DIPLOMA PROGRAMME

IN

MONTESSORI EDUCATION

Diploma in Montessori Education

Sl. No.	Course Code	Title of the Course	CIA Max.	ESE Max.	TOT Max.	C
I Semester						
1.	**516 11**	**Maria Montessori's Education**	25	75	100	2
2.	**516 12**	**Principles of Montessori Education**	25	75	100	2
3	**516 13**	**Pedagogical Aspects and Approaches in Montessori Education**	25	75	100	2
4	**516 14**	**Developing Life Work Skill (School based practicum – I)**	25	75	100	2
Total			**100**	**300**	**400**	**08**
II Semester						
5.	**516 21**	**Developing Teaching Competency in Montessori Education**	25	75	100	2
6	**516 21**	**Child Psychology and Health Education**	25	75	100	2
7	**516 21**	**Family and Child Life Education**	25	75	100	2
6.	**516 21**	**Developing Life Work Skill (School based Practicum – II)**	25	75	100	2
Total			**100**	**300**	**400**	**08**
Grand Total			**200**	**600**	**800**	**16**

CIA – Continuous Internal Assessment
ESE – End Semester Examination
TOT – Total
C – Credit

Detailed Syllabi

FIRST SEMESTER

Course Code	Title of the Course
516 11	**Maria Montessori's Education**

Max Marks: 100 **Credits: 02**

OBJECTIVE

To enable the X standard and XII standard students to understand the Montessori Education related to Philosophy, Psychology, Sociology and Educational bodies.

UNIT I Philosophy and Educational

Philosophy Education, meaning - Definition Meaning, Definition Montessori Philosophy and Education; Relationship between philosophy and education; Education for modification of behaviour; Epistemological approach of Education- Educare and Educere.

UNIT II Indian Philosophical thoughts and Montessori Education

Rabindranath Tagore- Mahatma Gandhi, Radhakrishnan, Vivekananda, Dayanand, Dr. Zahir Hussain, Thiruvalluvar- Bharathiar and Bharathidasan and their contributions related to Montessori Education.

UNIT III Western Philosophical thoughts and Montessori Education

Idealism-Naturalism-Pragmatism-John Jacques Rousseau- John Dewey- Soren Kier Kegaard's Existentialism – Mechanicalism- Humanism.

UNIT IV Psychological Contributions in Montessori Education

Thorndikes Trial and Error; Pavlov's Classical Conditioning; BF Skinner's Operant conditioning; Jean Piaget's cognitive development; Deniel Coleman – Emotional Intelligence.

UNIT V Sociological thoughts in Montessori Education

Max Webers's view on Social / human behaviorism - Ottaway's view on Social relations- Durkhiem's view of Methodological socialization- Brom's Group behavior-John Madge's view on social interaction.

UNIT VI Role of Educational Bodies in Montessori Education

NCERT-NCTE-SCERT-NIEPA- NIPCCD- MHRD- NEP

REFERENCES

1. Agarwal, J.C. (1999). Theory and Principles of Education. New Delhi: Vikas Publications House Pvt. Ltd.
2. Biswal, U.N. (2005). Philosophy of Education. New Delhi: Dominant Publishers and Distributors.
3. Chandra, S.S. (1996). Principles of Education. New Delhi: Atlantic Publishers.
4. Ghanta, R. and Dash, B.N. (2005). Foundations of Education. Hyderabad: Neelkamal Publications.
5. Mathur, S.S. (1997). Sociological and Philosophical Foundations of Education. Agra: Vinod Pustak Mandir.
6. Patel, M.S. (1953). The Educational Philosophy of Mahatma Gandhi. Ahmedabad: Navjeevan Pub. House. 8
7. Sharma, R.A. (2008). Development of Educational System in India. Meerut: R.Lall books depot.
8. Sharma, R.N. (2008). Education in the Emerging Indian Society. Delhi: Surjeet Publications. 9. Saraswathi, T.S. (1999). Culture, Socialisation and Human Development. New Delhi: Sage Publications.

Course Code	Title of the Course
516 12	Principles of Montessori Education

Max Marks: 100 **Credits: 02**

OBJECTIVE

To give awareness on the Principles of Montessori Education

UNIT I: Free Learning and Health

Free Learning: Definition, meaning: Health-improving their health and wellbeing; Teaching children to have sense of control; Freedom control; Free decision making-improving the skill; sensitize in work-Nature of work and time bound work.

UNIT II: Congenial Learning Environment

Learning environment for Montessori Education; Effective learning in congenial atmosphere; Environment promotes development on child; organized classroom; Physical Environment (layout); conceptual progressive learning (Effective use of material progress).

UNIT III: Learning Interest

Intrinsic motivation; learner and learning interest; children's rights and their feeling with strength and courage; superficial learning and goal oriented test; Creating interest for better learning.

UNIT IV: Group Learning

Peer tutoring - using imitation model in Montessori classroom; mixed age class - Young learning from old – Questioning- observing the work; Repetitive learning - Reciprocal learning; knowledge enhancement to promote learning skills - social skills.

UNIT V: Cognition and Learning by Doing

Relationship of cognitive and physical activities; Physical classroom environment is not for learning - learning is for physical classroom - Enhancement of Learning; Negligence of Teacher and Text in child learning - Montessori programmes; Classroom learning with objects and action; Predicting the children's interests.

UNIT VI: Teacher is a Guide

Teacher is a director for making boundary for child learning; sensitive interaction between teacher learner based on learner's needs and levels of aspiration; Authoritative parenting – traditional attitudes and authoritarian attitude.

REFERENCES

1. Erikson H Erick, "Childhood and Society", Penguin, 1969.
2. George G Thompson, "Child Psychology", The Times of India, 1965.
3. Issacc Susan, "The Nursery Years", Routledge, London, 1956.
4. Craig Grace J, and Marguerite Kermis, "Children Today", Allyn and Bacon, New Jersey, 1995.
5. Gordon Ira J, "Human Development", D.B.Taraporevala, Mumbai, 1970.
6. Todd V E and HelersHeffernon, "The Years Before School", Macmillan, London, 1970.
7. Ali Mohamad: "Food and Nutrition in India", K.B. Publications, New Delhi.
8. "National Seminar on Nutrition Education", NCERT, 1975.
9. Rirchie A S Jean, "Learning Better Nutrition", Raner, Italy, 1967.
10. Holmes C Alan, "Visual Aids in Nutrition Education", FAO, Rome, 1969.

Course Code	Title of the Course
516 13	Pedagogical Aspects and Approaches in Montessori Education

Max Marks: 100 **Credits: 02**

Objective

To enable the learners to get awareness on methods and approaches in Montessori education

Unit I Life Activity Method

Practical life activities - Child Promotes activities and learn to Interact with environment; Real life projects - Promote five Motor skills, Concentration of mind and Independent nature (transferring, sorting, Personal hygiene, grooming, Dusting and sweeping).

Unit II Language and Mathematical Learning Activity Method

Learning to Recognize; Learning the sound variation and writing; Grammar and etymology; Group work and hand on work; learn to count the numbers; Decimal System and geometry. Individualized and abstract work.

Unit III Cultural and Mental Activity Method (Learning)

Geographical, astronomical, artistic, Musical Learning enhance cultural activities; Multicultural activities expressing to the global culture; Develop observation Skill, Comparative Skill and Decision making skill; Visual ability and Visual Discrimination.

Unit IV Motor Skill - Sensory Skill Approach

Motor skills improve muscular movements - Perceiving the different sounds; Writing - Reading Skills approach - Learn to write (phonetic practices).

Unit V Experience- Vocabulary cum Storytelling - Reading Approach

Performance of Real nature and action before artificial one; Grasping ability; Pleasurable Reading; Narrative Interaction; Loud Reading and Exploration of New facts; Pronunciation and vocabulary; Storytelling and lifelong Reading.

Unit VI Sensorial Experience Approach

Memorization and recognition of objects; Manipulation of letters and constructing words; Recognize and matching the Words - Secret Words, Action Words; Reading, Friendly Environment / Adaptation to Environment; Logical and Perceptual Ability; Enhancement of Visible Sensibility.

REFERENCES

1. Francis Soundararaj, F. (1995). Teaching Spoken English and Communication Skills.Chennai:
2. Joyce., & Well., (2004). Models of Teaching. U.K: Prentice hall of India.
3. Kohli, A. L. (2006). Techniques of Teaching English. New Delhi: Dhanpat Rai pub.co
4. Fletcher F.G Some lessions in mathematics OUP.
5. Hogben Lancelot, Mathematics for the Million George Allen and Unwin Ltd., London.
6. Joseph Crescimbeni teaching of New Mathematics Parker publishing Co. New York.
7. NCERT Brochure on themes relating to Mathematics Education.
8. NCTMS year Books 15. Siddhu R.S teaching of Secondary Mathematics Sterling publishers 21 S.M.S.G Books Yale University.

Course Code	Title of the Course
516 14	Developing Life Work Skill (School based Practicum)

SCHOOL BASED PRACTICUM – 100 marks (2 credits)

LIFE WORK FOR PRACTICAL COURSE

I –Caring for self

1. Watching the table
2. Washing face, hands
3. Dressing dress clap cloth
4. Holding the tray

II –Caring for Environment

1. Caring for plants and Animals
2. Sitting in a chair
3. Mopping a Floor
4. Transferring

III –Grace and

1. Select mate
2. Shaking hands
3. Spooning
4. Polishing

IV –Control and Coordination of Body

1. Cutting fruits and vegetables
2. Folding
3. Carrying the glass of water
4. Opening and closingbottles

SECOND SEMESTER

Course Code	Title of the Course
516 21	Developing Teaching Competency in Montessori Education

Max Marks: 100 **Credits:02**

OBJECTIVE

To enable the learners to have familiarity with teaching competency

UNIT I: Motivation

Level of Motivation; Motivational environment; Dynamic classroom activity; Effective involvement and effective teaching is pursued in class room - simplification, enthusiastic participation and sensibility to children's needs.

UNIT II: Preparation

Careful planning and competent performance; well preparation; Cherished of presentation and positive emotional impact; Intellectual Excitement; Acquisition of basic teaching skills; Associated with student learning - Habit of reflective practice - new direction for pursuing the performance - Self correction, self-confident, self-direction and self-evaluation.

UNIT III: Personal Philosophy

Developing self-competency; promoting self-esteem; value characterized activities; sequential development in teaching activities; Teacher's role model - Effective implicit approach rather than direct approach - Enriched varieties of skill practice including language skill, Managerial skill and other relevant skills.

UNIT IV: Interpersonal Rapport

Social climate; Socialization; Social relationship; Developing prosocial behavior, congenial classroom climate- Open, Warm and non-authoritarian attitude; Student centred and student friendly and predictable practices in classroom; Degrees of Effectiveness - Adequate, Socratic, competent, masterful facilitator and holistic behaviour of classroom master.

UNIT V: Teacher Commitment

Commitment based on priorities offered by Teacher in classroom; values – Social, ethical and moral values; Attitude – professional attitudes; Excellence in Teaching - knowledge, values and reflection.

UNIT VI: Emotional Intelligence and Professional Competency

Teachers emotional intelligence - competency; (Sensitivity and Maturity) Teaching competency - Developing capacity to elicit varieties of stimuli in different environment; sensitivity- Identifying and expressing feelings - balancing rate of heart and mind adaptability; sensorial activities s- broaden and refine a child's senses - it is logical, perceptive and aware; maturity -managing the immediate environment maintaining rapport; harmony and comforts etc.

REFERENCES

1. Albrecht G.L, Katherine D Seelman. & Michael Bury, (2001). *Hand Book of Disability Studies.* Sage, London
2. Arcus, H.E. and Others (1993), Handbook of Family Life Education: The Practice of family Life Education (Vol II), New York:
3. Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social research, Himalaya Publishing House, Mumbai.
4. Bigner, Jerry . (2010, 8th edition). Parent-child Relations. Pearson Merrill Prentice Hall: Columbus Ohio.
5. Blau,D.M. (Ed)(1991) Quality cost and parental choice of Child Care. New York: Russel Sage

Course Code	Title of the Course
516 22	Child Psychology and Health Education

Max Marks: 100 **Credits: 02**

Objective

To enable students to get awareness on psychological practices in child hood stage and maintain their health

Unit –I Understanding the Child

Learning parents role to understand the child; effective guidance and nurturing the child - growth and mature; child and unique personality traits (consistent throughout the life); professional advantage of teachers in Montessori school-observing child activities.

Unit-II Understand the Children's Consistent Traits

Observing the desirable activities of child - sufficient time factors and familiarity with the normal characteristics - receiving crucial information for better understanding - child is unique individual.

Unit-III Child Development in Montessori Education

Children develop order, co-ordination, concentration and independency at the early age; role model to protect community - freedom within the Boundary - active seekers of knowledge - self-correction, self–introspection and self evaluation; integral part of Montessori classroom approach.

Unit –IV Society and Child Psychology

Chance for playing opportunities to develop human personality - concept of child hood is a cultural invention - Montessori school – age of child - unique period of development-hurried child - no opportunity to nurture development capabilities - play is creative and non-literal; play involving new skills and ability.

Unit-V Health Education

Mental health and mental hygiene; advantage of mental health programmes - anxiety, stress, Eustress and distress; emotional origin and common symptoms; health management of stress interpersonal relationship - case study self confidence.

Unit-VI Child psychologist Domain of Service in Montessori School

Interpersonal communication; accountability; decision making; collaborative ability and consultation; effective instruction and development of cognitive / academic skills socialization and development of life competencies; students diversity in school learning; organizational climate home, school and community collaboration research and programme evaluation; legal and ethical practice in professional activities and development.

Reference:

1. Carson, R.C., Butcher, J.N., &Mineka, S. (2007). *Abnormal Psychology and Modern Life* (11th Ed). New Delhi: Dorling Kindersley (India) Pvt. Ltd.
2. Hammer, Tommie J. & Turner, Pauline, H. (2001). Parenting in Contemporary Society 4th Ed. MA: Allyon& Bacon.
3. Heath, P. (2009). *Parent-child relations: Context, research, and application.*NewYork,NY : Pearson Education.
4. Hegarty Seamus &MithuAlur, (2002). *Education and Children with Special Needs.* Sage, London
5. Judith Winter, (2006). Breakthrough Parenting for Children with Special Needs. Library of Congress Cataloguing. San Francisco, USA.

Course Code	Title of the Course
516 23	Family and Child Life Education

Max Marks: 100 **Credits:02**

Objective

To enable the learners to develop good character / personality and to provide good moral spiritual life for conducive to healthy living.

Unit I Family and Family Life Education
Family Life Education: Definition, aims and objectives, value education; value transformation; value oriented education; Family as a custodian of Transmitter of values; social functions of family.

Unit II Family Relationship and Child Life
Mothering; Fathering; love oriented Discipline; Child rights to Healthy Parental Attitude; Parental Responsibility; Social functions of the family; Education toward Justice; Guidelines for parents and teachers to maintain relationship with child .

Unit III Child Development and Sensorial Activities
Exploration of world around child through senses; Child development - Physical and Mental Exercises; Discrimination of contrast; Child's capacity to define the Quality - Colour, Weight, Shape, Texture, sound, etc.

Unit IV Adolescent and Personality Development
Adolescence: meaning of life; Goal of life; Personality development; Emotions and activities of Adolescents; behaviour pattern of Adolescents; Role of Teachers and Parents in shaping and guiding Adolescence.

Unit V Child Care and Responsible Parent hood
Stage of child development; Responsible parenthood; Working mother and child care; Child Diet and Diet for Adolescent to maintain Health in a family.

Unit VI Child - Skill Based Education
Skill based Education; Teaching of life skill particularly, Interpersonal relationship, Personality, Social Adjustability, etc. Responsibilities of Teachers and Parents in developing skills among children and.

REFERENCES:

1. African Books Collective Ltd., The Jam Factory, 27 Park End Street, Oxford OX1 1HU, United Kingdom (paperback: ISBN-9966-846-42-5, $18)

2. S.K. Mangal & Uma Manga (l2012) Essentials of Educational Management, PHI Learning, Private Limited , New Delhi-110001

3. National College for School Leadership (2006) First Corporate Plan , Launch Year 2001-2002, Nottingham.

4. Carlo& Olson 1979 innovations in teaching –learning process, new delhi: vikas publishing house.

5. Gillies, & Robyn. M (2007) Cooperative Learning, Integrating Theory and Practice, Los Angels: Sage Publication

PRACTICAL COURSE

Course Code	Title of the Course
516 24	**Developing life skill-II** **school based practicum (2 credits)**

SCHOOL BASED PRACTICUM – 100 marks (2 credits)

LIFE WORK FOR PRACTICAL COURSE

V –Caring for self

1. Watching the table
2. Washing face, hands
3. Dressing dress clap cloth
4. Holding the tray

VI –Caring for Environment

1. Caring for plants and Animals
2. Sitting in a chair
3. Mopping a Floor
4. Transferring

VII –Grace and

1. Select mate
2. Shaking hands
3. Spooning
4. Polishing

VIII –Control and Coordination of Body

1. Cutting fruits and vegetables
2. Folding
3. Carrying the glass of water
4. Opening and closingbottles

DIPLOMA PROGRAMME

IN

COMPUTER APPLICATION

S.No	Course code	Name of the Course	CIA Marks Max.	ESE Marks Max.	Total Marks Max.	C Max. credits
SEMESTER I						
1	51711	Principles of Information Technology	25	75	100	2
2	51712	Open Source Software	25	75	100	2
3	51713	Office Automation	25	75	100	2
4	51714	Office Automation Lab	25	75	100	2
		TOTAL	**100**	**300**	**400**	**8**
SEMESTER II						
5	51721	Digital Logic Fundamentals	25	75	100	2
6	51722	Programming in C	25	75	100	2
7	51723	Data Structures and Algorithms	25	75	100	2
8	51724	C and Data Structure Lab	25	75	100	2
		TOTAL	**100**	**300**	**400**	**8**
		GRAND TOTAL	**200**	**600**	**800**	**16**

CIA : Continuous Internal Assessment **ESE :** End semester Examination

SEMESTER I

51711 PRINCIPLES OF INFORMATION TECHNOLOGY

Course Objectives

- To understand the revolution in computers and communications
- To know about various application software
- To understand the information systems and software development

Course Outcome

At the end of the course, students will be able to;

- To know the latest trends in information technology

Unit I :

Information Technology: Introduction – Information systems – Definition of computer and system – Software and Data - IT in business and Industry – IT in the Home and at Play – It in Education and Training – IT in Entertainment and the Arts – IT in Science, Engineering, and Mathematics – Global Positioning System.

Unit II:

Introduction to Computers, History of computers, Types of computers, Characteristics of computers, Basic Anatomy of a computer, Applications of computer – Memory – Memory types.

Unit III:

Software- Kinds of Software - The five types of Applications software - Word processing – Spreadsheets - Database software, Presentation graphics software - Communications software- System Software – Operating system - functions.

Unit IV :

Computer Networks: Introduction – Definition Computer Networks - Types of Networks – Local Area Network – Metropolitan Area Network - Wide Area Network – Personal Area Network - internet – Intranet – firewalls - Network Topology – Bus – Ring – Hybrid – Star.

Unit V:

Basic Internet Concepts: – Analog and Digital Signals - modems and communication Software, ISDN lines, and Cable Modems - Definition of Internet - The World Wide Web - Connecting to the Internet – Browsing the web – Web browser – Uniform Resource Locator (URL) – E-mail communication.

Unit VI :

Internet address - Domain Name System(DNS) – Locating information on the net – Internet Search Engines – Chatting and conferencing on the Internet Online Chatting –Messaging – Usenet Newsgroup.

References:

1. Dennis P.Curtin, Kim dolwy, KunL AWN, Xrhleen morin, Information Technology, the breaking wave, TMH 2000.
2. Stacey C Sawyer, Brain K Williams, Sarah E Hutchinson Using Information Technology – Brief Version A Practical Introduction to Computer and Communications Third Edition, McGraw Hill Companies 2011
3. James O'Brien – Introduction to Information systems. 16th edition, 2005.

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51712 OPEN SOURCE SOFTWARE

Course Objectives:

- To understand the need, advantages and applications of open source software in web designing.
- To know the use of mySQL in database management.
- To be able to create web pages using PHP

Course Outcome

- Attained to know and work with open source software like Linux, MySql,PHP etc in designing web pages.

Unit I :

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources–Application of Open Sources.

Unit II:

Open source operating systems: LINUX: Introduction– General Overview–Kernel Mode and user mode– Process– Advanced Concepts–Scheduling – Personalities – Cloning – Signals – Development with Linux.

Unit III:

MySQL: Introduction Setting up account Starting, terminating and writing your own SQL programs - Record selection Technology– Working with strings – Date and Time

Unit IV:

MySQL: Sorting Query Results – Generating Summary – Working with metadata –Using sequences – MySQL and Web.

Unit V:

PHP: Introduction – Programming in web environment – variables – constants–data types – operators – Statements -Functions– Arrays – OOP –String Manipulation and regular expression –File handling and data storage

Unit VI:

PHP and SQL database – PHP and LDAP – PHP Connectivity –Sending and receiving E-mails – Debugging and error handling – Security – Templates.

Text Books:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002

Books for Reference:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
2. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

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51713 OFFICE AUTOMATION

Objective of the Course:

- To help the students to understand how to format, edit, and print text documents and prepare for desktop publishing.
- Students will be able to create various documents newsletters, brochures, making document using photographs, charts, presentation, documents, drawings and other graphic images.
- To work with the worksheet and presentation software.

Learning Outcomes:

After completion of the course, students would be able to;

- know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet.
- create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker
- attain the knowledge about spreadsheet with formula, macros spell checker etc.
- go for higher studies such as diploma, bachelors or master's degree in related discipline.

Unit I :

MS-Word: Working with Files – Working with Text – Formatting, Moving, copying and pasting text Styles – Lists – Bulleted and numbered lists, Nested lists, Formatting lists. Table Manipulations. Graphics – Adding clip Art, add an image from a file, editing graphics, Spelling and Grammar, AutoCorrect - Page formatting, Header and footers, page numbers, Mail Merge, Macros - Creating & Saving web pages, Hyperlinks.

Unit II:

MS-Excel- Modifying a Worksheet – Moving through cells, Adding worksheets, rows and columns Resizing rows and columns, Selecting cells, Moving and copying cells, Freezing panes - Macros – recording and running. Formatting cells – Formatting toolbar, Dates and times, Auto formatting. Formula and Functions. Linking worksheets.

Unit III:

MS-Excel : Sorting and Filling, Alternating text and numbers with Auto fill, Auto filling functions. Graphics – Adding clip art, add an image from a file, Charts – Using chart Wizard, Copy a chart to Microsoft Word.

Unit IV

MS-Power Point -Create a Presentation from a template- Working with Slides – Insert a new slide, Applying a design template, Changing slide layouts -Slides: Reordering slides, Hide slides, Create a Custom slide show. Adding Content – Resizing a text box, Text box properties, Delete a text box. Video and Audio effects, Color Schemes & Backgrounds Adding clip art, Adding an image from a file, Save as a web page.

UNIT V

MS-Access - Using Access database wizard, pages and projects. Creating Tables – Create a Table in design view. Datasheet Records – Adding, Editing, deleting records, Adding and deleting columns Resizing rows and columns, finding data in a table & replacing, Print a datasheet. Queries.

UNIT VI

MS-Access Forms - Forms – Create a form using the wizard, Create a form in Design View. Form Controls. Sub forms-Create a form and sub form at once, Sub form wizard, Drag and drop method. Reports – Using the wizard, Create in Design View, Printing reports. Importing, Exporting, Linking.

REFERENCE BOOKS:

1. Sanjay Saxena, A First Course in Computers (Based on Windows 8 and MS Office 2013) Vikas Publishing 2015.
2. Jennifer fulton, Sherri Kinkoph, and Joe Kraynak, The Big Basics Book of Microsoft Office 1997, PHI, 1998.
3. Laura Acklen et al, Microsoft Office 97 Professional Essentials,EEE Que E&T, PHI (1998).

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51714 OFFICE AUTOMATION LAB

Objective of the Course:

- To help the students to understand how to format, edit, and print text documents and prepare for desktop publishing.
- Students will be able to create various documents newsletters, brochures, making document using photographs, charts, presentation, documents, drawings and other graphic images.
- To work with the worksheet and presentation software.

Learning Outcomes:

Upon successful completion of this assignment, students will be able to:

- Integrate both graphs and tables created in Microsoft Excel into a laboratory report in Microsoft Word.
- Generate equations, sample calculations, and basic diagrams in Microsoft Word.
- Input experimental data into Microsoft Excel.
- Perform calculations in Microsoft Excel using both manually inputting formulas and built-in functions.
- Generate simple and effective tables and graphs to describe experimental data in MS Excel.
- Properly format and organize a formal laboratory report in Microsoft Word.

Exercises based on MS-Word

- ❖ Working with Text, spell check and grammar
- ❖ Table manipulation
- ❖ Flow chart drawing
- ❖ Mail merge
- ❖ Create organization chart
- ❖ Real-time document preparation (Covering letter, greeting cards, invitation, brochure etc)

Exercises based on MS-Excel

- ❖ Performing arithmetic calculations using worksheet
- ❖ Using functions
- ❖ Using Graphs and charts
- ❖ Soring and filtering

Exercises based on MS-Power Point

- ❖ Designing slides for real time applications
- ❖ Using image, audio and video effects
- ❖ Using Animation and transition
- ❖ Using Wizard
- ❖ Using template

Exercises based on MS Access

Table manipulation

- Creating, altering and drop tables
- Inserting values
- Selecting and calculating values from the table
- Real-time application development (employee database , student database etc.,)

REFERENCE BOOKS:

1. Sanjay Saxena, A First Course in Computers (Based on Windows 8 and MS Office 2013) Vikas Publishing 2015.
2. Jennifer fulton, Sherri Kinkoph, and Joe Kraynak, The Big Basics Book of Microsoft Office 1997, PHI, 1998.
3. Laura Acklen et al, Microsoft Office 97 Professional Essentials,EEE Que E&T, PHI (1998).

SEMESTER II

51721 DIGITAL LOGIC FUNDAMENTALS

Course Objectives:

- To impart the knowledge in the field of digital electronics
- To impart knowledge about the various components of a computer and its internals.

Course Outcome:

After the completion of this course, the student will be able to :

- Basic principles of number system
- Concepts of digital, Boolean and instruction
- Design and realize the functionality of the computer hardware with basic gates and other components using combinational and sequential logic.

Unit I:

Number Systems: Binary, Octal, Decimal and Hexadecimal number systems – Conversion from one base to another base – Use of complements – binary arithmetic – Numeric and Character codes.

Unit II:

Boolean algebra and Combinational Circuits: Fundamental concepts of Boolean Algebra – DeMorgan's theorems.

Unit III:

Simplification of expressions – Sum of products and products of sums – Karnaugh map simplification – Quine - McKluskey method – two level implementation of Combinational Circuits.

Unit IV:

Combinational Circuits: Half Adder – Full Adder – Subtractors – Decoders – Encoders – Multiplexers – Demultiplexer.

Unit V:

Sequential Circuits: Flip flops – Registers – Shift Registers – Binary Counters – BCD Counters – Memory Unit.

Unit VI:

Data Representation : Data Types – Complements – Fixed Point Representations – Floating Point Representations – Other Binary Codes – Error detection codes.

Reference Books:

1. Digital Computer Fundamentals, 6th Edition, Thomas C. Bartee, Tata McGraw Hill, 2008.
2. Digital Logic and Computer Design, M. Morris Mano, Pearson Education, 2008.
3. Digital fundamentals, Floyd & Jain, eighth edition, 2005, Pearson Education.
4. Digital Principles and applications, Donald P leach, Albert Paul Malvino, Goutam saha, Sixth edition, Tata McGraw Hill,2006.

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51722 PROGRAMMING IN C

Course Objectives:

- To provide an overview of working principles of C language.
- To understand and apply the functions, arrays, pointers.
- To implement the features of C language in real world applications

Course Outcome:

At the end of the course, student will be able to:

- understand the C programming techniques
- solve the real-time problems using programming constructs

Unit I:

Introduction and Features: History of C, Importance of C, Basic Structure of C program, character set, Tokens, keywords and identifiers - Constants and variables and data types - declaration of variables, defining symbolic constants, declaring a variable as a constant - Operators and expressions: Evaluation of expressions, precedence of arithmetic operators.

Unit II:

Managing I/O operations: reading and writing a character, formatted input, output - Decision making and branching: IF statement, If..else statement, nesting if else statement, else if ladder, switch statement, goto statement, while statement, do statement, for statement.

Unit III:

Arrays: one-dimensional arrays, declaration, initialization, two dimensional arrays, multi-dimensional arrays, dynamic arrays. Strings : Declaration, Initialization of string variables, reading and writing strings, string handling functions.

Unit IV:

Functions basics: Elements of user defined functions, definitions, return values and their types, function calls, declaration, nesting of functions, recursion.

Unit V

Structures and Unions: Defining a structure, declaring a structure variable, accessing structure members, array of structures, array within structures, structures within structures, structures and functions.

Unit VI:

Pointers: Basics, declaring, initialization of pointer variables, address of variable, accessing a variable through its pointer - Files: Introduction, Defining, opening and closing files, I/O operations on files.

Books for Reference

1. Yashavanth Kanetkar, Let Us C, BPB publications, 2016.
2. Programming with C, Schaum outline series, Gottfried, TataMcHill,2010.
3. Programming with ANSI and Turbo C, Ashok N Kamthane, Pearson Education, 2008.

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51723 DATA STRUCTURES AND ALGORITHMS

Course Objectives:

- The learner should be well versed with the fundamentals of Algorithms, learn various data structures, should be able to use them appropriately as per need during development of programs.
- Also, the learner should know different sorting and searching techniques so that correct techniques can be used in different programs so that the complexity of the program does not increase due the sorting/ search technique employed.

Course Outcome

After the completion of this course, the student will able to;

- Write programs using structures, strings, arrays, pointers and strings for solving complex computational problem using the data structures real time applications
- Able to analyze the efficiency of Data Structures

Unit I :

Introduction to Data Structure : Types of Data Structure , Primitive data types -Algorithms –Time and space Complexity of algorithms.

Unit II:

Arrays: Array initialization, Definition of Array, Characteristic of Array ,One- dimensional Array, Two-dimensional array and Multi-dimensional array

Unit III:

Stack : Stack related terms, Operations on a stack - Representation of Stack: Implementation of a stack – application of Stack. Expression Evaluation Polish notation. Queues: Operations on queue Circular Queue, Representation of Queues, Application of Queues.

Unit IV:

List: Merging lists, Linked list, Single linked list, Double Linked List, Header - Linked list - Operation on Linked List : Insertion and Deletion of linked list -Traversal: Traversing a linked list , Representation of linked list.

Unit V:

Trees: Binary Trees, Types of Binary trees, Binary Tree Representation - Binary Tree operations / Applications : Traversing Binary Trees, Binary Search tree -Operations on Binary Tree: Insertion and Deletion operations, Hashing Techniques.

Unit VI:

Searching Techniques : Introduction, Searching, Types of searching, Linear Search, Binary search technique.

Books for reference:

1. Fundamentals of data structures, Second edition,Ellis Horowitz and Sartaj Sahini, Universities press, 2007.
2. Data Structures, Seymour Lipschutz, G.A.Vijayalakshmi Pai, Second Edition, Schaum's Outlines, Tata Mc-Graw Hill Private Ltd., 2006.

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51724 C AND DATA STRUCTURE LAB

Course Objectives

- To be able to solve data structure problems using C language
- To learn and implement C language programming techniques.
- To know about the implementation of data structures

Course Outcome

- Students can develop programming knowledge
- Students can solve any kind of problems using C language
- Data Structure based problems can be solved

Lab Experiments based on C programming and Data Structures

Contents

Simple C Programs
Using if and switch constructs Programs
Looping statements Problems
Functions and Recursive programs
Arrays, Strings and Matrices Programs
File Handling Programs
Pointers and Arrays Programs
Programs using structure and union
Programs based on file handling
Exercises using Stacks
Exercises using queues, expression evaluation programs
Infix to postfix conversion Program
Linked List programs: Single linked list, Double Linked List, Insertion and Deletion of linked list

REFERENCE BOOKS:

1. Programming in ANSI C, Fifth Edition, E.Balagurusamy, Tata McGraw-Hill Publishing Company Ltd, 2011
2. Data Structures, Seymour Lipschutz, G.A.Vijayalakshmi Pai, Second Edition , Schaum's Outlines, Tata Mc-Graw Hill Private Ltd., 2006.

3. Fundamentals of Data structures in C, Second edition, Ellis Horowitz and Sartaj Sahini, Universities press, 2007.
4. Programming and Data Structure, Pearson Edition, Ashok N Kamthane, 2007.

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DIPLOMA PROGRAMME
IN
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Course of Study and Scheme of Examinations

S.No	Course code	Name of the Course	*CIA Marks* Max.	*ESE Marks* Max.	*Total Marks* Max.	*C* Max.	*Hrs*
1	51811	Fundamentals of Artificial Intelligence	25	75	100	2	6
2	51812	Relational Database Management System (RDBMS)	25	75	100	2	6
3	51813	R Programming	25	75	100	2	6
4	51814	RProgramming Lab	25	75	100	2	60
		TOTAL	**100**	**300**	**400**	**8**	**78**
Semester II							
5	51821	Fundamentals of Machine Learning	25	75	100	2	6
6	51822	Principles of Soft Computing	25	75	100	2	6
7	51823	Python Programming	25	75	100	2	6
8	51824	Machine Learning using Python Lab	25	75	100	2	60
		TOTAL	**100**	**300**	**400**	**8**	**78**
GRAND TOTAL			**200**	**600**	**800**	**16**	**156**

CIA : Continuous Internal Assessment **ESE :** End semester Examination **Max**. Maximum Marks; **C :** Credits**Hrs**: Hours

SEMESTER I

Semester	Course Code	Title of the Course	Credits	Hours
I	**11**	**FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE**	**2**	**6**

Course objectives

- The objective of the course is to present an overview of artificial intelligence (AI) principles and approaches.
- Develop a basic understanding of the building blocks of AI as presented in terms problem, problem space: Search, Knowledge representation, inference, logic, and learning.

Course outcome

By the end of this course, you should be able to:

- Create AI solutions for various business problems.
- Build and deploy production grade AI applications.
- Apply methods, techniques and tools immediately.
- To gain experience of doing independent study and research.

Unit 1:

AI - Problems and Search: Introduction: The Artificial Intelligence (AI) Problem – What is an AI technique - Criteria for success. Problems, Problem Spaces, Search: Defining Problems, Problem Spaces, Search State space search - Production Systems – Problem characteristics - Production system characteristics – Application areas.

Unit 2 :

Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First search – Problem reduction – constraint satisfaction - Means-end analysis.

Unit 3:

AI - Knowledge Representation: Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.

Unit 4 :

Using Predicate logic: Representing simple facts in logic – Representing Instance and ISA relationships - Computable functions and predicates -Resolution. Representing knowledge

using rules: Procedural Vs Declarative knowledge –Logic programming - Forward Vs Backward reasoning - Matching – Control knowledge.

Unit 5 :

AI –Learning : What is learning – Rote learning - Learning by taking advice – learning in problem solving.

Unit 6 :

Learning from examples: Induction - Explanation-based learning – discovery – analogy – formal learning theory – Neural Net Learning and Genetic Learning.

Reference and text books:

1. Dan W. Patterson, "*Introduction to AI and ES*", Pearson Education.
2. Dheeraj Mehrotra(2019), *Basics of Artificial Intelligence & Machine Learning*, Notion Press.
3. Elaine Rich and Kevin Knight(1991)," *Artificial Intelligence*", Second Edition,Tata McGraw Hill, Publishers company Pvt Ltd.
4. Kevin Night, Elaine Rich, Nair B.(2008), "*Artificial Intelligence (SIE)",*McGraw Hill.
5. Stuart Russel, Peter Norvig (2007), "*AI – A Modern Approach*", 2nd Edition, Pearson Education.
6. Venugopal C.K(2019), *Artificial Intelligence and Machine Learning*, Pacific Books International.

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Semester	Course Code	Title of the Course	Credits	Hours
I	**12**	**RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS)**	**2**	**6**

Course Objectives:

- To understand the fundamentals of data models
- To make a study of SQL and relational database design.
- To know about data storage techniques an query processing.
- To impart knowledge in transaction processing, concurrency control techniques and External storage

Course Requirements:

- Knowledge about the basic concepts of the database.

Course Outcome:

By the end of this course, you should be able to:

- Design a database using ER diagrams and map ER into Relations and normalize the relations
- Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
- Develop a simple database application using normalization.

Unit 1 :

Data base System Applications, data base System VS file System – View of Data – Data Abstraction –Instances and Schemas – data Models – the ER Model - Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor.

\Unit 2

History of Data base Systems - Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets – Relationships and Relationship sets – Additional features of ER Model – Concept Design with the ER Model – Conceptual Design for Large enterprises.

Unit 3 :

Relational Model: Introduction– Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying / altering Tables and Views.

Unit 4 :

Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews - Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Unit 5 :

Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – joins- Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement.

Unit 6 :
Normal forms:Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF.

Reference and text Books:

1. Colin Ritchie (2004), *Relational Database Principles*,3rdEdition, Cengage Learning Business Press.
2. ElmasriNavrate ,*Fundamentals of Database Systems*, Pearson Education.
3. Peter Rob & Carlos Coronel, *Data base Systems design, Implementation, and Management*, 7th Edition.
4. Raghurama Krishnan, Johannes Gehrke(2003), Data base Management Systems, 3rd Edition, TATA McGrawHill.
5. Silberschatz, Korth(2011), Data Base System Concepts, 6th Edition, Tata McGraw Hill.
6. Sharad Maheswari and RuchinJain(2006), *Database management systems Complete Practical Approach*, Firewall media.

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Semester	Course Code	Title of the Course	Credits	Hours
I	**13**	**R PROGRAMMING**	**2**	**6**

Course objectives

- This course aims to provide a knowledge about R programming language.
- Student will learn how to use R for effective data analysis.
- By the end of the day-long course, the user will be comfortable operating in the R environment, including importing external data, manipulating data for specific needs, and running summary statistics, machine learning algorithms and visualizations.
- This course helps participants to have a good understanding of the methods, methodologies and techniques from the basics of statistics to obtain supporting evidence through data

Course outcome

By the end of this course, you should be able to:

- Download and install R
- Navigate and optimise the R integrated development environment (IDE) R Studio
- Install and load add-in packages
- Import external data into R for data processing and statistical analysis
- Learn the main R data structures
- Compute basic summary statistics
- produce data visualizations

Unit 1

Introduction to R – History of R - Features of R - Essentials of the R language – R-Environment setup – Basic syntax: command prompt, script file, comments. Data types - Variables – assigning, finding, deleting variables- operators: operator types – arithmetic operator – logical operators -assignment operators – logical operators -expressions.

Unit 2

Control statements – Decision making- if – if-else – nested if - switch– loops – repeat-while – for – loop control statements - break – next statement. Functions: function definition -function components –built-in functions – user defined function - calling function - Recursion - Strings: Rules of strings - string manipulation

.

Unit 3

Objects in R: Vectors – Vector creation – Vector Manipulation – Lists: Creating a list, naming, accessing, manipulating list elements- merge list -converting list to Vector – Arrays- Names columns and rows – Accessing array elements, manipulating array elements – operations of array elements.

Unit 4

Matrices – Accessing elements of Matrix – operations on matrix– Factors – Frames – Create data frames - getting the structure of data frame- Extract data from data frame. Packages – available R packages - install a new package – load package to library - Data reshaping – joining columns and rows in a data frame- merging dt frames – melting and casting

.

Unit 5

Working with files: CSV file – input CSV, read CSV, analyzing CSV, writing into CSV, Excel file: install, load, input, read excel files - Binary files: reading and writing – XML files: input and read XML files. mySQL package – connection R with mySQL – querying the table – table manipulation: create, insert, drop and update.

Unit 6

Visualizing: R charts and Graphs: R Pie charts: Pie chart title, color- slice percentages and chart legend – 3D Pie chart - Bar charts – Histograms – Line graphs – Scatter plots – creating scatterplot – scatterplot matrices.

Reference and text books:

1. Andrie de Vries, Joris Meys(2016), *R Programming for Dummies*, 2nd edition, Wiley.

2. Brett Lantz(2013), *Machine Learning with R*, Packt Publishing Ltd.
3. Mark Gardener(2013), *Beginning R The Statistical Programming Language*, Kindle edition.
4. Rajendra B. Patil,HirenDand& Rupali Dahake(2017), *A practical Approach to R*, Shroff/X-Team; First edition.
5. Scott Burger(2018), *Introduction to Machine Learning with R: Rigorous Mathematical Analysis*, Shroff/O'Reilly.
6. *UCI Machine Learning Repository* :http://archive.ics.uci.edu/ml/index.php

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Semester	Course Code	Title of the Course	Credits	Hours
I	**14**	**R Programming LAB**	**2**	**60**

Course objectives

- This course aims to provide a knowledge about practical R programming language.
- Student will learn how to use R for effective data analysis.
- By the end of the day-long course, the user will be comfortable operating in the R environment, including importing external data, manipulating data for specific needs, and running summary statistics, machine learning algorithms and visualizations.

Course outcome

By the end of this course, you should be able to:

- Download and install R
- Navigate and optimize the R integrated development environment (IDE) R Studio
- Install and load add-in packages
- Import external data into R for data processing and statistical analysis
- Learn the main R data structures
- Compute basic summary statistics and machine learning
- produce data visualizations

Experiments based on R Programming

- Simple R Programs
- Programs using conditional control statements
- Programs using functions and recursion.
- Problems based on Vectors, List, Arrays, Matrices, Factors and Frames.
- Experiments using packages.
- Problems using files and database.

- Experiments using charts and graphs.
- Experiments to perform statistics(mean, mode, median, normal distribution, binomial distribution) in R.
- Experiments for forecasting numeric data: Regression Methods.
- Experiments for data Visualizations.

Reference books:

7. Andrie de Vries, Joris Meys(2016), *R Programming for Dummies*, 2nd edition, Wiley.
8. Brett Lantz(2013), *Machine Learning with R*, Packt Publishing Ltd.
9. Mark Gardener(2013), *Beginning R The Statistical Programming Language*, Kindle edition.
10. Rajendra B. Patil,HirenDand& Rupali Dahake(2017), *A practical Approach to R*, Shroff/X-Team; First edition.
11. Scott Burger(2018), *Introduction to Machine Learning with R: Rigorous Mathematical Analysis*, Shroff/O'Reilly.
12. *UCI Machine Learning Repository* :http://archive.ics.uci.edu/ml/index.php

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SEMESTER II

Semester	Course Code	Title of the Course	Credits	Hours
II	**21**	**FUNDAMENTALS OF MACHINE LEARNING**	**2**	**6**

Course Objectives:

- To discover patterns in your data and then make predictions based on often complex patterns to answer business questions, detect and analyze trends and help solve problems**.**
- To introduce students to the state-of-the-art concepts and techniques of Machine Learning.

Course Outcome:

By the end of this course, you should be able to:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc. ...
- Be able to design and implement various machine learning algorithms in a range of real-world applications.
- be capable of confidently applying common Machine Learning algorithms in practice and

implementing their own.

- be capable of performing experiments in Machine Learning using real-world data.

Unit 1

Introduction: Basic definitions – Learning - Machine Learning vs AI - Machine Learning – features – samples – labels - Real-world applications and problems – hypothesis test - approaches of machine learning model - Data preprocessing.

Unit 2:

Representation of formal ML model: The statistical learning framework – training - testing – validation - cross validation - parametric and non parametric methods - Difference between Parametric and Non-Parametric Methods and examples.

Unit 3

Supervised learning Algorithms: Introduction – Approaches for classification – Decision Tree classification algorithm – Tree pruning - Rule based Classification –IF-THEN rules classification - Naïve Bayesian classification - Neural Network classification -Classification by Backpropagation algorithm. Support Vector Machines (SVM) - Lazy learners: k-Nearest Neighbor (k-NN) Algorithm – Case Based Reasoning (CBR) - Random Forest algorithm.

Unit 4

Unsupervised learning algorithms: Introduction– Defining Unsupervised learning – Cluster Analysis – Distance measures - Types of Clustering – Partition algorithms of clustering – Hierarchical clustering algorithms - Density based methods.

Unit 5

Reinforcement Learning and ELM: Introduction: Markov Decision process - Monte Carlo Prediction - case studies – Applications. Introduction to Extreme Learning Machine (ELM) - Software Tools: Introduction to Weka, Matlab, Rapidminer, tensorflow and keras –case studies.

Unit 6

Deep learning fundamentals: Introduction –Deep Belief Networks (DBN), A Restricted Boltzmann machine (RBM) - Recurrent Neural Networks (RNN) - Time series forecasting. Convolutional Neural Networks (CNN) - Auto-encoders: Auto-encoders and unsupervised learning - Regularization - Dropout and Batch normalization.

Reference and text Books.

1. Anuradha Srinivasaraghavan,Vincy Joseph (2019),*Machine Learning*, Wiley.

2. BalasKausikNatarajan(1991), "*Machine Learning: A Theoretical Approach*", Morgan Kaufmann
3. Dinesh Kumar U ManaranjanPradhan(2019), *Machine learning using Python*, Wiley.
4. EthamAlpaydin(2015), *Introduction to Machine Learning*, third edition, PHI Learning Pvt. Ltd.
5. Jiawei Han, Micheline Kamber, Jian Pei(2012), *Data mining concepts and techniques*, Morgan Kaufmann Publishers, Elsevier.
6. Lovelyn Rose S, Dr. L Ashok Kumar, Dr. D KarthikaRenuka(2019), *Deep Learning Using Python*,Wiley,
7. Rajiv Chopra(2018), *Deep Learning - A Practical Approach*, Khanna Books 2018.
8. Shai Shalev-Shwartz and Shai Ben-David(2014), *Understanding machine learning from theory to algorithms*,Cambridge university press.
9. UCI Machine Learning Repository :http://archive.ics.uci.edu/ml/index.php

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Semester	Course Code	Title of the Course	Credits	Hours
II	**22**	**PRINCIPLES OF SOFT COMPUTING**	**2**	**6**

Course Objective:

- To learn the key aspects of Soft computing.
- To know about the components and building block hypothesis of Genetic algorithm.
- To study the fuzzy logic components.

Course Outcome:

- Write Genetic Algorithm to solve the optimization problem
- Understand fuzzy concepts and develop a Fuzzy expert system to derive decisions.

Unit 1

Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics – Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process.

Unit 2

Perceptron Network – Adaline and Madaline Networks – Back Propagation Network - Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine.

Unit 3

Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

Unit 4

Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets. Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation. Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods

Unit 5

Fuzzy Arithmetic – Extension Principle – Fuzzy Measures - Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning - Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

Unit 6

Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function - Genetic Operators– Classification of Genetic Algorithm – Applications of GA.

Reference and Text Books:

1. Goldberg David E.(2003), "*Genetic Algorithms*", Pearson Education.
2. Haykin Simon (1999) , "*Neural Networks*", Prentice Hall, 1993/Pearson Education.
3. JangJ.S.R., C.T. Sun, E. Mizutani(2004), "*Neuro-Fuzzy and Soft Computing*", Prentice Hall India.
4. Kumar Satish, "*Neural Networks: Classroom Approach*", Tata McGraw Hill.
5. Koza J. (1993), "*Genetic Programming*", MIT Press.
6. KecmanVojislav(2001), "*Learning and Soft Computing*", MIT Press.
7. Konar Amit (2008), "*Artificial Intelligence and Soft Computing – Behavioural and CognitiveModeling of the Human Brain*", Special Indian Edition, CRC Press.
8. Rajasekaran S (2004), G.A.V. Pai, "*Neural Networks, Fuzzy Logic, Genetic Algorithms*", Prentice Hall India, 2004.
9. Rajase, Kharan S. and VijayalakshmiPai S. A.(2003), "*Neural Networks, Fuzzy Logic & Genetic Algorithms",* Prentice-Hall of India
10. Sivanandam, "*Introduction to Neural Networks with MATLAB 6.0*", Tata McGraw Hill Publications.
11. Sivanandam S.N, S.N. Deepa (2007), "*Principles of Soft Computing*", Wiley India.
12. Yen John and Langari Reza (2003), "*Fuzzy Logic, Intelligence, Control, and Information*", Pearson Education.

Semester	Course Code	Title of the Course	Credits	Hours
II	23	PYTHON PROGRAMMING	2	6

Course Objectives:

The learning objectives of this course are;

- To understand why Python is a useful scripting language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To define the structure and components of a Python program.
- To learn how to write loops and decision statements in Python.
- To learn how to write functions and pass arguments in Python.
- To learn how to build and package Python modules for reusability.
- To learn how to read and write files in Python.

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Course Requirements:

- Before studying this course, the student has knowledge about basic principles of programming
- Experience with a high-level language (C/C++, Java, MATLAB) is suggested. Prior knowledge of a scripting language (Perl, UNIX/Linux shells) and Object-Oriented concepts is helpful but not mandatory.

Course Outcome:

After the completion of this course, the student will able to;

- To write programs using structures, strings, arrays, pointers and strings for solving complex computational problem.
- Use if-else statements and switch-case statements to write programs in Python to tackle any decision-making scenario
- Master Object-oriented programming to create an entire Python project using objects and classes
- Store and retrieve information using variables
- Develop cost-effective robust applications using the latest Python trends and technologies

Unit 1

Introduction – Overview of programming languages - History of Python – Installing Python – Executing Python programs – Comments - Python Character set – token core datatypes – printf() function – Assigning value to variables – input() – eval() – formatting Number and strings – Inbuilt functions - Operators and Expressions.

Unit 2

Decision Statements: Introduction - if , if-else , nested if statements – multi-way if-elif statements. Loop Control Statements: Introduction – while loop – range() function – for loop = nested loops – break and continue statements.

Unit 3

Functions: Introduction – Syntax and basics of function – use of function – parameters and arguments in function – local and global variables – return statement. Strings: Introduction – The str class – built in functions for string – index[] operator - traversing string – immutable strings – string operators – string operations.

Unit 4

Lists : Introduction – creating lists – accessing the elements of a list – negative list indices – list slicing – built-in functions for list – list operator – list methods – passing list to a function – returning list from function.Introduction to tuples - creating – tuple() function – built-in functions for tuples - indexing -slicing – operators – list and tuples – sorting -traversing.

Unit 5

Introduction to tuples - creating – tuple() function – built-in functions for tuples - indexing - slicing – operators – list and tuples – sorting -traversing. Sets – creating – set in and not in operator – set classes - operations. Dictionaries: Introduction – creating, adding, replacing, retrieving values – formatting – deletion of items – comparing dictionaries – methods of dictionary class – nested dictionaries - traversing dictionaries

Unit 6

File Handling: Introduction – Need for file handling – Text input and output using file – seek() function. Introduction to Scientific computing with Scipy, Mathematical computing with Numpy, Scikit learn, Data visualization using Matplotlib, Data manipulation with pandas and sympy – Case studies.

Reference and text books:

1. Ashok NamdevKamthane(2018), Amit Ashok Kamthane, *Programming and Problem solving with Python*, Mc GrawHill Education.
2. Dinesh Kumar UManaranjanPradhan(2019), *Machine learning using Python*, Wiley
3. Manisha Bharambe(2019), *Python programming*, NiraliPrakashan.
4. Robert Sedgewick,Kevinwayne , Roberdondero(2016), *Introduction to Programming in Python: An Interdisciplinary Approach,* 1e , Pearson.
5. Wesley J. Chun(2009), "*Core Python Programming*", 2nd Edition, Prentice Hall.

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Semester	Course Code	Title of the Course	Credits	Hours
II	**24**	**MACHINE LEARNING USING PYTHON LAB**	**2**	**60**

Course Objectives:

The learning objectives of this course are:

- To understand why Python is a useful scripting language for developers.
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To learn how to identify Python object types.
- To learn how to use indexing and slicing to access data in Python programs.
- To define the structure and components of a Python program.
- To learn how to write loops and decision statements in Python.
- To learn how to write functions and pass arguments in Python.
- To learn how to build and package Python modules for reusability.
- To learn how to read and write files in Python.
- To learn how to design object-oriented programs with Python classes.
- To learn how to use class inheritance in Python for reusability.

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Course Requirements:

- Before studying this course, the student has knowledge about basic principles of programming.
- Experience with a high-level language (C/C++, Java, MATLAB) is suggested. Prior knowledge of a scripting language (Perl, UNIX/Linux shells) and Object-Oriented concepts is helpful but not mandatory.

Course Outcome:

After the completion of this course, the student will able to;

- To write programs using structures, strings, arrays, pointers and strings for solving complex computational problem.
- Use if-else statements and switch-case statements to write programs in Python to tackle any decision-making scenario.
- Master Object-oriented programming to create an entire Python project using objects and classes.
- Store and retrieve information using variables.
- Develop cost-effective robust applications using the latest Python trends and technologies.
- Write program to solve real-world machine learning problems.

Lab Experiments based on Python programming and machine learning problems.

Simple Python programs.
Experiments using decision control statements.
Exercises using functions and recursion.
Exercises using arrays and strings.
Experiments using list processing.
Object oriented Programming Lab Problems using Python.
Experiments using Tuples, sets and dictionaries.
Programs using file handling.
Programs using graphics programming.
Experiments for data visualization using Matplotlib.
Scientific computing with Scipy.
Data manipulation with pandas and sympy.
Mathematical computing with Numpy.
Programs to perform Supervised learning algorithms (k-NN algorithm.)
Programs to perform Unsupervised learning algorithms (k-means clustering.).

Reference Books:

1. Ashok NamdevKamthane(2018), Amit Ashok Kamthane, *Programming and Problem solving with Python*, Mc GrawHill Education.
2. Dinesh Kumar UManaranjanPradhan(2019), *Machine learning using Python*, Wiley
3. Manisha Bharambe(2019), *Python programming*, NiraliPrakashan.
4. Robert Sedgewick,Kevinwayne , Roberdondero(2016), *Introduction to Programming in Python: An Interdisciplinary Approach*, 1e , Pearson.
5. Wesley J. Chun(2009), "*Core Python Programming*", 2nd Edition, Prentice Hall.

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DIPLOMA PROGRAMME

IN

CYBER SECURITY

Course of Study and Scheme of Examinations

S.No	Course Code	Name of the Course	CIA Marks Max.	ESE Marks Max.	Total Marks Max.	Credits
I SEMESTER						
1	51911	Cryptography and Network Security	25	75	100	2
2	51912	Fundamentals of Cyber Security	25	75	100	2
3	51913	Cyber Security Law & Practice	25	75	100	2
4	51914	Cryptography – LAB	25	75	100	2
II SEMESTER						
5	51921	Web Application Security	25	75	100	2
6	51922	Malware Analysis and Network Security	25	75	100	2
7	51923	Mobile Security	25	75	100	2
8	51924	Cyber Security - LAB	25	75	100	2
		TOTAL	**200**	**600**	**800**	**16**

CIA: Continuous Internal Assessment ESE: End semester Examination

Detailed Syllabi

11 - CRYPTOGRAPHY AND NETWORK SECURITY

Course Objectives

- To understand the computer security concepts
- To understand the Data Encryption Standard mechanism

Course Outcome

- At the end of this course, the student will be able to;
- Able to know AES, RSA cryptography principles
- Able to know Digital Signatures, E-mail security

UNIT 1:
Introduction: The OSI security architecture, security attacks, Security Services, Security mechanism, A model for network security, classical Encryption techniques, Symmetric cipher model, Substitution techniques.

UNIT 2:
Block cipher principle, the data encryption standard, The strength of DES, Differential and Linear cryptanalysis, Block cipher design principles,Advanced Encryption Standard: Finite Field arithmetic, AES structure, AEStransformation function, Implementation

UNIT 3:
Principles of public-key cryptosystems, The RSA algorithms, Other public key cryptosystems: Diffie-Helman key Exchange, Elgamelcryptographic system, Elliptic curve cryptography, pseudorandom number generation based onasymmetric cipher

UNIT 4:
Message authentication requirements, functions, message authenticationCodes, Security of MACs, MAC based Hash functions, MAC based ciphers

UNIT 5:
Digital Signatures: ElGamal Digital Signature scheme, schnorr digital signature schemes, digital signature standard

UNIT 6:
Web security considerations, Socket layer and transport layer and transport layer security
Electronic mail security: pretty good privacy, IP security overview, IP security policy, encapsulating security payload

Text Book:

1. William Stallings, "Cryptography and Network Security Principles and Practice", Pearson, 5th Edition.

Book for Reference:

1. A Handbook of Applied Cryptography by Alfred J. Menezes, Paul C. Van Oorschot and Scott A. Vanstone,CRC Press Series on Discrete Mathematics and Its Applications

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12- FUNDAMENTALS OF CYBER SECURITY

Course Objectives

- To understand the Basic Concepts in Cyber Security
- To know about Classification of Cyber Security
- To understand the Present and Future Cyber Security

Course Outcome

At the end of the course, students will be able to;

- To know the latest trends in Ethical Hacking
- To understand the fundamentals of computer forensics, Evidence Collection Etc.

UNIT-1:

Introduction to Cyber Crime – Types of Cyber Crime – Classification of Cyber Criminals – Tools used in Cyber Crime – Challenges – Strategies – Cryptocurrency – Bitcoin – Blockchain - Ransomware.

UNIT-2:

Cyber Forensics Definition – Disk Forensics – Network Forensics – Wireless Forensics – Database Forensics – Malware Forensics – Mobile Forensics – Email Forensics

UNIT-3:

Ethical Hacking: Essential Terminology, Hacking windows – Network hacking – Web hacking – Password hacking, Malware, Scanning, Cracking.

UNIT-4:

Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence,

UNIT-5:

Intrusion, Physical Theft, Abuse of Privileges, Unauthorized Access by Outsider, Malware infection, Intrusion detection and Prevention Techniques, Anti-Malware software, Network based Intrusion detection Systems, Network based Intrusion Prevention Systems, Host based Intrusion prevention Systems,Security Information Management, Network Session Analysis, System Integrity Validation.

UNIT-6:

Cyber Security Vulnerabilities-Overview, vulnerabilities in software, System administration, Complex Network Architectures, Open Access to Organizational Data, Weak Authentication, Unprotected Broadband communications, Poor Cyber Security Awareness. Cyber Security Safeguards- Overview, Access control, Audit, Authentication, Biometrics.

Reference Books:

1. Dejey, Dr.Murugan, "Cyber Forensics", Oxford University Press, India, 2018.

2. William Stallings and Lawrie Brown, "Computer Security: Principles and Practice", Prentice Hall.

3. Swiderski, Frank and Syndex, "Threat Modeling", Microsoft Press.

4. John W. Rittinghouse, William M. Hancock, "Cyber Security Operations Handbook", ElsevierPub.

5. Deborah G Johnson, "Computer Ethics", 4th Edition, Pearson Education Publication.

6. Earnest A. Kallman, J.P Grillo, "Ethical Decision making and IT: An Introduction with Cases", McGraw
Hill Publication.

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13 - CYBER SECURITY LAW & PRACTICE

Objective of the Course:

- To help the students to understand Cyber Law and its need.
- Students will be able to know Information Technology Act 2000 and its benefits.
- To know about IPR, Patent etc.

Learning Outcomes:

After completion of the course, students would be able to;

- Know the basics of Cyber Security Law and Practices.
- Attain the knowledge about Intellectual Property Rights, Patent, Copy right, Trade Mark Law.

UNIT-1:
Introduction – Need for Cyber Law - Evolution of the IT Act, Genesis and Necessity - Salient features of the IT Act, 2000, various authorities under IT Act and their powers, Penalties & Offences, amendments.

UNIT-2:

Impact on other related Acts (Amendments) - Amendments to Indian Penal Code, Indian Evidence Act, Bankers Book Evidence Act, Reserve Bank of India Act - Cyber Space Jurisdiction.

UNIT-3:

E – commerce and Laws in India - Digital / Electronic Signature in Indian Laws - E – Commerce Issues and provisions in Indian Law - E – Governance concept and practicality in India - E – Taxation issues in Cyberspace - E – Contracts and its validity in India (f) Cyber Tribunal & Appellate Tribunal.

UNIT-4:

Intellectual Property Rights - Domain Names and Trademark Disputes - Concept of Trademarks / in Internet Era - Cyber Squatting - Reverse Hijacking - Jurisdiction in Trademark Disputes - Copyright in the Digital Medium - Copyright in Computer Programmes.

UNIT-5:

Cyber Laws in India – Crime against Individual – Crime against Property – Crime against Nation – Indian Case Laws.

UNIT-6:

International Cyber Laws Introduction – Cybercrime Legislation in the Netherlands – Cyber Laws in Malaysia – Cyber Laws in UK – Cyber Laws in United States – Australian Law related to Privacy.

TEXT BOOK:

4. Dejey, Dr.Murugan, Cyber Forensics, 2018, Oxford University Press.

REFERENCE BOOKS:

1. Harish Chander, Cyber Law and IT Protection, PHI Publication, 2012.
2. Philips, Computer Forensics and Investigations, Cengage Learning India Edition.

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14 -CRYPTOGRAPHY - LAB

Objective of the Course:

- To implement the cryptographic algorithms.
- To implement the security algorithms.
- To implement cryptographic, digital signatures algorithms.

Learning Outcomes:

Upon successful completion of this assignment, students will be able to:

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should XOR each character in this string with 0 and displays the result.
2. Implementation of Diffie-Hellman algorithm
3. Write a C program that contains a string (char pointer) with a value \Hello World'. The program should AND or and XOR each character in this string with 127 and display the result.
4. Write a Java program to perform encryption and decryption using the following algorithms: a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher
5. Write a Java program to implement the DES algorithm logic.
6. Write a C/JAVA program to implement the BlowFish algorithm logic.
7. Write a C/JAVA program to implement the Rijndael algorithm logic.
8. Implementation of RSA based signature system
9. Write a Java program to implement RSA Algorithm
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

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II SEMESTER

21- WEB APPLICATION SECURITY

Course Objectives

- To understand the web basics, HTML commands
- To know about various Web Penetration Testing methods
- To understand the Web Application Technologies and Attacks

Course Outcome

At the end of the course, students will be able to;

- To know the latest trends in Web Application Security Methods
- To understand the various Web Attacks and other techniques.

UNIT-1:

Web Fundamentals – HTML, HTTP 1.0 and 1.1- Client-side scripting, Server-side scripting- Web server architecture - Windows & Linux, IIS and LAMP servers- Network topologies and DMZ

UNIT-2:

Web Penetration Testing Methodology - Types of Web Penetration Testing - Web Pen Testing Approach – Core Defense Mechanisms

UNIT-3:

Web Application Technologies – Mapping the Application – Bypassing the Client-side Controls

UNIT-4:

Attacking the Authentication – Attacking the Session Management – Attacking access Controls

UNIT-5:

Attacking Back-End Components – Attacking Users: Cross-Site Scripting – Attacking Users: Other Techniques.

UNIT-6:

Automating Customized Attacks – Attacking Application Architecture – Attacking the Application Server

Text Books:

1. Shostack, Adam. Threat modeling: Designing for security. John Wiley & Sons, 2014.
2. DafyddStuttard, and Marcus Pinto, The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2nd Edition, John Wiley & Sons, 2011.

References:

1. Wenliang Du, Computer Security – A hands-on Approach, First Edition, Createspace Independent Pub, 2017 4. https://www.owasp.org

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22- MALWARE ANALYSIS AND NETWORK SECURITY

Course Objectives

- To protect the network itself;
- To reduce the susceptibility of computer systems and applications to threats originating from the network; and,
- To protect data during transmission across the network.

Course Outcome

At the end of the course, students will be able to;

- To know the latest trends in malware attacks, monitoring and execution methods
- To understand the fundamentals of firewall, LAN attacks and Network Sniffing.

Unit I

Goals of Malware Analysis, AV Scanning, Hashing, Finding Strings, Packing and Obfuscation, PE file format, Static, Linked Libraries and Functions, Static Analysis tools, Virtual Machines and their usage in malware analysis, Sandboxing, Basic dynamic analysis, Malware execution, Process Monitoring, viewing processes, Registry snapshots, Creating fake networks,

Unit II

X86 Architecture- Main Memory, Instructions, Opcodes and Endianness, Operands, Registers, Simple Instructions, The Stack, Conditionals, Branching, Rep Instructions, Disassembly, Global and local variables, Arithmetic operations, Loops, Function Call Conventions, C Main Method and Offsets. Portable Executable File Format, The PE File Headers and Sections, IDA Pro, Function analysis, Graphing,

Unit III

Live malware analysis, dead malware analysis, analyzing traces of malware, system calls, api calls, registries, network activities. Anti-dynamic analysis techniques, VM detection techniques, Evasion techniques, Malware Sandbox, Monitoring with Process Monitor, Packet Sniffing with Wireshark, Kernel vs. User-Mode Debugging, OllyDbg, Breakpoints, Tracing, Exception Handling, Patching

Unit IV

Techniques for Network Protection: Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls-iptables, Proxies, NAT, Intrusion Detection System-Snort, Signature and Anomaly based detection, Honeypots and Honeynets, Network Log management-syslog or SPLUNK

Unit V

LAN attacks: ARP Cache poisoning, MAC flooding, Man in the middle attacks, Port Stealing, DHCP attacks, 10 VLAN hopping; Network Sniffing-wireshark and Password Cracking-John the Ripper;

Unit VI

Secure Network Communication: SCP, SSH, SSL3.0, TLS 1.2, STARTTLS, IPSec, VPN and Secure HTTP; Understanding the dark web, TOR traffic, Attacks on SSL/TLS: SSL stripping, Drown and Poodle attack; Encrypting and Signing Emails: PGP- GPG/openPGP,DKIM and SPF; Single Sign On (SSO)-OAUTH and OPENID; Network packet creation and Manipulation using scapy and dpkt libraries.

Text Books:

1. Michael Sikorski, Andrew Honig, Practical Malware Analysis: TheHands-On Guide to DissectingMalicious Software.

References:

1. Mike Shema, Anti-hacker toolkit, Tata McGraw Hill Publications, 2014.

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23- MOBILE SECURITY

Course Objectives

- To understand the Android Architecture and Framework
- To know about various Android Permission management
- To understand the information systems and software development

Course Outcome

At the end of the course, students will be able to;

- To know the latest trends in Android Application Package, Installation Process
- To understand the Android Device Security

UNIT-1:

Introduction - Android Versions – Android Architecture – Android Security Model – Android Framework

UNIT-2:

The Nature of Permissions – Permission Enforcement – System Permission – Custom Permission – Content Provider Permission

UNIT-3:

Android Application Package Format – Code Signing – APK Install Process – Package Verification

UNIT-4:

Android User Management – Types of Users – User Management – User Metadata – Per user Application Management – External Storage

UNIT-5:

Cryptographic Service Providers – JCA Engine Classes – Android JCA Providers

UNIT-6:

Network Security and PKI – Credential Storage – Device Security – Enterprise Security

Text Book:

1. Nikolay Elenkov, Android Security Internals, No Starch Press, 2015.

References:

1. Karim Yaghmour, Embedded Android, O'Reilly Publications, 2013.

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24 - CYBER SECURITY - LAB

Course Objectives

- To understand the TCP, Port Scanning using NMAP Tool
- To know about various SQL Injection methods
- To understand the information about Sniffing and E-mail Security
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Course Outcome

At the end of the course, students will be able to;

- To know the latest trends in Cyber Security Tools.
- To understand the fundamentals of configuring your E-mail account against threats.

List of Experiments:

1. TCP Scanning using NMAP.
2. Port Scanning using NMAP
3. TCP/UDP Connectivity using Netcat
4. Network Vulnerability using OpenVAS
5. Web Application Testing using DVWA
6. Manual SQL Injection using DVWA
7. XSS using DVWA
8. Automated SQL Injection with SQLMAP
9. Demonstrate Sniffing using packet tool i.e. snort.
10. Configure your e-mail account against various threats. i.e. spam attack, phishing, spoofing etc.

References:

1. http://www.pearsonhighered.com/assets/hip/us/hip_us_pearsonhighered/samplechapter/013 1407333.pdf
2. http://www.cs.nyu.edu/courses/fall04/G22.2262-01/assignments/assignment4_files/Ethereal_TCP.pdf
3. http://www.snort.org/docs
4. http://manual.snort.org/node27.html

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