development of concentration Suriyanamaskar – Advance skills of any one of the games which were taught in the I Semester.

Semester –IV

Course No	Subject Name	TH	PR	CR	HRS
AIT 221	Software Engineering	3	0	3	3
AIT 222	Introduction to .Net Framework and ASP.NET	2	2	4	6
AIT 223	Computer Networks	2	1	3	4
AIT 224	Operating System with Unix/Linux	2	1	3	4
AIT 225	E-Content Development Using Multimedia	1	2	3	5
AGRI 221	Agricultural Meteorology and Climate Change	2	1	3	4
AGRI 222	Entrepreneurship Studies and Business Communication	2	0	2	2
STAT 221	Statistical Methods	2	1	3	4
PE 221	NCC /NSS / Physical Education	0	1	1*	
SMNR 221	SEMINAR-II	0	1	1*	
	TOTAL CREDITS	16	8	24	32

* Non Credit Course

UNIT I
Introduction
Introduction to Software Engineering, Software Components, Software Characteristics, Software Engineering Processes, Software Quality Attributes, Various Software Development Life Cycle (SDLC) Models.

UNIT II
Software Requirement Specifications (SRS) and Software Project Management
System Analysis, Feasibility Study (Technical, Economical, Operational), Fact-finding Techniques (Interview, Questionnaire, Record Scanning, Observation), Specification Tools (Decision Tree, Decision Table, Data Flow Diagram of various levels, Data Dictionary, Structured English) SRS Document, IEEE Standards for SRS, Project Cost Estimation, Project Scheduling, Gantt Chart, PERT(Program Evaluation and Review Technique), CPM(Critical Path Method)

UNIT III
Software Design
Design Objectives, Input Design, Output Design, UI Design, Architecture and Component Level Design, File Organization, Database Design, Input Validation, Backup and Recovery Design. Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures. Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

UNIT IV
Software Reliability and Software Testing
Software Reliability: Concept of Software Reliability, Reliability Models, Limitations of Reliability Models. Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Reengineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, Software Licensing (Proprietary v/s. Free and Open Source Software), An Overview of CASE Tools.

Software Testing: Testing Fundamentals, Manual and Automated Testing, Blackbox and Whitebox Testing, Functional Testing, Structural Testing, Test Plan activities, unit testing, integration Testing. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools.

UNIT V

CASE STUDY
Examples
- Hotel Automation System
- Book Shop Automation Software
- Word processing Software

- Software Component Cataloguing Software.
- Payroll System
- Banking System
- Purchase Order System
- Library Management System
- Railway Reservation System
- Bill Tracking System
- College Admission System

Reference Book(s)
1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
5. Ian Sommerville, Software Engineering, Addison Wesley.

AIT 222   INTRODUCTION TO .NET FRAMEWORK AND ASP.NET   4(2+2)

Objective(s)

On verge of this course, students will be able to understand the 3-tier software architecture (presentation/client tier, application tier, data tier) and develop multi-tier web applications. The goal of this course is to impart the basics of the .NET framework like Common Language Runtime (CLR), .NET framework classes, Event driven programming, Error handling, State Management, and ADO.NET.

UNIT I

Introduction to ASP.NET & Controls

Overview to .Net Framework– Web Architecture (**Overview of ASP.NET Architecture**) – Client Server Architecture – Application Web Servers – Installation of IIS server – **Introduction to Visual Studio** – Types of Files in ASP.NET – Types of controls in ASP.NET – Page life cycle, Adding Controls to a Webpage – **Using standard controls** (Buttons, Textbox, Checkbox, Label, Panel, Listbox, Dropdownlist etc.) **and Rich web Controls (calendar, fileupload etc.).**

UNIT II

Validation & Error handling

What is Validation? – Client-Side Validation – Server-Side Validation – Validation Controls (RequiredField Validator, Range Validator, CompareField Validator, RegularExpression Validator, Custom Validator, ValidationSummary Control) – Master Page – Designing Website with Master Page, Theme and CSS – Navigation Controls – Introduction of Exceptions and Errors, try/catch & finally block – Page Tracing.

UNIT III

State Management & Configuration

What is State? – Why is it required in Asp.Net? – Client-Side State Management – Server-side State Management – State management (viewstate, session, application, cache, Query String, Cookie) – Introduction to Web.Config (using various sections like connectionstrings, appsettings, customerrors, Authentication and Authorization) & global.asax file.

UNIT IV

ADO.NET

Overview of ADO.NET– Architecture of ADO.NET – Connected Architecture – Disconnected Architecture – Database Programming with ADO.NET (Connection, Command, DataReader, DataAdapter, Dataset, DataColumn, DataRow, DataConstraints, DataView etc.) – Using Data Access Control (Gridview Control, Repeater Control etc.) – Binding Data to DataBound Controls – Displaying Data in a webpage using SQLDataSource Control – Data Binding Expressions – Caching Application Pages and Data.

UNIT V

AJAX & XML

Using AJAX with ASP.NET - Introduction to XML – Reading Datasets from XML – Writing Datasets with XML

Reference Book(s)
1. ASP.NET UNLEASHED – BY Stephen Walther, Kevin Hoffman, Nate Dudek **SAMS**
2. Beginning_ASP.NET 4 in C# and VB – By Imar Spaanjaars **Wrox**
3. Beginning ASP.NET 4 in C# 2010 – By Matthew MacDonald Apress
4. C# 4.0 The Complete Reference – By Herbert Schildt – McGraw-Hill Prof Med/Tech
5. C# in a Nutshell – By Peter Drayton, Ben Albahari, Ted Neward – **O'Reilly Media, Inc.**
6. Professional C# 4.0 and .NET 4 – By Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner – **WORX**

Practical(s):
1. Installing Visual Studio and IIS.
2. Practice of Standard Controls.
3. Practice of Standard Controls.
4. Practice of Validation Controls.
5. Practice of Master Page.
6. Using Theme and CSS in website.
7. Practice of Navigation Controls.
8. Using try/catch block.
9. Understanding & Practice of Query String, Viewstate
10. Understanding & Practice of Session, Application
11. Importance and use of web.config file.
12. Use of global.asax file.
13. Practice of Displaying Data in a webpage using SQLDataSource Control
14. Database programming with ADO.NET (Connection, Command, DataReader).
15. Database programming with ADO.NET (DataAdapter, Dataset, DataColumn, DataRow, DataConstraints, DataView etc.).
16. Practice of Data Access Controls (Gridview Control, Repeater Control etc.).
17. Practice of Data Binding Expressions
18. Practice of Caching Application Pages and Data.
19. Practice of AJAX.
20. Practice of sending emails.
21. Practice of Writing Datasets to XML file and Reading Datasets From XML.

Objective(s)

This course addresses the principles, architectures and protocols that have gone into the development of the Internet and modern networked applications. The course examines network design principles, underlying protocols, technologies and architectures such as naming, data transport, routing and algorithms for networked applications including messaging, encryption and authentication.

UNIT I

The importance of Networking, Types of Networking, Network Topology, Transmission Media, Data communication: Concepts of data, signal, channel, bandwidth, Network adapters card, Multiplexer (FDM, TDM, STDM), Hub, Repeater. Network References Models, Layered architecture, protocol hierarchies

UNIT II

Physical layer functionality, Data link layer function and protocols: Framing, error-control, flow control; sliding window protocol, CSMA and other DLL protocols

UNIT III

Network layer- IP addressing, classful-classless addressing, routing algorithms, congestion control algorithms; Internetworking, Transport layer -connection management, addressing; Flow control and buffering, multiplexing

UNIT IV

Session layer –RPC; Presentation layer -abstract syntax notation, Application layer -File Transfer Protocol (FTP), Telnet, Simple Mail Transfer Protocol(SMTP); World Wide Web(WWW) -Wide Area Indexed Servers, DNS

UNIT V

Security Technology –Intruders, Firewalls, Scanning and Analysis tools, Content filters, Advanced Encryption standard, Principles of public-key cryptosystem, Message authentication and Hash functions, Digital signatures, Digital certificate

UNIT – VI

Wireless Sensor Networks :Introduction to Wireless Sensor Networks, Sensor Nodes, Architecture – WSN, Topologies – WSN, Data Dissemination Architectures and Protocols, Data Gathering Algorithms, MAC Protocols for WSN, Exposure; Coverage and Deployment, Security

Practical(s)

1. An Overview of Campus Networks Design
   a. Router
   b. Workgroup Switch
   c. High-End Switch
   d. Multilayer Switch with Route Processor
2. Introduction to Motherboard & Installation of LAN Card

3. Introduction to LAN with its cables, connectors and topologies
4. To connect two personal computer with straight and cross over twisted pair
    a. identify the proper cable to connect the PCs to the hub
    b. Configure workstation IP address information
    c. Test connectivity using the ping command
5. Installation & working of Remote desktop
6. Installation and working of Telnet (Terminal Network)
7. Switch configuration and management (Telnet, SNMP, HTTP)
8. Installation of Dynamic Host Configuration Protocol (DHCP)
9. To study DNS Server Case Study and to install DNS Server and its Configuration
10. Optical Fiber Splicing Machine experiment
11. Basic Firewall Configuration
12. Router configuration and management
13. Implement RSA asymmetric (public key and private key)-Encryption
14. Generate digital signature using Hash code and using MAC code

Reference Book(s)
1. W. Stallings, "Data and Computer Communications", Prentice Hall of India.
2. B. A. Forouzan, "Data Communications and Networking", McGraw Hill.
3. Tanenbaum, A.S. Computer Networks, Prentice Hall of India, New Delhi.

Objective(s)
After completing the course the student shall be able to understand core operating system concepts, Different techniques for process scheduling, memory management, Commands and Programming in linux environment

Unit I

Introduction, Role of an OS computer system, types of operating system. Operating system structures, System documents, OS services, system calls, system structure, concept of virtual machines.

Unit II

Process management

Process concept, process scheduling, cooperating processes, Inter process communication.

CPU scheduling

Basic concept, scheduling criteria, scheduling algorithms

Unit III

Process synchronization

Critical section problem, synchronization hardware, semaphores, classical problems of synchronization, critical regions, monitors.

Deadlocks

Dadlock characteristics, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlocks, combined approach for deadlock handling.

Unit IV

Memory Management

Logical versus Physical Address space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging

Virtual Memory

Demand Paging, Performance of Demand Paging, Page Replacement, Page-replacement algorithms, Allocation of frames, Thrashing, Other Considerations, Demand segmentation

File-System Interface

File concept, Access methods, Directory Structure, Protection, Consistency

File-System Implementation

File-System Structure, allocation methods, Free-space Management, Directory Implementation, Efficiency and performance

Unit V

I/O subsystems

I/O Hardware, Application I/O interface

Protection

Goals of protection, domain of protection, access matrix, implementation of access matrix, revocation of access rights, capability based systems, languages based protection.

Security

The problem, authentication, one-time password program threats, system threats, threat monitoring, encryption, computer security classification

Case studies (UNIX, LINUX, WinNT)

Reference Book(s)
1. Operating System Concept: Silbertschatz, Galvin, 5ed.Addison Wesley.
2. Operating system Concepts: Milan Malinkovic, TMH, 2nd ed.
3. Operating System: William Stallings, PHI, 2nd ed.

Practical(s):
1. Installation of Linux operating system
2. File and Directory related commands
3. File permissions and related commands
4. File text manipulation, compression and comparison
5. Process related commands
6. I/O redirection and piping
7. Using gcc and java compiler in linux
8. Editors(Vim, Emacs)
9. Bash shell scripting - I
10. Bash shell scripting - II
11. Understanding of signals and traps
12. Study system calls related to process & process control
13. Inter process communication (POSIX-IPC) using pipe
14. Inter process communication (POSIX-IPC) using shared memory
15. Study system calls related to semaphore

AIT 225   E-CONTENT DEVELOPMENT USING MULTIMEDIA   3(1+2)

Objective(s)

After completing the course the student shall be able to create e-content for different fields and devices using action script programming, creating Animation, create platform for interactive media, creating different video footages with transitions and effect, Export video in a variety of formats, Importing audio and applying Sound effect to short film, provide the best audio impact for the video's story.

UNIT I

Introduction to action script 3.0, Using Code Snippets and Navigating the flash Timeline - Adding action script using code snippets, Working with frame labels, Looping playback with action script, conditional statement to control timeline , Working with properties, methods, events and functions, Crating animation with action script - controlling movie clip properties with tween, Using action script and components to load content, Using array and loop in action script 3.0.

UNIT II

Crating and formatting text with action script - Creating Text Fields, Setting Text Field Attributes, Selecting Text, Formatting Text, Formatting with HTML and CSS , creating a scroll bar using action script, Controlling sound with action script - ActionScript Sound Architecture, Internal and External Sounds, Playing, Stopping, and Pausing Sounds, Changing Sound Volume and Pan, control video using action script - Encoding, Components, Full-Screen Video, Captions. adding FLVplayback controls.

UNIT III

Introduction to Adobe Premiere Pro, Basic workflow, Keyboard shortcuts, Touring the workspace, Working with Panels, Using the Source Monitor and Program Monitor, Set preferences, **Project setup, Importing footage** - Supported file formats, Importing sequences, clip lists and compositions, Editing sequences and clips - Add clips to sequences, Working with markers, Trimming clips, Rendering and previewing sequences, Synchronizing audio and video with Merge Clips, Working with captions, **Graphics, titles, and Motion Graphics templates** - Create titles and motion graphics, Essential Graphics Panel , Motion Graphics Templates

UNIT IV

Effects and transitions - Applying, removing, finding, and organizing effects, Viewing and adjusting effects and keyframes, Effect presets, Masking and tracking, Stabilize motion with the Warp Stabilizer effect, Change duration and speed of clips, Motion: position, scale, and rotate clips, Adjustment Layers, Audio and Video effects and transitions, **Animation and keyframes** - Adding, navigating and setting keyframes, **Editing audio** - Editing, repairing, and improving audio using Essential Sound panel, Organize assets in the Project panel, **Compositing in Premiere Pro** - Blending modes, Compositing, alpha channels, and adjusting clip opacity, **Exporting media from Premiere Pro** - Workflow and overview for exporting, Exporting projects for other applications

UNIT V

Audition Introduction : Audio interfacing and Audition environment, Wave form View : Basic Editing, Signal processing, Mastering, Sound design, Creating and recording files , Multi track View : Basic multi track orientation, Track parameters, Clips, Creating music with sound libraries, Creating music by overdubbing and multi track recording, Mixing strategies, Working with Video.

Reference Book(s)

1. Adobe Animate CC Classroom in a Book, Author: Russell Chun by Adobe Press
2. Adobe Premiere Pro CC Classroom in a Book, Author: Maxim Jago by Adobe Press
3. Adobe Audition CC Classroom in a Book, Author : Adobe Creative Team by Adobe Press.
4. Adobe Animate CC Help, Reference PDF by adobe Creative Team
5. Adobe Premiere Pro CC Help, Reference PDF by adobe Creative Team
6. Adobe Audition CC Help, Reference PDF by adobe Creative Team

Practical(s)

Flash ActionScript

1. Creating Animation using ActionScript
2. Controlling the Timeline with ActionScript
3. Creating preloaders in ActionScript
4. Controlling Sound with ActionScript
5. Create a Dynamic Slideshow with ActionScript
6. Create flash platform for interactive media

Premiere Pro

1. Create footage with different transitions and effect.
2. Create a video with Speed ramping and slow motion.
3. Create & Animate Lower Third Graphics
4. Create Cinematic Intro Titles
5. Make small documentary film on any subject
6. Export video in a variety of formats, from Blu-ray to mobile devices

Audition

1. Importing audio, applying effects, waveform editing and multi track mixing.
2. Import, edit, mix, and export the dialogue, sound effects, and music for a short film and provide the best audio impact for the video's story.

AGRI 221   AGRICULTURAL METEOROLOGY AND CLIMATE CHANGE   3 (2+1)

Theory:

Meaning and scope of Agricultural Meteorology; Earth atmosphere - its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed; Cyclone, anticyclone, land breeze and sea breeze; Nature and properties of solar radiation, solar constant, depletion of solar radiation; Atmospheric temperature, daily and seasonal variations of temperature; Atmospheric humidity, concept of saturation, vapour pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Monsoon mechanism and importance in Indian agriculture; Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave; Potential Evapotranspiration and Actual Evapotranspiration; Agriculture and weather relations; Weather forecasting - types of weather forecast and their uses; Climate change, Climatic variability, Global warming, Causes of climate change and its impact on regional and national Agriculture; Effect of temperature on crop productivity, Effect of CO_2 on C_3 and C_4 plant, Climate resilient agriculture, Effect of climate change on pest proliferation, Climate change adaptation and mitigation strategies.

Practical(s):

Visit of Agrometeorological Observatory, Site selection of observatory, Exposure of weather instruments and data recording, Measurement of albedo and sunshine duration, Computation of Radiation Intensity using BSS, Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis. Measurement of soil temperature. Determination of vapour pressure and relative humidity. Determination of dew point temperature. Measurement of wind speed and wind direction, Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Reference Books
1. Fundamentals of Agrometeorology   - G S Mahi and P K Kingra (2014).
2. Principles of Agricultural Meteorology - O P Bisnoi (2007). Oxford & IBH Publishing Co. Pvt. Ltd.
3. Agricultural Meteorology - GSLHV Prasad Rao (2008).
4. Agrometeorology - D S Reddy and S R Reddy (2012). Kalyani Publishers
5. Agrometeorology - S R Ghadekar (2006). Kalyani Publishers
6. Introduction to Agriculture and Agrometeorology - S R Reddy (2014). Kalyani Publishers
7. Agrometeorology : Principles and Applications of Climate Studies in Agriculture - Harpal S. Mavi, Graeme J. Tupper (2004). CRC Press
8. Climate Change Impacts - Singh, Vijay P, Yadav, Shalini, Yadava, Ram Narayan (2018).
9. Managing Weather and Climate Risks in Agriculture - Sivakumar, Mannava, V K , Motha, Raymond P. (2007).
10. Crops and Weather – VenkatRaman
11. Climate, Weather and Crops in India - D Lenka

AGRI 222 ENTREPRENEURSHIP STUDIES AND BUSINESS COMMUNICATION 2 (2+0)

UNIT I
Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs. SWOT Analysis & achievement motivation. Government policy and programs and institutions for entrepreneurship development

UNIT II
Role of economic reforms *viz.* Agri-clinics, Agribusiness/Agri-enterprises, Entrepreneurial Development. Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management.

UNIT III
Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise. Extension administration: meaning and concept, principles and functions.

STAT 221   STATISTICAL METHODS   3(2+1)

Unit I Introduction, Measures of Central Tendency and Dispersion
Introduction to Statistics and its Applications in Agriculture. Graphical Representation of Data, Measures of Central Tendency & Dispersion

Unit II Probability and Distribution
Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Normal Distribution

Unit III Correlation and Regression
Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations

Unit IV Test of significance
Introduction to Test of Significance, One sample & two sample test t for Means, Large sample test (Z test), Chi-Square Test of Independence of Attributes in 2 ×2 Contingency Table.

Unit V Experimental Design and Sampling
Introduction to Analysis of Variance, Principle of experimental designs, Analysis of One Way Classification (CRD and RBD). Introduction to Sampling Methods, Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement, Use of Random Number Tables for selection of Simple Random Sample.

Practical(s):
Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles& Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles& Percentiles. Measures of Dispersion (Ungrouped Data).Measures of Dispersion (Grouped Data).Moments, Measures of Skewness & Kurtosis (Ungrouped Data).Moments, Measures of Skewness & Kurtosis (Grouped Data). Correlation & Regression Analysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test.Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2 × 2 contingency table. Analysis of Variance One Way Classification. Selection of random sample using Simple Random Sampling.

PE 221   **NATIONAL SERVICE SCHEME**   **1*(0+1)**

Introduction to National Service Scheme – objectives and motto of NSS – programme planning and development – kinds of activities in regular and special camping programmes – aspects of NSS programmes – institutional, rural and urban projects – village/slum adoption – organisational and administrative arrangements of NSS at national, state, university and college levels – each student has to undergo a minimum of 240 hours of regular service in two consecutive and attend one special camp of ten days duration in the following activities to complete the course – environmental enrichment and conservation – plantation of trees, their preservation and upkeep.

Construction of rural roads, cleaning of village ponds, popularisation of bio-gas plants, prevention of soil erosion, health, family welfare and nutrition programmes, mass immunisation, blood donation, integrated child development, population education – programme, aimed at creating awareness for improvement of the status of woman – production oriented programmes – teaching improved agricultural technologies, rodent control and pest management, weed control, soil testing, guidance in animal husbandry and poultry farming and small savings. Programmes of work during emergencies and natural calamities like cyclones, floods and earthquake – assisting the authorities in distributions of rations, medicines and clothes – assisting health authorities in inoculation, supply of medicines etc. – reconstruction of huts, relief and rescue work – adult education, programmes of continuing education of school dropouts, coaching of students from economically weaker sections, organisation of youth clubs, discussions on eradications of social evils like castism, regionalism, corruption, untouchability etc. non-formal education of rural youth – awareness programmes on drug abuse and AIDS – voter awareness campaign.

<center>**OR**</center>

PE 221   **NATIONAL CADET CORPS**   **1*(0+1)**

Organisation – NCC – Director General, Directorate, group – army – infantry – section – company – battalion, military history various wars – post and after independence of India, introduction to defense services – system of NCC training, foot drill – attention, stand at ease and stand easy – sizing – forming up in three ranks, open and close order march – dressing – getting on parade, dismissing and falling out – saluting – marching, arms drill – shoulder arm – order arm – present arm – guard of honour – ceremonial drill.

Weapon training – rifle – buoyant – light machine gun – sten machine carbine – introduction and characteristics – stripling – assembling and cleaning – loading and unloading – firing, field – craft – visual training – targets – judging distance – fire discipline and fire control orders – battle craft – field signals – description of ground – section formatic – section battle drill – scouts and patrols – ambush – field engineering – map reading – conventional signs – grid systems – use of service protractor – prismatic compass and its use, self-defense – general principles – precautions and training – attacks and counter attacks – marching and searching – first aid – hygiene and sanitation – civil defense – leadership – NCC song.

<center>**OR**</center>

PE 221   **PHYSICAL EDUCATION**   **1*(0+1)**

Definition, rules and regulations of anyone of the games and Athletic events. Warming up and conditioning exercise are compulsory for each student – conditioning and calisthenics for various Athletic activities. Exercise for strength, agility, co-ordination, flexibility, co-operation, vital capacity endurance, speed and for various systems of our body and team spirit.

Compulsory skill development in anyone of the following games

Basket Ball, Volley Ball, Ball Badminton, Foot Ball, Kho-Kho, Chess, Kabaddi, Cricket, Table Tennis, Shuttle Badminton, Gymnastics, Athletics viz. Jumps, Throws, Hurdles

Aims and Objectives of Yoga – Asanas: i.e. Padmasana, Pujankasana, Sarvangasana, Chakrasana, Dhanurasana, Halasana, Mayurasana and Savasana. Asanas for Ailments, Back pain, Arthritis, Abdominal problems, Stress, Fatigue, Insomnia, Obesity, Circulation, Hypertension, Varicose veins, Respiration, Heart, Digestion, head Aches, Depression, Addiction and eye problems.

Mental Balance and Importance – Development of concentration Suriyanamaskar – Advance skills of any one of the games which were taught in the I Semester.

Semester –V

Course No	Subject Name	TH	PR	CR	HRS
AIT 311	Advance ASP.NET	2	1	3	4
AIT 312	Python Programming	2	1	3	4
AIT 313	Elective-I	2	1	3	4
AIT 314	E-Content Development Using Advance Multimedia	1	2	3	5
AIT 315	Fundamentals of Artificial Intelligence	2	1	3	4
AGRI 311	Communication Skills and Personality Development	2	0	2	2
AGRI 312	Elective – II	2	1	3	4
AGRI 313	GIS and Remote Sensing Techniques	2	1	3	4
PRJT 311	Project – I	0	1	1*	
	TOTAL CREDITS	**15**	**8**	**23**	**31**

Objective(s)

At the end of this course, the student will get acquainted about latest trend in ASP.NET website development using MVC and data retrieval using LINQ; to target local market, development of multilingual application/site using custom controls and report generations; Optimize site performance by enabling asynchronous loading of page and usage of web services and use of Angular JS.

Unit I Create custom controls, Asynchronous execution & Localization

Custom Controls - Types of Custom Controls - Building User Controls, Composite Controls - Asynchronous Processing using await and Async - Approaches of Asynchronous processing in ADO.NET – Asynchronous Methods for SQL command class – AsyncCallBack – WaitHandle Class – Asynchronous Connections – Building Culture-Neutral Pages – Creating Local Resources – Creating Global Resources.

Unit II Web service & Angular JS

Building XML web service – Consuming simple XML web service – Protocols for web service – Overloading web methods – Caching web service response – SOAP Headers – Introduction Windows communication Foundation– Building WCF Services – Building AJAX-Enabled Web Services – Introduction to Angular JS

Unit III Reports

Accessing reports in ASP.NET - Overview to SQL Server Reports - Creating SQL Server Reports with wizards - Integrating with Web Applications - Customizing the Report Viewer - Adding a Database or Table to a Report – Introduction to Crystal Reports.

Unit IV MVC

Introduction to Controllers, views & Models – Forms and HTML Helpers – Data Annotations & Validations – Routing – Customizing Application URLs – Using MVC and AJAX and Jquery.

Unit V LINQ

LINQ expressions - Using via extension methods - Filtering - Sorting - Aggregation - Joins - Extension methods - Object initialization syntax - Anonymous types - Lambda expressions - Deferred Execution - Data Projection - Single result value - Existing types - Anonymous types - Grouping - LINQ to SQL - Attributes and mapping - Inserts and deletes – Transactions.

Reference Book(s)
1. ASP.NET 4 UNLEASED - by Stephen Walther, Kevin Scott Hoffman, Nate Scott Dudek - Publisher: SAMS Publishing
2. Beginning ASP.NET 4.5: in C# and VB – by Imar Spaanjaars -   Publisher - WROX
3. Professional ASP.NET MVC 5 – by Jon Galloway, Brad Wilson, K. Scott Allen, David Matson; ISBN: 978-1-118-79475-3 – Publisher WROX
4. Professional LINQ – by Scott Klein ISBN: 978-0-470-04181-9 – Publisher WROX

Practical(s)

1. Practice of Creating custom controls
2. Practice of Creating composite custom controls 3. Practice of Asynchronous Methods for SQL command class.
3. Practice of Wait approach.
4. Practice of Callback approach and asynchronous connection.
5. Practice of global and local resource file for localization.
6. Practice of creating and using XML web service.
7. Practice of consuming Web Services Asynchronously.
8. Practice of creating WCF services.
9. Practice of creating AJAX-Enabled Web Services.
10. Practice of creating and using RDLC, SSRS and crystal reports.
11. Practice of creating MVC controllers, views and models.
12. Practice of using Forms & HTML Helpers.
13. Practice of using Data Annotations & Validations
14. Practice of customizing application URLs
15. Practice of using AJAX and JQuery with MVC
16. Practice of using LINQ in place of SQL queries
17. Practice of using LINQ with XML files
18. Practice of Basic of Angular JS

Objective(s)

To build programming logic and thereby developing skills in problem solving using Python programming language; To be able to do testing and debugging of code written in Python, Emphasize the concepts and constructs rather than on language features.

Unit I

Introduction

The basic elements of python, Branching Programs, Control Structures, Strings and Input, Iteration

Unit II

Functions, Scoping and Abstraction

Functions and Scoping Specifications, Recursion, Global variables, Modules, Files, System Functions and Parameters

Unit III

Structured Types, Mutability and Higher-Order Functions

Strings, Lists, Tuples and Dictionaries Lists and Mutability, Functions as Objects

Unit IV

Testing, Debugging, Exceptions and Assertions

Types of testing – Black-box and Glass-box, Debugging, Handling Exceptions, Assertions

Unit V

Classes and Object-Oriented Programming

Abstract Data Types and Classes, Inheritance, Encapsulation and Information Hiding

Unit IV

Advanced Topics

Regular Expressions – REs and Python, Plotting using PyLab, Graphics and GUI Programming – Drawing using Turtle, Tkinter and Python, Other GUIs

Practical(s)

1. **Basic Python Programs :** Print Hello world! , Add Two Numbers, Find the Square Root, Calculate the Area of a Triangle, Solve Quadratic Equ Convert Celsius To Fahrenheit ation Swap Two Variables, Generate a Random Number, Convert Kilometers to Miles etc

2. **Decision Making and Loop:** Check if a Number is Positive, Negative or 0 , Check if a Number is Odd or Even, Check Leap Yea , Find the Largest Among Three Numbers, Check Prime Number, Print all Prime Numbers in an Interval, Find the Factorial of a Number, Display the multiplication Table, Print the Fibonacci sequence, Check Armstrong Number, Find Armstrong Number in an Interval

3. **Function :** Display Powers of 2 Using Anonymous Function , Find Numbers Divisible by Another Number, Convert Decimal to Binary, Octal and Hexadecimal, Find ASCII Value of Character, Find HCF or GCD, Find LCM , Find Factors of Number, Make a Simple Calculator, Shuffle Deck of Cards, Display Calendar, Display Fibonacci Sequence Using Recursion, Find Sum of Natural Numbers Using Recursion, Find Factorial of Number Using Recursion,Convert Decimal to Binary Using Recursion

4. **Native Data type :** To Add Two Matrices, To Transpose a Matrix, To Multiply Two Matrices , To Check Whether a String is Palindrome or No, To Remove Punctuations From a String, To Sort Words in Alphabetic Order, To Illustrate Different Set Operations

5. **File :**To Merge Mails , to Find the Size (Resolution) of a Image , to Find Hash of File

Reference Book(s)

1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Allen Downey, Jeffrey Elkner, Chris Meyers ,How to think like a computer scientist : Learning with Python,Freelyavailableonline.2012
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010
5. Swaroop C H, "**A Byte of Python**", 2003-2005 , Book released under Creative Common License.
6. Allen Downey, Jeffrey Elkner, Chris Meyers, "***How to Think Like a Scientist – Learning with Python* ",** Green Tea Press, 2002, First Edition.
7. Guido van Rossum, "***Python Tutorial – Release 2.3.3***" 2003, Python Software Foundation Ltd.
8. https://www.programiz.com/python-programming

AIT 314   E-CONTENT DEVELOPMENT USING ADVANCE MULTIMEDIA 3(1+2)

Objective(s)

After completing the course the student shall be able to create advance e-content creation for different field and devices as per industries/organization needs using Vector Graphics, Logo, Icon in 2D and 3D, controlling a puppet, typographic portrait and cartoon character, video compositing, motion graphics design, 3D animation, green screen composition, Create high-quality visual effects(VFX), Creating Interior Visualizations, Modeling Lighting and Rendering, Create virtual studio and virtual product workflow, Learn the creative aspects and finer nuances of animation and video production, starting from pre-production to post production, including storyboarding and character animation.

UNIT I

Adobe Illustrator CC/ Inkscape - Workspace basics, Properties panel, Tools, Drawing basics, Draw simple lines and shapes, Perspective drawing, Symbols, Create 3D objects, Edit artwork using Image Trace, Select colors, About painting, Select and arrange objects, Reshape objects, Import, export, and save.

Character Animator Workspace – Start, Rig, Record, stream, Character Animator workflow - Create Character Animator project, Create your first character, Control the puppet using webcam, microphone, and mouse, Adjust the behaviour of your puppet, Record and refine your performance, Export the recorded scene, Use your scene in other applications

UNIT II

After Effects Planning and setup, General user interface items, Working other applications, Workspaces, panels, and viewers, Projects and compositions basic, Precomposing, nesting, and pre-rendering, Importing footage - Working with footage items, Layers and properties - 3D layers, Cameras, lights, and points of interest, Animation and keyframes - Compositing tools for VR/360 videos, Apply immersive video effects, Create Motion Graphics templates in After Effects, Speed, Time-stretching and time-remapping, Tracking 3D camera movement, Animating with Puppet tools, Tracking and stabilizing motion.

UNIT III

Drawing, painting, and paths, Creating shapes and masks, Managing and animating shape paths and masks, Mask Tracking, Creating and editing text layers, Animating text, Compositing and transparency, Alpha channels, masks, and mattes, Keying, Roto Brush, Refine Edge, Expression basics, Working with expressions, expression reference, Expression example, Basics of rendering and exporting still images and still-image sequences, Export an After Effects project as an Adobe Premiere Pro project.

UNIT IV

Intro to 3D Software, The Workspace - User-Interface Elements, Viewports, ViewCube, Mouse Buttons, Quad Menus, Display of Objects in a viewport, Viewport Navigation, Transforming Objects using Gizmos, Graphite Modeling Tools set, Command Panel, Time Slider and Track Bar, Setting Up a Project Workflow, Architectural Model – creating walls, doors, window, floor, ceiling, furniture, Character poly modelling

UNIT V

Introduction to Materials: Interiors and Furniture, The Slate Material Editor, Material Types, Creating a Multi/Sub-Object Material, Textures and UV Workflow- UV Unwrapping, Applying the Color and bump Map, Character Studio: Rigging, Creating and Modifying the Biped with modifier, Character Studio: Animation - Adding a Run-and-Jump Sequence, Adding Freeform Animation, Introduction to Lighting - Standard Lights, Target Spotlight, Target Direct Light, Free Spot or Free Direct Light, Omni Light, Rendering - Rendering Setup, Render Processing, Creating a Camera, Using Cameras, Animating a Camera.

Reference Book(s)

1. Adobe Illustrator CC Classroom in a Book (2018 release) , Author : Brain Wood by Adobe press
2. Adobe After Effects CC Classroom in a Book (2018 release), Author : Lisa Fridsma by Adobe press
3. Adobe After Effect CC Help, Reference PDF by adobe Creative Team
4. Adobe Illustrator CC Help, Reference PDF by adobe Creative Team
5. Autodesk 3ds Max 2015 Essentials: Autodesk Official Press
6. Autodesk 3ds Max 2014 Essentials: Autodesk Official Press by Randi L. Derakhshani.

Practical(s)

Adobe illustrator/Inkscape and Character Animator

1. Create a logo for an organization/Company
2. Create a typographic portrait and cartoon character or animate character
3. Create an icon for something – experiment with different styles (3d, web2.0, simple, etc)
4. Create your first character, control puppet with your webcam, mic and mouse, adjust the behavior of your puppet, record and refine your performance, export your recorded scene and use your scene in other application.

After Effects

1. Create a Photo slideshow animation in After Effects.
2. Create Kinetic Typography motion graphics.
3. Create Motion Graphics templates and Cinematic Title Animation.
4. Create 3d scene from still picture using Camera Mapping and 3D Environment.
5. Create a Lower Third in After Effects & use it in Premiere Pro with Live Text Templates.
6. Create green screen composition for video footage.
7. Create a video clip using Motion Tracking and Rotoscoping.

3Ds MAX / BLENDER

1. Create Architectural Model - Creating Interior Visualizations, Modeling Lighting and Rendering
2. Animating Text - Using Modifiers, particles
3. Design 3D company logo
4. Create Character Poly Modeling
5. Create virtual studio and virtual product
6. Create Product Presentation Workflow
7. Create environments to build the scenes for your movie or visualization

AIT 315   FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE   3(2+1)

Objective(s)
The purpose of this course is to impart concepts of Artificial Intelligence and Expert System. Artificial Intelligence includes problem solving, knowledge representation, reasoning, decision making, planning, perception & action, and learning.

UNIT I
Introduction to Artificial Intelligence (AI); Scope of AI: natural language processing, robotics, expert system, Games, theorem proving, AI evolution, Knowledge Based and Rule based systems, Ethics and issues with AI

UNIT II
Search and Control strategies: Blind search, Breadth first search, Depth first search, Hill climbing method, Best First search, Branch and Bound search.

UNIT III
Neural Networks, Classification, Regression, Activaition Functions, CNN, RNN, Transfer Learning, Deep Learning, Generative Adverserial Networks

UNIT IV
Natural Language Processing, Corpus, Tokenization, Stemming, Sentiment Analysis

Practical(s)
1. Search and Control strategies: Blind search, Breadth - first search, Depth First search, Hill climbing method, Best First search, Branch and Bound search.
2. Explore ChatGPT, StableDiffuesion
3. Build Fruit / Vegetable / Disease classifers
4. Sentiment Analysis from text
5. Build chatbots

Reference Book(s)
6. Rich, E. and Knight, K. 2002. Artificial Intelligence. Tata McGraw Hill.
7. Bratko, Prolog Programming for Arti cial Intelligence, Pearson.
1. Gonzalez, A. and Dankel, D. 2004. The Engineering of Knowledge -Based Systems. Prentice Hall.

AGRI 311   COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT   2 (2+0)

UNIT I
Communication: meaning, definition and importance. Models of communication process with its key elements. Principles, Functions and level of Communication. Fidelity and barriers in communication. Communication skill - definition and types of communication skills.

UNIT II
Extension teaching methods: meaning, classification, individual, group and mass contact methods. Transfer of technology: concept and models. Training centers (MANGE, EEI, SAMETI, KVK) for capacity building of extension personnel. ICT Application in TOT (New and Social Media), media mix strategies.

UNIT III
Agriculture Journalism, Importance and Advantages. Diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories. Personality: definition, meaning and nature. Importance of personality, Traits, Types and Characteristics of personality. Factors influencing the growth and Development of personality. Methods of measuring personality. Advantages and Disadvantages of personality.

Objective(s)

The basic Objective(s) of this course is to teach concepts of GIS and remote sensing with specific applications in agriculture related statistics.

UNIT I

Introduction to Geographical Information System; Components of a GIS; Data Models in GIS-Raster and Vector

UNIT II

Spatial Data Analysis- Raster and Vector, Data input, verification, storage and output

UNIT III

Introduction- maps and spatial information; manual and automatic digitizing process; Spatial and nonspatial data linking; preparation of thematic maps, Data errors in GIS; Spatial modeling; Spatial interpolation; Current and potential uses of GIS in agricultural planning;

UNIT IV

Physics of remote sensing, Satellites and their characteristics; Satellite Remote Sensing and Sensors; Spectral signatures of earth surface features, spectral characteristics of vegetation, soil and water

UNIT V

Data acquisition Data Reception, Transmission, Processing and data storage; Visual and digital image interpretation; Digital image processing, Applications of Remote Sensing in Agriculture, Basics of GPS; Observables and Biases; Errors and Limitations; Type and applications of GPS.

Reference Book (s):

1. Annadurai, S. and Shanmugalakshmi, R. Fundamentals of Digital Image Processing. Pearson Education.
2. Burrough, P.A. Principles of Geographic Information System for Land Resources Assessment. Oxford University Press.
3. Curran, P.J. Principles of Remote Sensing. Longman Inc., New York.

Practical(s):

1. Digitization of a map with the help of a digitizer; Map editing;
2. Geo-referencing and map projections;
3. Creation of attribute database and linking with spatial data;
4. General analysis of the data with the help software;
5. Applications of digital elevation models using GIS;
6. Spatial interpolations using GIS;
7. Visual interpretations of remote sensing data;
8. Geometric corrections of remote sensing digital data;
9. Methods for improving quality of digital data and Techniques of image classifications

Semester –VI

Course No	Subject Name	TH	PR	CR	HRS
AIT 321	Web Data Management	2	1	3	4
AIT 322	Machine Learning	1	1	2	3
AIT 323	Application Development in Mobile Technology	2	1	3	4
AIT 324	Data Analysis with MATLAB/Open Source Platforms	2	1	3	4
AIT 325	Image Processing	2	1	3	4
AGRI 321	Elective – III	2	1	3	4
AGRI 322	Elective – IV	2	1	3	4
EI 323	Embedded and IoT system	2	1	3	4
PRJT 321	Project – II	0	1	1*	
	TOTAL CREDITS	**15**	**8**	**23**	**31**

* Non Credit Course

Objective(s)

After learning the course, the student will be able to understand the overall vision of the Semantic Web, to analyze the current technology stack (URIs, XML, RDF/S, OWL), to understand how one could use these technologies for building something useful, to define and test an ontology, to define schema mappings and to install and use tools for semantic data management

UNIT I
Data Model

Introduction to Modeling Web Data, Semi structured data, XML, Web Data Management with XML, XML Standards, XML and syntax, XML Data Model, XLink, and XPointer

UNIT II
XPath and XQuery

Introduction, Basics of XPath and XQuery, XPath: Steps and path expressions, Evaluation of path expressions, Generalities on axes and node tests, Axes, Node tests and abbreviations, Predicates,   XPath 2.0; FLWOR expressions in XQuery: Defining variables -the for and let clauses, Filtering - the where clause, The return clause, Advanced features of XQuery; XPath foundations.

UNIT III
Typing

Motivating Typing, Automata, Schema Languages for XML, Typing Graph Data: Graph Semistructured Data, Graph Bisimulation, Data guides.

XML Query Evaluation

XML fragmentation, XML identifiers: Region-based identifiers, Dewey-based identifiers, Structural identifiers and updates; XML evaluation techniques: Structural join, Optimizing structural join queries, Holistic twig joins.

UNIT IV
Ontologies, RDF, and OWL

Introduction, Ontologies by example, Web resources, URI, namespaces, RDF, RDFS: RDF Schema, OWL, Ontologies and (Description) Logics.

Querying Data through Ontologies

Introduction, Querying RDF data: notation and semantics, Querying through RDFS ontologies, Answering queries through DL-LITE ontologies.

UNIT V
Data Integration

Introduction, Containment of conjunctive queries, Global as view mediation, Local as view mediation, Ontology-based mediators, Peer-to-Peer Data Management Systems.

Building Web scale applications

Web search, web crawlers, web information retrieval, Web graph mining and hot topics in web search, Distributed systems, failure management, Required properties of a distributed

system, P2P networks, Hash-based structures, distributed indexing, Distributed computing with Map Reduce

Reference Book(s)

1. Serge Abiteboul, Ioana Manolescu, Philippe Rigaux, Marie-Christine Rousset and Pierre Senellart, "Web Data Management", Cambridge University Press, 2011
2. Bhavani Thuraisingham, "Web Data Management and Electronic Commerce", CRC Press, 2000
3. Bhavani Thuraisingham, "XML Databases and the Semantic Web", CRC Press, 2002
4. Athena Vakali and George Pallis, "Web Data Management Practices: Emerging Techniques and Technologies", IGI Publishing, 2007, ISBN-10: 1599042282; ISBN-13: 978-1599042282

Practical(s)

1. Create an XML file defining an article in newspaper.
2. Create an XML file containing list of students. Also create stylesheet file to display list in an HTML format.
3. Create an XML file containing list of students. Using XPath display following information
    a. Information of a student with ID No : 101
    b. All the student in the sorted order according to their CGPA
4. Create an XForm to collect information from staff member regarding their publications. Details like Year of Publication, National/International, Title, Conference/Journal etc.
5. From the above gathered information, using XQuery find out the number of publication in a specific year.
6. Demonstrate the use of AJAX.
7. Study of XMLSPY tool.
8. Create an RSS for the events occurring in your institute.
9. Write a program to read the articles in RSS created in above practical.
Study of RDF (Resource Description Framework)

Objective(s)

At the end of this course, Student will have better understanding of Machine learning concept and scenario of machine learning application. They will be able to compare different types of learning algorithms and apply machine learning concepts in real life problems.

Unit I

Introduction: Learning Problems, designing a learning system, Issues with machine learning, Supervised vs Unsupervised Learning, Regression vs Classification, Bias vs Variance, Train-Test split, Python Libraries (NumPy, SciPy, Matplotlib, Pandas, Scikit-Learn, StatsModels), Hyper-parameter tuning, model selection, cross-validation

Unit II

Regression: Linear algebra review (Matrix Multiplication), Gradient Descent, Least squared Error, Loss/cost Function, Simple and Multiple Regression, Handling quality parameters using dummy variables, Imputation of missing values

Unit III

Classification: Bayes Theorem, Maximum Likelihood, Naïve Bayes Classifier, Logistic Regression, LDA, k-NN, SVM, Decision Tree, Random Forests, Feature selection, Confusion Matrix

Unit IV

Unsupervised Learning: Linear algebra review (Eigen Value, Eigen Vectores), Dimensionality Reduction, PCA, hierarchical clustering, k-means clustering

Unit V

Neural networks : Neural Network Representation, Appropriate problems for Neural Network Learning, Perceptrons, Multilayer Networks and Back Propagation Algorithms, Remarks on Back Propagation Algorithms

Reference Book(s):
1. Tom M Mitchell, "Machine Learning", McGraw Hill
2. Peter Harrington, "Machine Learning in Action", DreamTech

Practical(s):
1. Linear Algebra (Matrix-Vector, Matrix-Matrix multiplaction, Eigen value, Eigen vector)
2. Data Handling and cleaning (Pandas dataframe, Scikit-learn impute, onehotencoding)
3. Regression (Simple Linear Regression, Multiple Linear Regression)
4. Classification using Naïve Bayes Classifier, Logistic Regression, k-NN, SVM, Decision Tree and Random Forests)
5. Clustering through k-means clustering and heirarchical clustering
6. Dimensionality reduction through PCA

Construction of Neural Networks for classification and regression

AIT 323   APPLICATION DEVELOPMENT IN MOBILE TECHNOLOGY   3(2+1)

Objective(s)
The course is an overview to the essentials of mobile computing. The ubiquity of wireless communication technologies and the spread of portable computing devices have made possible a mobile computing time in which users, on the move, can seamlessly access network services and resources, from any-where, at any-time. We shall effort to contemporary the challenges faced to professionally enable such access along with state of the art solutions.

UNIT- I
Introduction
Wireless Communication, Mobile Computing Functions & Devices, Ad-hoc Networks, Architecture for Mobile Computing, 3-Tier Architecture, Multiple Access Procedures – FDMA, TDMA, CDMA, SDMA, Blue-Tooth Protocol Stack, Radio-Frequency Identification (RFID), Mobile IP

UNIT- II
Global System for Mobile Communications (GSM)
GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, GSM Frequency Allocation
Short Message Service (SMS)
Short Message Service, Strength of SMS, SMS Architecture, Value Added Services through SMS

GPRS
Packet Data Network, GPRS Network Architecture, Network Operations, Applications for GPRS

UNIT- III
J2ME
Java 2 Micro Edition (J2ME), Programming for CLDC, GUI in MIDP, Multimedia, Record Management System, Jar management
Introduction to Android
The Android Platform, Android SDK, Building a sample Android application, Anatomy of an Android applications, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions, Managing Application resources in a hierarchy Working with different types of resources

UNIT- IV
Android User Interface Design Essentials
User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation

Unit V

Using Common Android APIs

Using Android Data and Storage APIs, Managing data using SQLite, Sharing Data Between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs

Deploying Android Application to the World

Selling your Android application

Reference Book(s)

1. Mobile Computing , Asoke Telukder, Roopa Yavagal, TMH
2. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)
3. The complete reference J2ME, TMH
4. Principles of Mobile Computing, - Hansmann, Merk, Nicklous and Stober, Springer
5. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd (2011)
6. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd(2009)

Practical(s)

1. Various WML tags, WML Script.
2. Design a web page using WML.
3. Study of J2ME, Write various programs with J2ME.
4. Hello ANDROID.
5. Creating Applications and Activities.
6. Creating User Interfaces, Intents.
7. Broadcast Receivers, Adapters, and the Internet.
8. Data Storage, Retrieval, and Sharing.
9. Working in the Background.
10. Peer-to-Peer Communication.

AIT 324 DATA ANALYSIS WITH MATLAB/OPEN SOURCE PLATFORMS 3 (2+1)

UNIT I
Introduction

The basic features of Data Analysis Platform(s), A Few Elementary Calculations, File types , General commands; Matrices and Vectors: Input, Indexing, Matrix manipulation, Creating vectors; Matrix and Array Operations: Arithmetic operations, Relational operations, Logical operations, Elementary math functions, Matrix Functions; Character Strings: Manipulating character strings, eval Function; Command- Line Functions: Inline functions, Built-in Functions, Plotting Simple Graphs

UNIT II
Programming Techniques

Data Types, Global variables, Loops, control-flow, Interactive input, Advanced Data Objects, Multidimensional matrices, Structures, Functions, Classes and Objects, Files I/O

UNIT III
Applications

Linear Algebra, Interpolation, Ordinary Differential Equations, Numerical Integration, Graphics: Basic 2-D Plots, Using subplot for Multiple Graphs, 3-D Plots, Saving and Printing Graphs, Statistical plotting and data visualization

UNIT IV
Modelling and Curve Fitting

Introduction to Curve Fitting, Building a Simple Model; Curve Fitting Tools, Programmatic Curve Fitting, Data Modelling, Linear and Nonlinear Models

UNIT V
Statistical Tools

Data organization and management, Database Connectivity, Descriptive Statistics, Probability Distributions, Hypothesis Tests, Correlation and Regression, Design of Experiments

Practical(s)
1. An overview of various software(s)
2. Create and work with arrays of numbers
3. Create and print simple plots
4. Manipulate matrices and use them as matrices or arrays
5. Use Built- in Functions
6. Work with symbolic and various numerical libraries
7. Saving, loading, importing, and exporting data
8. Finding the determinant of a matrix , eigenvalues and eigenvectors
9. Curve Fitting and Interpolation
10. Data Analysis and Statistics
11. Ordinary Differential Equations
12. Hypothesis Testing
13. Correlation and Regression

14. Design of Experiments

Reference Book(s)
1. Wes McKinney (3E) Python for Data Analysis, O'Reilly
2. Chapra S.C. and Canale R.P. (2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill
3. Hanselman, Duane. Little_eld, Bruce. Mastering Matlab (international edition). Pearson/Prentice Hall.
4. Hadley Wickham and Garrett Grolemund, R for Data Science, O'Reilly

Objective(s)

After learning the course the students should be able to understand the basic image enhancement techniques in spatial & frequency domains, understand the various kind of noise present in the image and how to restore the noisy image, understand the basic multi-resolution techniques and segmentation methods, to apply this concepts for image handling in various fields.

UNIT I

Digital image fundamentals

Light and Electromagnetic spectrum, Components of image processing system, Image formation and digitization concepts, Neighbours of pixel adjacency connectivity, regions and boundaries, Distance measures, Applications

UNIT II

Image Enhancements

In spatial domain: Basic gray level transformations, Histogram processing, Using arithmetic/Logic operations, smoothing spatial filters, Sharpening spatial filters.

In Frequency domain: Introduction to the Fourier transform and frequency domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.

UNIT III

Image Restoration:

Various noise models, image restoration using spatial domain filtering, image restoration using frequency domain filtering, Estimating the degradation function, Inverse filtering.

UNIT IV

Colour Image processing:

Colour fundamentals, Colour models, Colour transformation, Smoothing and Sharpening, Colour segmentation

Wavelet and Multi-resolution processing

Image pyramids, Multi-resolution expansion, wavelet transform.

UNIT V

Image compression

Introduction, Image compression model, Error-free compression, Lossy compression

Image segmentation

Detection of discontinuities, Edge linking and boundary detection, thresholding

Practical(s)

Experiments will be based on the topics taught in the theory

Reference Book(s):

1. Digital Image Processing, Second Edition by Rafel C. Gonzalez and Richard E. Woods, Pearson Education
2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI

3. Fundamentals of Digital Image Processing by Anil K Jain, PHI
4. Digital Image Processing Using Matlab, Rafel C. Gonzalez and Richard E. Woods, Pearson Education

EI 323　　　　**Embedded and IoT system**　　　　**3(2+1)**

Unit I

Introductions to Embedded system, Application and purpose of Embedded system, Quality Attributes of Embedded system, Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.

Unit II

Architecture of 8051 Microcontroller, microcontroller hardware, Pin diagram of 8051, input/output pins, ports and circuits. Internal RAM and ROM, SFR's, interfacing with external memory, timers and counters, interrupts. Serial data communication (UART).

Unit III

Instruction Set of 8051 & Addressing modes: Classification of instruction set - Data transfer group, arithmetic group, logical group, single bit, branching group, CALL and RET instructions andtheir usage. Addressing modes - Immediate, register, direct, register indirect and indexed addressingmodes.Accessing the data from internal and external memory.Programming and Interfacing of simple switch and LED to I/O ports to switch on/off LED with respect to switch status.

Unit IV

Introduction to Architectureof Arduino, ESP 8266 and Raspberry PI,Instruction set of Arduino,ESP 8266 and Raspberry PI,Programming andInterfacing of various sensors with Arduino,ESP 8266 and Raspberry PI.Case Study for Embedded and IoT Design: Home Automation. Agriculture Environment –Industry – Health and Life style.

Reference Books:

1).Internet of Things: A Hand on Approach by Arshdeep Bahga and Vijay K. Madisetti
2).The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Thomson/Cengage Learning.
3).Designing the Internet of Things by Adrian McEwen, Hakim Cassimally
4).Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the
　Cloud by Cuno Pfister

Practical(s)

1　To study Architecture of IoT systems.
2　To study 8051 Microcontroller Architecture.
3　To study an assembly language program for Data transfer for block data movement, sorting and exchanging.
4　To study an assembly language program to add, subtract, multiply, divide 16 bit data.
5　To study an assembly language program for Bit addressable Instructions.
6　To study Digital, Analog and Advanced I/O functions of Arduino IDE.
7　To study Time, Math and Character functions of Arduino IDE.
8　Write a sketch and Interface an LED with Arduino.
9　Write a sketch and Interface Light Crystal Display with Arduino
10　Write a sketchand Interface Temperature sensor with Arduino.
11　Write a sketch and Interface Light Depending Resistance sensor with Arduino.

12 Write a sketch and Interface Moisture sensor with Arduino.
13 Write a sketchand Interface Temperature sensor with ESP 8266.
14 Write a sketchto create Access Point, Server/web Server and Client with ESP 8266.
15 To Introduce and setting up a Raspberry Pi.
16 To Interface an LED with Raspberry Pi.

ELECTIVE SUBJECTS

Elective-I	Subject Name
1	Information Retrieval
2	Data Warehouse and Data Mining in Agriculture
Elective-II	**Subject Name**
1	Fundamentals of Crop Physiology
2	Nanotechnology and Precision Farming
3	Farm Machinery and Power
Elective-III	**Subject Name**
1	Operations Research
2	Crop Simulation Models
3	Agricultural Marketing, Trade and Prices
Elective-IV	**Subject Name**
1	Protected Cultivation and Green Technology
2	Bioinformatics Computing

Objective(s)

To provide the basis knowledge in information retrieval. To prepare students with sound skills to solve computational search problems. To escalate how to evaluate search engines. To appreciate the different applications of information retrieval techniques in the Internet or Web environment. To provide experience in building search engines and evaluating search engines.

UNIT I

Basic Concepts, Retrieval Process, Classic Information Retrieval, Set Theoretic, Algebraic and Probabilistic Models – Structured Text Retrieval Models

UNIT II

Query Languages, Key Word based Querying, Pattern Matching, Structural Queries, Query Operations, Text and Multimedia languages, Markup Languages

UNIT III

User Interface and Visualization, Human Computer Interaction, Access Process, Interface for Search

UNIT IV

Searching the Web, Challenges, Characterizing the Web, Search Engines, Browsing, Meta searchers, Web crawlers, robot exclusion, Web data mining,

UNIT IV

Meta crawler, Collaborative filtering, Web agents (web shopping, bargain finder,..), Economic, ethical, legal and political issues.

Reference Book(s):

1. G.G. Chowdhury, "Introduction to Modern Information Retrieval", Neal-Schuman Publishers
2. Ricardo Baeza-Yate, Berthier Ribeiro-Neto, "Modern Information Retrieval", Pearson Education Asia
3. An Introduction to Information Retrieval, By Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, Cambridge University Press, Cambridge, England
4. Daniel Jurafsky and James H. Martin, "Speech and Language Processing", Pearson Education
5. David A. Grossman, Ophir Frieder, " Information Retrieval: Algorithms, and Heuristics", Academic Press
6. Charles T. Meadow, Bert R. Boyce, Donald H. Kraft, "Text Information Retrieval Systems", Academic Press

Practical(s)

Searching the Web (crawling, indexing etc..) , web data mining , Practical exposure to tools like Zettair, mg, smart, trec_eval etc.

AIT 313(ELECTIVE-I) DATA WAREHOUSE AND DATA MINING IN AGRICULTURE 3(2+1)

Objective(s)
This course benefits the students to comprehend the overall architecture of a data warehouse and techniques and methods for data congregation and data preprocessing using OLAP tools. The dissimilar data mining models and techniques will be deliberated in this course. Data mining and data warehousing applications in bioinformatics will also be explored.

UNIT I
Introduction
What is data warehousing and data mining, A Multi-dimensional data model, Multi-dimensional Data Cubes, Star, Star Flakes, & Fact Constellation Schema, Concept Hierarchies, OLAP

UNIT II
Data Warehouse Architecture
Steps for design and construction of data warehouse, 3-tier data warehouse architecture, ROLAP, MOLAP, HOLAP, Data Pre-Processing, Overview, Need for pre-processing Issues related to efficient data handling (Extraction, Transformation, and updating of large databases Data Cleaning Data Integration & Transformation Data Reduction Discretization & Concept Hierarchy Generation

UNIT III
Data mining Primitives, Language, & System Architecture
What defines a data mining task? A data mining Query Language, Architecture of a Data mining System

UNIT IV
Mining frequent patterns and associations, efficient and scalable frequent item set mining methods. Multi-level association rules, association mining and correlation analysis, constraint-based association rules.

UNIT V
Classification and prediction - basic concepts, decision tree, Bayesian classification, rule-based classification. Prediction. Cluster analysis - basic concepts, types of data in cluster analysis. Case Studies related to Data Mining in Agriculture.

Reference Book(s):
1. Han, J., Kamber, M.: Data Mining: Concepts and Techniques. Second Edition. Elsevier Inc.
2. Dunham, M.H.: Data Mining. Introductory and Advanced Topics. Pearson Education

Practical(s)
1. To perform various commands given in PL/SQL in Oracle 8.0(For brushing up.)
2. To perform multi-dimensional data model using SQL queries. With Cube
3. JAVA FILE HANDLUING Programmed

4. Java database
5. Java program for data extraction
6. Java program for data cleaning
7. Java program for data transformation
8. To perform data mining using Weka mining tool.
9. Various Data Mining Experiments like Apriori etc.
10. To perform data mining using Orange mining tool.

UNIT I

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology; Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms;

UNIT II

Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: Glycolysis, TCA cycle and electron transport chain; Plant growth regulators: Physiological roles and agricultural uses, Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity. Absorption of water, ascent of sap and antitranspirants.Photoperiodism and Vernalization.Tanslocaton of solutes

Practical(s)

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of absorption spectrum of chlorophyll

AGRI 312 (ELECTIVE-II) NANOTECHNOLOGY AND PRECISION FARMING   3(2+1)

Theory

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informaticsuse in Precision Agriculture. Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Practical

Introduction to image processing software. Visual and digital interpretation of remote sensing images. Generation of spectral profiles of different objects. Supervised and unsupervised classification and acreage estimation. Multispectral remote sensing for soil mapping. Creation of thematic layers of soil fertility based on GIS. Creation of productivity and management zones. Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projects formulation and execution related to precision farming.

AGRI 312 (ELECTIVE-II)   **FARM MACHINERY AND POWER**   **3(2+1)**

UNIT I

Status of Farm Power in India, Sources of Farm Power , I.C. engines, working principles of I C engines, comparison of two stroke and four stroke cycle engines , Study of different components of I.C. engine, I.C. engine terminology and solved problems, Familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication ,fuel supply and hydraulic control system of a tractor,

UNIT II

Familiarization with Power transmission system : clutch, gear box, differential and final drive of a tractor , Tractor types, Cost analysis of tractor power and attached implement, Criteria for write selection of tractor and machine implements

UNIT III

Familiarization with Primary and Secondary Tillage implement, Implement for hill agriculture, implement for intercultural operations, Familiarization with sowing and planting equipment, calibration of a seed drill and solved examples, Familiarization with Plant Protection equipment, Familiarization with harvesting and threshing equipment.

Practical(s)

Study of different components of I.C. engine. To study air cleaning and cooling system of engine, Familiarization with clutch, transmission, differential and final drive of a tractor, Familiarization with lubrication and fuel supply system of engine, Familiarization with brake, steering, hydraulic control system of engine, Learning of tractor driving, Familiarization with operation of power tiller, Implements for hill agriculture, Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow . Familiarization with seed-cum-fertilizer drills their seed metering mechanism and calibration, planters and transplanter Familiarization with different types of sprayers and dusters Familiarization with different inter-cultivation equipment, Familiarization with harvesting and threshing machinery. Calculation of power requirement for different implements

AGRI 321 (ELECTIVE-III)   **OPERATIONS RESEARCH**   **3(2+1)**

UNIT I

Introduction to OR and LPP

Introduction, formulation of LPP, Graphical solution, The standard form of linear programming problems, Basic feasible solutions, unrestricted variables, Simplex Method, Big-M method, II-Phase method, Degeneracy, alternative optima, unbounded solutions, infeasible solutions, Dual

UNIT II

Transportation and Assignment Problems

North-West corner method, Least-Cost entry method, Vogel's method, Optimality of Transportation Problem, Hungarian method

UNIT III

Network Analysis

Minimal Spanning tree method, Shortest Route Problems, Maximum flow problems, CPM, PERT, Branch and Bound Algorithms cutting plan algorithm.

Smoothing and Allocation

Development of software for the techniques, Exposure to Project Management Packages

UNIT IV

Queuing Theory

Types of queuing system, Elements of Queuing model, Role of Poisson and exponential distribution in queuing, pure birth and death model, MM1 models

UNIT V

Modeling and Simulation

Use of Computer in modeling real life situations, Distribution functions, Random number generation, Selection of input probability distribution, Design of simulation models Experimental design, Introduction to simulation languages Programming tools for developing simulation models.

Reference Book(s)

1. Quantitative Techniques in management, N. D. Vohra , Tata McGraw Hill
2. Operations Research – An Introduction, Hamdy A Taha, Prentice Hall of India , New Delhi.
3. Introduction to Operations Research by HILLIER/LIEBERMAN, Tata McGraw Hill
4. Operations Research by R Panneerselvan, Prentice Hall of India.
5. Operations Research: Theory and Application, J. K. Sharma, Macmillan publication

Practical(s)

1. Simplex method using Ms Excel
2. N-W corner method
3. LCM
4. MODI method
5. Exponential distribution

6. Poisson distribution
7. Random number generation
8. Floyed's algorithm
9. Dijkstra's algorithm
10. Simulation model using MATLAB.

Objective(s)

To imparting knowledge of growth, development and yield analysis, To develop crop growth model for yield prediction.

UNIT I

Photosynthesis, Respiration and photorespiration, Nitrogen metabolism, Solute transport and photoassimilate translocation: uptake, transport and translocation of water, ions, solutes and macromolecules from soil, through cells, across membranes, through xylem and phloem; transpiration; mechanisms of loading and unloading of photoassimilates

UNIT II

Principles of crop production; Evaluation of crop responses to weather element; impacts of natural and induced variability of climate on crop production

UNIT III

Empirical and statistical crop weather models, their application with examples, regression model incorporating weather, soil, plant and other environmental related parameters and remote sensing inputs; growth and yield production models

UNIT IV

Crop Simulation models, e.g., CERES, WOFOST, InfoCrop, SPAW

UNIT V

Verification, Calibration and Validation of models

Reference Book(s)

1. Principles of Agricultural Meteorology – by Bisnoi O. P. (2007). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi
2. Simulation of Water Use, Nitrogen Nutrition and Growth of a Spring Wheat Crop. Simulation Monographs, PUDOC, Wageningen
3. Agro-meteorological Crop Monitoring and Forecasting – by Frere, M. and Popav, G. (1979) FAO.

Practical(s)

Working with statistical and simulation model, DSSAT model, WOFOST, SPAW, InfoCrop

AGRI 321(ELECTIVE-III) AGRICULTURAL MARKETING, TRADE AND PRICES   3(2+1)

UNIT I

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri-commodities.

UNIT II

Nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark).

UNIT III

Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing:

UNIT IV

Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR. Role of government in agricultural marketing. Role of APMC and its relevance in the present day context.

Practical(s)

Plotting and study of demand and supply curves and calculation of elasticities; Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

UNIT I

Green house technology: Introduction, Types of Green Houses; Plant response to Green house environment, Planning and design of greenhouses, Design criteria of green house for cooling and heating purposes.

UNIT II

Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar green house, hot air green house heating systems, green house drying.

UNIT III

Cost estimation and economic analysis. Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation.

UNIT IV

Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, recirculatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

Practical(s)

- Study of different type of green houses based on shape.
- Determine the rate of air exchange in an active summer winter cooling system.
- Determination of drying rate of agricultural products inside green house.
- Study of green house equipments.
- Visit to various Post Harvest Laboratories.
- Determination of Moisture content of various grains by oven drying & infrared moisture methods.
- Determination of engineering properties (shape and size, bulk density and porosity of biomaterials).
- Determination of Moisture content of various grains by moisture meter.
- Field visit to seed processing plant. Storage structure

AGRI 322 (ELECTIVE-IV) BIOINFORMATICS COMPUTING   3(2+1)

Objective(s)
To acquire knowledge about role of information technology in reading biological data, computer programming use in analysis and interpretation of biological data.

UNIT I
Introduction to bimolecules and central dogma of molecular biology; Carbohydrates, lipid, protein, nucleic acid-concept, Brief introduction of DNA and RNA, Gene expression, Protein Synthesis, Genomic rearrangement and DNA repair.

UNIT II
Organization of biological data, (Databases raw and processed) querying in the databases

UNT III
Primers in biology, Exploration of databases (Design and primers and different kinds of primers used in analysis), combinatorial problems in biology, Gene finding, motif finding and multiple sequence alignment

UNIT IV
Mechanism and flow of information in biology, Management and analysis of biological data Protein sequence analysis (Theory and algorithms), Protein structure analysis and applications.

UNIT V
Genome analysis, Protein folding, Protein Engineering and Drug design; Blast etc; Data mining on large data bases of biological data; Tools for NGS data analysis.

Reference Book(s)
1. Introduction to Bioinformatics – by T. K. Attwood and David J. Perry-Smith. Prentice Hall.
2. Bioinformatics for dummies – by Jean-Michel Claverie and Cedric Notredame. Wiley Publications
3. Bioinformatics: Methods and Protocols – by Stephen Misener and Stephen A. Krawetz (Eds.). Humana Press, Totowa, NJ.

Practical(s)
1. Biological Databases and records and file format
2. Data retrieval using entiez search
3. Homology search-BLAST/FASTA
4. Multiple sequence Alignment
5. Primer Designing
6. Identification of Gene/EST using different tools/software

Semester-VII

Course No	Subject Name	TH	PR	CR	HRS
EXPL 411	Educational Tour	0	3	3	6
EXPL 412	Experiential Learning - I	0	6	6	12
EXPL 413	Experiential Learning - II	0	6	6	12
EXPL 414	Experiential Learning - III	0	5	5	10
PRJT 411	Project –III	0	1	1*	
SSD 411	Soft Skills Development	0	1	1*	
	TOTAL CREDITS	**0**	**20**	**20**	**40**

* Non Credit Course

Educational Tour will often cater to more than one learning style, making them excellent teaching tools for certain deserving students. Classroom lectures apply primarily to audio learners, who learn best by listening. Visual learners can take benefit from visual aids, which exist with a limitation in the classroom, but are much more frequent during an Educational Tour. Finally, for tactile learners, Educational Tour offer an uncommon opportunity to perform hands-on learning and provide valuable educational opportunities in the actual field of work, without using textbooks and other tools used in a normal college schedule. It is supplement to the classroom learning. Students can actually see and enrich their knowledge. Gain deeper understanding of the problem in tangible view. It is not only helpful in effective learning but promote the qualities of leadership, discipline and self-confidence.

Objectives of Educational Tour Programme
1. To provide an opportunity to work with IT Research Stations and IT/AIT-based industries.
2. To develop the communication skills, confidence and competence among the students to interact with the IT people so as to prepare Project Reports on "Role of Information Technology in Agricultural Development".

Principles of Educational Tour Programme
1. Learn from IT/AIT-based industries and Serve them
2. Work and plan with IT/AIT-based industries
3. Start with what IT/AIT-based industries know

Expected Outcome of Educational Tour Programme
1. Personality development
2. Art of listening and art of negotiation
3. Confidence building
4. Develop skill of joint effort (community management)
5. Developing art of creative thinking
6. Effective decision-making
7. Time and relationship management
8. Observe problem and come out with a best possible/feasible solution
9. Current Technology Trends
10. Human Resource Management in Companies
11. Work Culture in Companies
Duration: 15/20 Days

UNIT I

Problem identification: What is the actual problem? , What are the causes for this problem?, Is it important to solve this problem? , How complex it is? , What are the likely solutions to this problem? , What type of benefits can be expected once the problem is solved? and so on.; Internal and external environment; Problem of : reliability, validity, accuracy, economy, timeliness, capacity , throughput ; advantages of problem identification in SDLC

UNIT II

Feasibility study and cost benefit analysis: Need for feasibility study: whether a new system is to be installed or not? , determine the potential of the existing system, improve the existing system and know what should be embedded in the new system, define the problems and objective involved in a project, avoid crash implementation of a new system, avoid the "hardware approach"; Method: Technical feasibility, Economics feasibility and Operational or behavioral feasibility

UNIT III

System requirement analysis: What outputs are needed? , What inputs are needed to obtain theses outputs? , What operations it must perform to obtain these outputs? , What resources must be used? , What operational and accounting controls are needed? etc.; Different ways to assess the user requirements

UNIT I

System design specifications and Programming: Output designs , Input designs ,Procedures ,Information flow , Files and databases , Volumes , Manually used forms, Program specification etc.; Standard tools : System flowcharts, computer run chart, clerical procedure chart, computer procedure chart etc ; IPO and HIPO charts , Decision tables ; File design : types of files, file structure, File organization , choice of storage mediu

UNIT II

System implementation, follow up and maintenance: Site preparation, Installation of new equipment, User's training, seminars and meetings to gain user support , Use of inputs and procedures , Trial and parallel runs of the system on the computer , Gradual phasing out of the old system

UNIT III

Evaluation of the system: Development evaluation, Operation Evaluation: response time, ease of use, reliability of computation and adequacy of storage capacity etc.; User Management Assessment evaluation

EXPERIENTIAL LEARNING - III

UNIT I

System Tools and Techniques: What are system tools and techniques? , Classification of tools and techniques: Traditional tools , Structured tools and Software development tools; Analysis tools: Charting tools (Data/Fact collection tools) ,Dictionary tools (Data flow , Data dictionary , Structured English); Design tools: Specification tools, Layout tools; Development tools : Software Engineering tools , Coding tools , Testing tools)

UNIT II

Test Case: Test Case, Test Priority (Low/Medium/High), Module Name, Test Title, Pre-conditions, Dependencies, Test Steps, Test Data, Expected Result, Actual Result, Status (Pass/Fail) etc.

Software Testing: Why Test? , Beta Testing, Problems with Beta Testing, Black-Box / White-Box Testing, Advantages of Black Box / White-Box Testing, Automated Testing Tools (Selenium , Ranorex ,Sahi)

Analyzer in LoadRunner : How to use Analyzer in LoadRunner, Session explorer, Analysis Graphs (Average Response Time graph, Hits Per Second graph, Running VUsers graph, Throughput graph, Transactions Per Second graph, Transaction Performance Summary graph, Testing Strategy Used, Limitations and Constraints, Future Applications)

UNIT III
Workshop/ Advance Training

SSD 411   **SOFT SKILLS DEVELOPMENT**   **1* (0+1)**

Objective(s)

The focus of the course is to develop a wide variety of soft skills starting from communication, to working in different environments, developing emotional sensitivity, learning creative and critical decision making, developing awareness of how to work with and negotiate with people and to resolve stress and conflict in ourselves and others.

Unit I

Basics Communication skills

Understanding the communicative environment, What to listen for and why, When to speak and how, Starting and sustaining a conversation

Unit II

Presentation and interaction

What to present and how, Multimedia presentation: Understanding the basics , Communication styles , Speaking in groups

Unit III

Visual, nonverbal and aural communication

The world of visual culture, Visual perception, The aural: Its relevance and impact, The body and the way it communicates, The face, its expressions and what it says

Unit IV

Interpersonal communication

Individuals, groups and cultures: Building Relationships, Understanding Group Dynamics, Groups, Conflicts and their Resolution, Social Network, Media and Extending Our Identities, Emotional and social skills

Unit V

Developing key traits

Creativity, critical thinking and problem solving, motivating oneself, art of persuasion, from persuasion to negotiation, leadership and motivating others

Essential and vocational skills: survival strategies

Managing time, Managing stress, Resilience, Work-life balance, Applying soft-skills to workplace

| PRJT 421 | Project cum Internship | 0 | 20 | 20 | 40 |

PRJT 421   **PROJECT CUM INTERNSHIP**   20(0+20)

The objective of the project work is to solve industrial (or society or research) problems by developing quality software solution. During the development of the project the students should involve in all the stages of the software development life cycle like requirements engineering, systems analysis, systems design, software development, testing strategies and documentation with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of how to plan, schedule, and monitor the software project. Topics selected should be complex and large enough to justify as a software project. The courses studied by the students during the B. Tech. (AIT) programme provide them the comprehensive background to work on diverse application domains.