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| **THE ASSAM KAZIRANGA UNIVERSITY** | | | | | | | | | | | |
| **SCHOOL OF COMPUTING SCIENCES** | | | | | | | | | | | |
| **Integrated B.Sc-M.Sc(IT) Specialization in Cloud Technology and Information Security** | | | | | | | | | | | |
| **YEAR- 1 SEMESTER- I** | **SEMESTER-1** | | | | | | | | | | |
| **Course No.** | **Type** | | **Course Code** | **Subject** | | **Contact Hours** | | | | | **Credit** |
| **L** | **T** | | | **P** |
| **1** | **Theory** | | **UN1123** | English Communication | | **3** | **0** | | | **0** | **3** |
| **2** | **CS2012** | Basic Mathematics | | **3** | **1** | | | **0** | **4** |
| **3** | **CS2301** | Computer Fundamentals and Organization | | **3** | **1** | | | **0** | **4** |
| **4** | **UN1121** | Professional Ethics and Human Values | | **1** | **0** | | | **0** | **1** |
| **5** | **CS2303** | Programming in C | | **3** | **0** | | | **0** | **3** |
| **6** | **Practical** | | **CS2304** | Programming in C Laboratory | | **0** | **0** | | | **3** | **2** |
| **7** | **CS2302** | Computer Fundamentals and Organization Laboratory | | **0** | **0** | | | **3** | **2** |
| **Total Contact Hours and Credits** | | | | | | **13** | **2** | | | **6** | **19** |
| **Cumulative contact Hours and credits** | | | | | | **13** | **2** | | | **6** | **19** |
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| **YEAR- 1 SEMESTER- II** | **SEMESTER-2** | | | | | | | | | | |
| **Course No.** | **Type** | **Course Code** | | **Subject** | **Contact Hours** | | | | | | **Credit** |
| **L** | | | **T** | **P** | |
| **1** | **Theory** | **CS2305** | | Introduction to Unix and Linux | **3** | | | **0** | **0** | | **3** |
| **2** | **CS2216** | | Operating Systems | **3** | | | **0** | **0** | | **3** |
| **3** | **CS2122** | | Discrete Structure | **3** | | | **0** | **0** | | **3** |
| **4** | **CS2123** | | Digital Logic and Design | **3** | | | **0** | **0** | | **3** |
| **5** | **CS2307** | | Data Structures using C | **3** | | | **0** | **0** | | **3** |
| **6** | **Practical** | **CS2306** | | Introduction to Unix and Linux Laboratory | **0** | | | **0** | **3** | | **2** |
| **7** | **CS2308** | | Data Structures using C Laboratory | **0** | | | **0** | **3** | | **2** |
| **8** | **CS2217** | | Operating System Laboratory | **0** | | | **0** | **3** | | **2** |
| **Total Contact Hours and Credits** | | | | | **15** | | | **0** | **9** | | **21** |
| **Cumulative contact Hours and credits** | | | | | **28** | | | **2** | **15** | | **40** |
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| **YEAR-2** | **SEMESTER- 3** | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2309** | Object Oriented Programming with C++ | **3** | **0** | **0** | **3** |
| **2** | **UN1122** | Environmental Studies | **2** | **0** | **0** | **2** |
| **3** | **CS2311** | Relational Database Management Systems | **3** | **0** | **0** | **3** |
| **4** | **CS2313** | Security Threats and Trends | **3** | **0** | **0** | **3** |
| **5** | **CS2314** | Designing Enterprise Network I | **3** | **0** | **0** | **3** |
| **6** | **Practical** | **CS2310** | Object Oriented Programming with C++ Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2312** | Relational Database Management Systems Laboratory | **0** | **0** | **3** | **2** |
| **8** | **CS2315** | Designing Enterprise Network I Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **14** | **0** | **9** | **20** |
| **Cumulative contact Hours and credits** | | | | **42** | **2** | **24** | **60** |

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| **YEAR-2** | **SEMESTER-4** | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2150** | Formal Language and Automata Theory | **3** | **0** | **0** | **3** |
| **2** | **CS2316** | Programming in JAVA | **3** | **0** | **0** | **3** |
| **3** | **CS2318** | Software Engineering | **3** | **0** | **0** | **3** |
| **4** | **CS2319** | Ethical Hacking Fundamentals | **3** | **0** | **0** | **3** |
| **5** | **CS2321** | Desktop Operating System | **3** | **0** | **0** | **3** |
| **6** | **Practical** | **CS2317** | Programming in JAVA Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2320** | Ethical Hacking Fundamentals Laboratory | **0** | **0** | **3** | **2** |
| **8** | **CS2322** | Desktop Operating System Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **15** | **0** | **9** | **21** |
| **Cumulative contact Hours and credits** | | | | **57** | **2** | **33** | **81** |

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| **YEAR-3** | **SEMESTER-5** | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2323** | Information Security Fundamentals | **3** | **0** | **0** | **3** |
| **2** | **CS2324** | Data Centre Fundamentals | **3** | **0** | **0** | **3** |
| **3** | **CS2325** | Computer Forensics | **3** | **0** | **0** | **3** |
| **4** | **CS2327** | Server Operating System I | **3** | **0** | **0** | **3** |
| **5** | **CS2329** | Principles of Virtualization | **3** | **0** | **0** | **3** |
| **6** | **Practical** | **CS2326** | Computer Forensics Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2328** | Server Operating System I Laboratory | **0** | **0** | **3** | **2** |
| **8** | **CS2330** | Principle of Virtualization Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **15** | **0** | **9** | **21** |
| **Cumulative contact Hours and credits** | | | | **72** | **2** | **42** | **102** |
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| **YEAR-3** | **SEMESTER-6** | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2331** | Cryptography | **3** | **0** | **0** | **3** |
| **2** | **CS2166** | Computer Graphics | **3** | **0** | **0** | **3** |
| **3** | **CS2332** | Virtualization and Cloud Security | **3** | **0** | **0** | **3** |
| **4** | **CS2333** | Server Operating System II | **3** | **0** | **0** | **3** |
| **5** | **CS2335** | Network Security | **3** | **0** | **0** | **3** |
| **6** | **Practical** | **CS2199** | Computer Graphics Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2334** | Server Operating System II Laboratory | **0** | **0** | **3** | **2** |
| **8** | **CS2336** | Network Security Laboratory | **0** | **0** | **3** | **2** |
| **9** | **CS2337** | Mini Project | **0** | **0** | **6** | **4** |
| **Total Contact Hours and Credits** | | | | **15** | **0** | **15** | **25** |
| **Cumulative contact Hours and credits** | | | | **87** | **2** | **57** | **127** |
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| **YEAR-4** | **SEMESTER-7** | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2225** | Design and Analysis of Algorithms | **3** | **0** | **0** | **3** |
| **2** | **CS2338** | Database Security | **3** | **0** | **0** | **3** |
| **3** | **CS2339** | Introduction to Cloud Computing | **3** | **0** | **0** | **3** |
| **4** | **CS2340** | Designing Enterprise Network II | **3** | **0** | **0** | **3** |
| **5** | **CS2342** | Advanced Virtualization | **3** | **0** | **0** | **3** |
|  | **CS20\*\*** | Elective I | **3** | **0** | **0** | **3** |
|  | **CS2344** | IT Governance Risk and Information Security Management | **3** | **0** | **0** | **3** |
| **6** | **Practical** | **CS2341** | Designing Enterprise Network II Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2178** | Design and Analysis of Algorithms Laboratory | **0** | **0** | **3** | **2** |
| **8** | **CS2343** | Advanced Virtualization Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **21** | **0** | **9** | **27** |
| **Cumulative contact Hours and credits** | | | | **108** | **2** | **66** | **154** |
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| **YEAR-4** | **SEMESTER-8** | | | | | | |
| **Course No.** | **Type** | **Course Code** | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2185** | Compiler Design | **3** | **0** | **0** | **3** |
| **2** | **CS2345** | Advanced Server Operating System I | **3** | **0** | **0** | **3** |
| **3** | **CS2347** | Application Web Security | **3** | **0** | **0** | **3** |
| **4** | **CS2349** | OSI layer and Security | **3** | **0** | **0** | **3** |
| **5** | **CS2350** | Advanced Network Security | **3** | **0** | **0** | **3** |
|  | **CS20\*\*** | Elective II | **3** | **0** | **0** | **3** |
|  | **CS2351** | Personal and Effective Communication | **2** | **0** | **0** | **2** |
| **6** | **Practical** | **CS2187** | Compiler Design Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2346** | Advanced Server Operating System I Laboratory | **0** | **0** | **3** | **2** |
| **8** | **CS2348** | Application Web Security Laboratory | **0** | **0** | **3** | **2** |
| **Total Contact Hours and Credits** | | | | **20** | **0** | **9** | **26** |
| **Cumulative contact Hours and credits** | | | | **128** | **2** | **75** | **180** |

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| **YEAR-5** | **SEMESTER-9** | | | | | | | | |
| **Course No.** | **Type** | **Course Code** | | | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
| **1** | **Theory** | **CS2353** | | | Information Technology Infrastructure Library (ITIL) | **3** | **0** | **0** | **3** |
| **2** | **CS2354** | | | Disaster Recovery and Business Continuity Management | **3** | **0** | **0** | **3** |
| **3** | **CS20\*\*** | | | Elective III | **3** | **0** | **0** | **3** |
| **4** | **CS20\*\*** | | | Elective IV | **3** | **0** | **0** | **3** |
| **5** | **CS2355** | | | Storage Management | **3** | **0** | **0** | **3** |
|  | **Practical** | **CS2352** | | | Personal and Effective Communication Laboratory | **0** | **0** | **3** | **2** |
| **7** | **CS2356** | | | Major Project - Phase I | **0** | **0** | **6** | **4** |
| **Total Contact Hours and Credits** | | | | | | **15** | **0** | **9** | **21** |
| **Cumulative contact Hours and credits** | | | | | | **143** | **2** | **84** | **201** |
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| **YEAR-5** | | | | | **SEMESTER-10** | | | | |
| **Course No.** | **Type** | **Course Code** | | | **Subject** | **Contact Hours** | | | **Credit** |
| **L** | **T** | **P** |
|  | **Practical** | **CS2357** | | | Major Project - Phase II / Internship | **0** | **0** | **21** | **14** |
| **1** |
|
| **Total Contact Hours and Credits** | | | | | | **0** | **0** | **21** | **14** |
|  | | |  |  |  | **143** | **2** | **105** | **215** |
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| **LIST OF ELECTIVE OFFERED** | | |
| Elective-I | Hacktivism Cyber Warfare and Cyber Terrorism | **CS2017** |
| Trusted Systems | **CS2018** |
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| Elective-II | Cloud Computing Solution | **CS2025** |
| Mobile and Wireless Security | **CS20126** |
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| Elective-III | Exchange Server | **CS2034** |
| Advanced Storage Management | **CS2035** |
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| Elective-IV | Transition from Campus to Corporate | **CS2045** |
| ERP | **CS2044** |

**SEMESTER I**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit: English Communication (3) Code: UN1123**

**Programme: Integrated MSC IT Semester: I**

**Rationale**: Communication is the key to the 21st century world. More and more people are becoming aware of the role of effective communication in achieving one’s goals. English for specific purposes (ESP) is a domain of English language education that deals with specific language requirement of various professions. English Communication Skills is a course tuned to help prospective science graduates build and sharpen their language skills. The course is designed to familiarize learners with the nuances of technical and non-technical language use and to boost their communicative competence.

**Catalog Description:** The course is an introduction to the four basic modules of communication: reading, speaking, listening and writing, along with grammar and compositional skills. The first four modules deal with the four modules of communication and are aimed at developing the communicative abilities of the science students in dealing with technical as well as non-technical situations. The final module of the course deals with functional grammar.

**Pre-requisites**: Intermediate-level proficiency in English

**Course Outline:**

**I. READING AND VOCABULARY (07 hours)**

1. Enhancement of Reading Ability/Purpose of Reading
2. Guidelines for Effective Reading/Developing Reading Efficiency
3. Sensitivity towards the use of words in appropriate contexts and situations
4. Awareness of the connotations of different vocabulary items

**II. SPEAKING AND CONVERSATION (07 hours)**

1. Oral Communication: Principles, Guidelines and Barriers
2. Speaking with Confidence: Speech Anxiety, Ways to Overcome Speech Anxiety
3. Social Conversation and Conversation Control
4. Simulation of Conversational Situations: Meeting People, Greetings, Introducing Yourself, Introducing People, Saying Thanks

**III. LISTENING AND UNDERSTANDING (07 hours)**

1. The Process of Listening
2. Factors that Affect Listening
3. Characteristics of Effective and Ineffective Listeners
4. Guidelines for Improving Listening Skills

**IV. WRITING (09 hours)**

1. Skills Required in Written Communication/Principles of Effective Writing
2. Writing Composition: Preparing an outline, structuring and organizing of ideas, organizational coherence (within a paragraph and between paragraphs), and writing around a theme
3. Planning and writing of technical/non-technical reports, essays, narratives, formal/informal letters and other compositions
4. Remedial work for students who need to improve their writing skills

**V. GRAMMAR IN COMMUNICATION (09 hours)**

1. Time, tense and aspect
2. Voice: active and passive
3. Determiners, Articles and Prepositions
4. Subject-verb agreement/planarization
5. Synonyms, antonyms and One-word substitutes
6. Framing Sentences (Phrasal Verbs, Idiomatic Expressions)

(Note: The teaching of grammar should be treated as a diagnostic and remedial activity and integrated with communication practice. The areas of grammar in which errors are common should receive special attention when selecting items for review. Teaching need not be confined to the topics listed above)

**Recommended Readings**

1. *Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press, 2012*
2. *English Grammar in Use. Raymond Murphy. Cambridge University Press, 2004 (2009)*
3. *Grammar practice activities. Penny Ur. Cambridge University Press, 2008*
4. *An Introduction to Professional English and Soft Skills. B.K. Das et al. Cambridge University Press*
5. *The Functional Aspect of Communication Skills. Dr. P. Prasad. Katson Student Edition, 2012*
6. *Business Communication: Skills, Concepts and Applications. Chaturvedi and Chaturvedi. Pearson, 2013.*
7. *Communicative English for Engineers and Professionals. NitinBhatnagar and Bhatnagar.*
8. *Pearsonn, 2012.*
9. *Communication Skills for Engineers and Scientists. Sangeeta Sharma and Binod Mishra. PHI, 2009*
10. *Communication Skills for Professionals. NiraKonar. PHI, 2011*
11. *Understanding Human Communication. Adler and Rodman.*

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Basic Mathematics(4)** | Code:**CS2012** |
| Programme:**Integrated MSC IT** | Semester:**I** |

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| **Rationale:** Mathematics arises from many different kinds of problems. At first these were found in [commerce](http://en.wikipedia.org/wiki/Commerce), [land measurement](http://measurement), [architecture](http://en.wikipedia.org/wiki/Architecture) and later [astronomy](http://en.wikipedia.org/wiki/Astronomy); today, all sciences suggest problems studied by mathematicians, and many problems arise within mathematics itself. This course aims to acquaint the students with various mathematical techniques so as to solve various problems which arise in many physical situations |
| **Catalog Description:** The course gives an introduction to fundamental concepts of mathematics such as set theory, permutation, algebra, vector, matrices, statistics and probability. |
| **Pre-requisites:** Basic mathematics**.** |
| **Course Outline:**   1. **FUNDAMENTALS (09 hours)** 2. Number System 3. Profit and Loss 4. Series and Progressions 5. Sets and Subsets, Operations on sets, Relations, Properties of Relations, Equivalence Relations 6. **ALGEBRA (09 hours)** 7. Standard form of a quadratic equation ax2 +bx +c=0, (a≠0). 8. Solution of ax2 + bx + c = 0, by a) Factorisation b) Quadratic formula. 9. Application of quadratic equations in solving word problems from different areas.(Roots should be real)(Problems related to day to day activities to be incorporated.) 10. **VECTOR (09 hours)** 11. Definition, Different types of vectors, Operations on vectors 12. Scalar and Vector products of vectors. 13. **MATRICES (09 hours)** 14. Definition and different types of matrices. 15. Some basic operations on matrices. 16. Properties on matrices. 17. Determinant. 18. Properties of Determinant. 19. **THEORY OF STATISTICS AND PROBABILITY (08 hours)** 20. Mean, Median and Mode of grouped data 21. Elementary idea of probability as a measure of uncertainty 22. **COUNTING (08 hours)** 23. Permutation 24. Combinations. |
| **Text Books:**   1. R D Sharma, Mathematics for class X and class XI, S. Chand. 2. A. R. Vaisistha, “Matrices”, Krishna Prakashan Media, 1991.   **Reference Book(s):**   1. H. K. Dass, “Engineering Mathematics”, S. Chand |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit: Computer Fundamentals and Organization (3) Code:CS2301**

**Programme: Integrated MSC IT Semester: I**

**Rationale**: The basic knowledge of how a computer works is very important for any fresh networking or operating system professional. The functional knowledge of a computers working and its main building parts are paramount. The computers of today may come with variety of features but the basic working principles remain the same.

Students will explore the fundamentals of organization of a computer and the principles and building units of a computer (its hardware). Also, they will be introduced to the basics operating systems.

**Catalog Description:**

To enable students to understand the basics of computer organization, gain functional knowledge of the hardware used in computers and gain a basic knowledge of operating systems (both PC and server operating systems)

**Pre-requisites**: Basic knowledge of computers

**Unit I**

**General Features of a Computer (10 Hrs)**

General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia

**Unit II**

**Computer Organization (14 Hrs)**

Computer organization, central processing unit, computer memory – primary memory and secondary memory. Secondary storage devices – Magnetic and optical media. Input and output units. OMR, OCR, MICR, scanner, mouse, modem.

**Unit III**

**Computer Hardware and Software (16 Hrs)**

Computer hardware and software. Machine language and high level language. Application software, computer program, operating system. Computer virus, antivirus and computer security. Elements of MS DOS and Windows OS. Computer arithmetic, Binary, octal and hexadecimal number systems. Algorithm and flowcharts, illustrations, elements of a database and its applications

Basic Gates(Demorgans theorems, duality theorem, NOR,NAND,XOR,XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

**UNIT IV MS Office**

Word processing and electronic spread sheet. An overview of MSWORD, MSEXCEL and MSPOWERPOINT

**UNIT V**

Introduction to Networking

Network of computers. Types of networks, LAN, Intranet and Internet. Internet applications. World wide web, E-mail, browsing and searching, search engines, multimedia applications.

**TEXT BOOKS:**

Rajaraman, V (1999): Fundamentals of Computers, Prentice hall India

**REFERENCE BOOKS:**

1. *Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.*
2. *Jain, S K (1999) : Information Technology “O” level made simple, BPB Pub*
3. *Jain V K (2000) “O” Level Personal Computer software, BPB Pub.*
4. *hamacher, Computer Organization McGrawhill*
5. *Alexis Leon: Computers for everyone. Vikas, UBS*
6. *Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub*
7. *Sinha. Computer Fundamentals BPB Pub*

Grading System: The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Professional Ethics and Human Values(1)** | Code: **UN1121** |
| Programme: **Integrated MSC IT** | Semester: **I** |

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| **Rationale:** This subject deals in creating awareness on engineering ethics and human values, and instilling moral and social values as well as loyalty to appreciate the rights of others. |
| **Catalog Description:** This course is designed to make the students familiar with the basic tenets of professionals and professionalism, ethics in engineering, engineers’ responsibility for safety, and human values and attributes. |
| **Pre-requisites:** None |
| **Course Outline:**  **I. PROFESSIONALS AND PROFESSIONALISM (03 hours)**   1. Roles of a Professional: Engineering as a Profession 2. Professional Risks and Accountability 3. Virtue, Ethics, Honesty and Moral Responsibility   **II. ETHICS IN ENGINEERING (03 hours)**   1. Engineer’s Moral Responsibility for Safety and Human Right 2. Engineering Ethics: Making Sense of Engineering Ethics, Issues in Engineering Ethics, and Ethical Obligations of Engineering Professionals 3. Models of Professional Roles and Application of Ethical Theories: Kohlberg’s Theory, Gilligan’s Theory, and theories about right action   **III. ENGINEERS’ RESPONSIBILITY FOR SAFETY (03 hours)**   1. Safety and Risk: Concept of Safety, Assessment of Risk: Risk–Benefit Analysis, Risk Costs and Management, and Principles of Risk Management 2. Engineers’ Responsibility for Safety: Safety in Engineering Products, Mandatory Product Standards, Designing for Safety, and Providing for Safe Exit 3. Select Case Studies: Bhopal Gas Tragedy, Uphaar Cinema Tragedy, Chernobyl Disaster, etc.   **IV. HUMAN VALUES AND ATTRIBUTES (03 hours)**   1. Human Values: Classification of Values, Values and Ethics, and Universality of Values 2. Acquiring Values, Components of Attitudes, and Degeneration of Values 3. Values, Attitudes and Engineering Professionals |
| **Text book:**   1. Subramanian, R. *Professional Ethics*. New Delhi: Oxford University Press, 2013. |
| **Reference Books:**   1. Fleddermann, Charles D., *Engineering Ethics*. New Jersey: Pearson Education/Prentice Hall, 2004 (Indian Reprint). 2. Harris, Charles E., Michael S Pritchard and Michael J Robins, *Engineering Ethics: Concepts and Cases*. Wordsworth/Thompson Learning, United States, 2000 (Indian Reprint). |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit: Programming in C (3) Code:CS2303**

**Programme: Integrated MSC IT Semester: I**

**Rationale**:

Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments. The object oriented platforms and event driven systems use procedural languages for coding integral command content.

C is an important procedural language and was developed initially to write the UNIX operating system. UNIX operating system, C compiler and all UNIX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms.

This unit focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units. The students will be implementing the concepts explained here to create simple to complex programs.

**Catalog Description:**To provide students with an understanding of the different principles of programming with language C. It will also enable them to design and implement procedural programming concepts

**Pre-requisites:** Basic programming knowledge

**UNIT I: OVERVIEW OF PROGRAMMING: (08 Hours)**

Introduction to computer based problem solving, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters.

**UNIT II : FUNDAMENTALS OF C PROGRAMMING: (08 Hours)**

Overview of C, Data Types, Constants & Variables, Operators & Expressions, Control constructs-if then, for, while, Arrays- single & multidimensional arrays, Functions-fundamentals – general form, function arguments, return value, Basic I/O-formatted and Unformatted I/O, Advanced features- Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, \* operator, Type casting, type conversion.

**UNIT III : ADVANCED PROGRAMMING TEChNIQUES: (08 Hours)**

Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of hanoi

**UNIT IV: DYNAMIC DATA STRUCTURES IN C: (08 Hours)**

Pointers- The & and \* operator, pointer expression, assignments, arithmetic, comparison, malloc vs calloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers, Structures- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, Unions – Declaration, uses, enumerated data-types, typedef.

**UNIT V: ADDITIONAL FEATURES: (07 Hours)**

File handling – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: header files, string functions, mathematical functions, Date and Time functions .

**TEXT BOOKS:**

1. Let us C by Yashwant Kanetka, 6th Edition, PBP Publication.

**REFERENCE BOOKS:**

1. The C programming Language by Richie and Kenninghan, 2004, BPB Publication
2. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw hill

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit: Programming in C - Lab (2) Code: CS2304**

**Programme: Integrated MSC IT Semester: I**

**Rationale:**

C is one of the most widely used programming languages of all times. It is a generalpurpose

Programming language initially developed by Dennis Ritchie between 1969 and 1973 atBell Labs. C is often used for "system programming", including implementing operating systemsand embedded system applications, due to a combination of desirable characteristics such as codeportability and efficiency, ability to access specific hardware addresses and low run-time demandon system resources. Hence this preliminary course will enhance the knowledge of the student’s onthe basic structure of the C programming language. More emphasis will be given on thebackground basics of how a program is structured in an efficient manner, how it is executed andwhat happens to the system memory during the whole process till the program is executed.

**Catalog Description**:

This is a course on basic programming covering the algorithms,programming approaches, basic data types, loops etc. Moreover the course will also cover sometopics relating to designing structured programs, arrays, structures etc. along with their exampleprograms.

**Pre-requisites:** A basic knowledge of mathematical logic and operations

**Course Outline:**

**Part A (12 Hours)**

1. Printing the reverse of an integer.
2. Printing the odd and even series of N numbers.
3. Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().
4. Input a string and find the number of each of the vowels appear in the string.
5. Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.
6. Printing the reverse of a string.

**Part B (27 Hours)**

1. Searching an element in an array using pointers.
2. Checking whether the given matrix is an identity matrix or not.
3. Finding the first N terms of Fibonacci series.
4. Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.
5. Define a structure with three members and display the same.
6. Declare a union with three members of type integer, char, string and illustrate the use of union.
7. Recursive program to find the factorial of an integer.
8. Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.
9. Arranging N numbers in ascending and in descending order using bubble sort.
10. Addition and subtraction of two matrices.
11. Multiplication of two matrices.
12. Converting a hexadecimal number into its binary equivalent.
13. Check whether the given string is a palindrome or not.
14. Demonstration of bitwise operations.
15. Applying binary search to a set of N numbers by using a function.
16. Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Computer Fundamentals and Organization Laboratory (2) **Code:CS2302**

**Programme: Integrated MSC IT Semester: I**

**Rationale**: The basic knowledge of how a computer works is very important for any fresh networking or operating system professional. The functional knowledge of a computers working and its main building parts are paramount. The computers of today may come with variety of features but the basic working principles remain the same.

Students will explore the fundamentals of organization of a computer and the principles and building units of a computer (its hardware). Also, they will be introduced to the basics operating systems.

**Catalog Description:**To enable students to understand the basics of computer organization, gain functional knowledge of the hardware used in computers and gain a basic knowledge of operating systems (both PC and server operating systems

**Pre-requisites**: Laboratory Session: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments. (At least 8 Experiments to be conducted)

**Course Outline:**

**Unit 1: HARDWARE AND NETWORKING LAB (13 hours)**

1. Identify computer components and install CMOS battery
2. Assemble a PC
3. Install Windows 7 OS on a PC
4. Create a user in Windows 7 OS
5. Install RAM, Processor and connect Hard disk to motherboard using a data cable or SATA cable
6. Check SMPS and note down different power supplies available in SMPS
7. Create logical partitions in Hard Disk
8. Crimp RJ-45 connector to CAT cable, straight through or Crossover cables
9. Connect two PC’s using CAT cable for data transfer

**Unit 2: MS Office Lab (13 hours)**

1. Prepare a document about any tourist destination of your choice with appropriate pictures and editing features.
2. Prepare a News Paper Layout. Insert appropriate pictures wherever necessary. Use the following Features:
3. Three Column and Four Column setting
4. Set One or Two Advertisements
5. Use Bullets and Numbering.
6. Open a new workbook, save it as JavaCoffeeBar.xls. In sheet1 write following sales data for Java Coffee bar to show their first 6 months sales.
7. Select cell B4:D4 and change the horizontal alignment to center and text to 90 degree.
8. All titles should be in bold
9. Format all cells numbers to currency style and adjust width as necessary.
10. Add border to data.
11. Select the cell range A1:H1, merge and center these cells. Apply same format to A2:H2.
12. Give border, shading and pattern to data in sheet
13. Apply different font settings for all titles in sheet
14. Apply green color and bold setting to sales above 10000 (use conditional formatting)
15. Rename current worksheet as FirstHalfSales
16. Prepare a worksheet to maintain student information. The work sheet should Contain Roll Number, Name and marks in 5 subjects. (Max Marks is 100).Validate the marks. Calculate the total marks. Assign the grade according to the following. Assign grade 'A' if the total marks is above 450. From 401 to 449 assign the grade as 'B'. From 351 to 400 assign the Grade as 'C'. From 300 to 350 the grade to be assigned is 'D'. For the total marks less than 300 No grade is assigned. A student is eligible to get a grade only when he gets 40 and above in all the subjects. In such cases the grade is “FAIL”. (Assume that there are 10 students)
17. Assume that you are going to give a presentation about Information Technology. (Choose some latest technologies). The presentation should have minimum 10 slides. Insert appropriate images wherever necessary. Use proper formatting, Diagrams and tables. Show the usage of action buttons, hyperlinks, and animations.

**Recommended Readings**

**TEXT BOOKS:**

Rajaraman, V (1999): Fundamentals of Computers, Prentice hall India

**REFERENCE BOOKS:**

1. Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology “O” level made simple, BPB Pub
3. Jain V K (2000) “O” Level Personal Computer software, BPB Pub.
4. hamacher, Computer Organization McGrawhill
5. Alexis Leon: Computers for everyone. Vikas, UBS
6. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
7. Sinha. Computer Fundamentals BPB Pub

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**SEMESTER II**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit: Introduction to UNIX and Linux (3) Code: CS2305**

**Programme: Integrated MSC IT Semester: II**

**Rationale:**

The unit provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. This unit provides examples to help the learners get a better understanding of the Linux system. The unit also provides the guidelines for the learners to take up vendor certifications.

The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting.

**Catalog Description:**

To enable the students to have a hands on practical exposure to the Linux Red hat Enterprise and make them prepared for the RhCE Certification

**Pre-requisites:** Basic knowledge of Operating System

**Course Outline:**

**UNIT I: LINUX INTRODUCTION (07 Hours)**Introduction to Multi user System, history of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr, yacc etc. getting Started (Login/Logout) . Creating and viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces.

**Exploring Linux Flavors**

Introduction to various Linux flavors. , Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu. history, Versions, Installation, Features, Ubuntu one. Fedora: history, Versions, Installation, Features.

**UNIT II:The UNIX FILE SYSTEM (07 Hours)**Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode -Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.

**UNIT III:UNIX PROCESS MANAGEMENT (06 Hours)** The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.

**UNIT IV:VI EDITOR (09Hours)**

Vi Editor: Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line,Deleting & Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set Auto Indent, Set No. Communicating with Other Users: who, mail, wall, send, mesg, ftp.

**UNIT V: SYSTEM ADMINISTRATION (10Hours)**Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disabling of user’s accounts, creating and mounting file system, checking and monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command.

**TEXT BOOKS:**

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
2. Advance UNIX, a Programmer’s Guide, S. Prata, BPB Publications, and New Delhi, 2011
3. Unix Concepts and Applications, Sumitabh Das, 2010

**REFERENCE BOOKS:**

1. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice hall of India. 2009
2. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. house Pvt. Ltd. 2010

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Operating Systems (3)** | Code: **CS2216** |
| Programme: **Integrated MSC IT** | Semester: **II** |

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| **Rationale:** The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing inputfrom the keyboard, sending output to the display screen, keeping track of filesand directories on the disk, and controlling peripheral devices such as disk drives and printers. |
| **Catalog Description:** This course covers the concept of operating system and its applications. |
| **Pre-requisites:** Computer Programming, Data structures, DBMS |
| **Course Outline:**   1. **INTRODUCTION (02 hours)** 2. What is an Operating System 3. Function of Operating System 4. Operating System Structure: System Components, Operating System Services 5. System Calls. 6. **PROCESSES (03 hours)** 7. Process Concept 8. Process State and State Transitions 9. Process Control Block 10. Suspend & Resume of Process 11. Interrupt Processing 12. Context Switching 13. **PROCESS SYNCHRONIZATION AND INTERPROCESS COMMUNICATION (03 hours)** 14. The Critical-Section Problem 15. Dekker’s Algorithm, Semaphores 16. Synchronization Hardware: Test-and-Set 17. Compare-and-Swap 18. Solution of Producer-Consumer Problem. 19. Inter-Process Communication 20. **DEADLOCKS (04 hours)** 21. System Model 22. Deadlock Characterization 23. Methods for Handling Deadlocks 24. Deadlock Prevention 25. Deadlock Avoidance & Banker’s Algorithm 26. Deadlock Detection 27. Deadlock Recovery 28. **THREADS (02 hours)** 29. Single & Multithreading Models 30. Threading issues 31. P Threads 32. **CPU SCHEDULING (03 hours)** 33. Basic Concepts 34. Scheduling: Levels, Criteria, Pre-emptive & Non-Preemptive Scheduling 35. Scheduling Algorithms 36. Multi-Processor Scheduling      1. **MEMORY MANAGEMENT (07 hours)** 2. Memory Organization 3. Storage Hierarchy 4. Storage Management Strategies 5. Swapping 6. Contiguous & Non Contiguous Memory Allocation 7. Virtual memory: Paging, Segmentation, Segmentation with Paging, Notion of Locality and Working Sets 8. Thrashing 9. Page Replacement Algorithms 10. **FILE-SYSTEM IMPLEMENTATION (04 hours)** 11. File Concepts 12. Access Methods 13. Directory Structure 14. File-system Mounting 15. File Sharing 16. Protection and Recovery 17. Efficiency and Performance 18. **DISK SCHEDULING (05 hours)** 19. Disk Structure 20. Disk Caching 21. Disk Scheduling 22. Disk Management 23. **PROTECTION & SECURITY (05 hours)** 24. Goals of Protection 25. Domain of Protection 26. Implementation of Access Matrix 27. The Security Problem 28. User Authentication 29. Program Threats 30. System Threats 31. Securing Systems and Facilities 32. Intrusion Detection |
| **Text books:**   1. Abraham Silberschatz, Peter Baer Galvin & Greg Gagne, “Operating System Concepts”, John Wiley & Sons 2. H M Deitel, “Operating System”, Pearson Education |
| **Reference Books:**   1. Crowley, “Operating Systems: A Design Oriented Approach” , TMH 2. William Stallings, “Operating Systems: Internals And Design Principles”, PHI |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Discrete Structure(3)** | Code: **CS2122** |
| Programme: **Integrated MSC IT** | Semester: **II** |

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| **Rationale:** Discrete structures is a subject to study for understanding mathematical structures in the form of discrete not in continuous. It motivates the student to apply logical reasoning to solve a particular problem and also able to construct direct and indirect proof. |
| **Catalog Description:** This subject covers the basic concepts of different mathematical structures (i.e., set theory, logic, group, relations, functions etc.) which are required to solve different real-world problems. |
| **Pre-requisites:** Mathematical aspects for computer science |
| **Course Outline:**  **I. ALGEBRAIC STRUCTURES (08 hours)**   1. Semigroups, Groups, Subgroups. 2. Homomorphisms. 3. Rings, Integral Domains, Fields.   **II. RELATIONS (08 hours)**   1. Relations and their properties. 2. *n*-ary Relations. 3. Representation of Relations. 4. Equivalence Relations. 5. Partial Orderings.   **II. MATHEMATICAL LOGIC (08 hours)**   1. Propositions. 2. Logical Equivalence. 3. Rules of Inference. 4. Predicates and Quantifiers.   **IV. INDUCTION AND RECURSION (08 hours)**   1. Mathematical Induction. 2. Strong Induction and Well-Ordering. 3. Recursive Definitions and Structural Induction.   **V. GRAPH THEORY (07 hours)**   1. Paths, Connectivity. 2. Sub-Graphs, Isomorphic and Homeomorphic Graphs. 3. Trees. 4. Complete Graphs, Bipartite Graphs. Matching Colorability, Planarity, Digraphs |
| **Text books:**   1. D. S. Chandrasekharaiah, “Discrete Mathematical Structures”, Prism Books Pvt. Ltd., 2005 2. S. Lipschutz and M. L. Lipson, “Schaum’s Outline of Theory and Problems of Discrete Mathematics”, 2nd Ed, Tata McGraw Hill, 1999. 3. J. P. Tremblay and R. P. Manohar, “Discrete Mathematics with Applications to Computer Science”, Tata McGraw-Hill, 1997 |
| **Reference Books:**   1. Discrete Mathematics with Graph Theory, Edgar G. Goodaire, Michael M. Parmenter, Third Edition, PHI, 2007 |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Digital Logic and Design (3)** | Code: **CS2123** |
| Programme: **Integrated MSC IT** | Semester:**II** |

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| **Rationale:** Digital electronics are the most common representation of Boolean algebra and are the basis of all digital circuits for computers, mobile phones, and numerous other consumer products. The most common fundamental unit of digital electronics is the logic gate. By combining numerous logic gates (from tens to hundreds of thousands) more complex systems can be created. The complex system of digital electronics is collectively referred to as a digital circuit. Hence, this preliminary course will enhance the knowledge of students in the field of digital electronics and will also assist students to understand the basic operation those are carried out inside the complex systems. |
| **Catalog Description:** This course basically includes the basic gates, combinational circuits and sequential circuits. About semiconductor memory devices and digital IC families are also dealt in this course. |
| **Pre-requisites:** Knowledge of logic gates is assumed. |
| **Course Outline:**  **I. INTRODUCTION TO DIGITAL LOGIC DESIGN (13 hours)**   1. Binary Number system 2. Binary Coded Decimal 3. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR 4. Boolean algebra: Boolean postulates and laws 5. Minimization of Boolean expressions, 6. Sum of Products (SOP), Product of Sums (POS) 7. Karnaugh map technique of Minimization   **II. COMBINATIONAL CIRCUITS (13 hours)**   1. Introduction to combinational circuits. 2. Design procedure of arithmetic circuits such as ADDER, SUBTRACTOR, MUX, DEMUX, ENCODER, DECODER etc.   **III. SEQUENTIAL CIRCUITS (13 Hours)**   1. Introduction to sequential circuits. 2. Architectural distinction between combinational and sequential circuits 3. Concept of memory - Latches 4. Flip-flops - SR, JK, D and T 5. State Table and Excitation Table 6. Counters and its design procedure 7. Shift registers   **Textbooks:**   1. Modern Digital Electronics by R.P.Jain, Tata McGraw-Hill Education 2. An Engineering Approach to Digital Design by William I. Fletcher, PHI 3. Digital Electronics by G.K.Kharate, Oxford |
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| **Reference Books:**   1. Digital Logic and Computer Design by M. morries Mano, Pearson 2. Digital Design by M. Morris Mano and Michael D. Ciletti, Pearson 3. Digital Fundamentals (Eighth Edition), Thomas L. Floyd and R.P. Jain, Pearson |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Data Structures using C (3)  **Code:CS2307**

**Programme: Integrated MSC IT Semester: II**

**Rationale**:

A data structure is a particular way of storing and organizing data in a computer so thatit can be used efficiently. Different kinds of data structures are suited to different kinds ofapplications and some are highly specialized to specific tasks

**Catalog Description:**

This subject covers the basic concepts of different data structures which arebasic building blocks of Programming and problem solving.

**Pre-requisites**: Computer programming and problem solving

**Unit I : Introduction to Data structures (08 Hours)**

Definition and classification -primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing, Definition of Dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Static and dynamic memory allocation-meaning, Memory allocation functions: malloc(), calloc() , free() and realloc(), Writing Recursive programs- Binomial coefficient, Fibonacci and GCD**.**

**Unit II: Searching and Sorting (08 Hours)**

Basic Search Techniques- Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search.

Sort - General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort and Quick sort

**Unit III: Stack and Queue (08 Hours)**

Stack- Definition and Array representation of Stack, Operations on Stack- Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix; Applications of Stack, Queue: Definition and Array representation of Queue, Types of Queue- Simple, Circular, Double ended (deque) and Priority queue, Operations on all types of Queues.

**Unit IV: Linked List (07 Hours)**

Definition, Component and Representation of Linked list, Advantages/ Disadvantages of linked list, Types: single, doubly linked and Circular linked list, Operations on Singly linked list: creation, insertion, deletion, search and display.

**Unit V: Tree Graphs and their Applications (08 Hours)**

Definition of Tree-Binary, Complete binary and Binary search tree, heap Tree Technology: Root, Node, Degree of a node and tree, Terminal and non-terminal nodes, Nodes: Siblings, Level, Edge, Path, depth, Parent node and ancestorsm, Binary tree : Array representation and creation, Traversal of Binary Tree: Preorder, Inorder and postorder, Graphs: Application of Graphs, Depth First search, Breadth First search

**Recommended Readings:**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum’s outline series Data structures Tata McGraw-hill
3. Robert Kruse Data Structures and program designing using ‘C’
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Introduction to Unix and Linux Laboratory (2) **Code:CS2306**

**Programme: Integrated MSC IT Semester: II**

**Rationale:**

The unit provides an overview of the Linux Operating System, geared toward new users as an exploration tour and getting started guide. This unit provides examples to help the learners get a better understanding of the linux system. The unit also provides the guidelines for the learners to take up vendor certifications.

The unit explores the basics of Linux, the underlying management of the Linux operating system and its network configuration. The complete system services of Linux is explained along with the troubleshooting

**Catalog Description:**

To enable the students to have hands on practical exposure to the Linux Red hat Enterprise and make them prepared for the RhCE Certification

**Pre-requisites:** Successful completion of an introductory computer programming course

**Course Outline:**

**Part I (45 Hours)**

1. Execute 25 basic commands of UNIX.
2. Basics of functionality and modes of VI Editor.
3. WAP that accepts user name and reports if user is logged in.
4. WAP which displays the following menu and executes the option selected by user:
5. ls
6. Pwd
7. ls –l
8. ps –fe
9. WAP to print 10 9 8 7 6 5 4 3 2 1 .
10. WAP that replaces all “\*.txt” file names with “\*.txt.old” in the current.
11. WAP that echoes itself to stdout, but backwards.
12. WAP that takes a filename as input and checks if it is executable, if not make it executable.
13. WAP to take string as command line argument and reverse it.
14. Create a data file called employee in the format given below:

|  |  |
| --- | --- |
| **Field Name** | **Data Type** |
| EmpCode | Character |
| EmpName | Character |
| Emp Grade | Character |
| Years of experience | Numeric |
| Basic Pay | Numeric |

$vi employee

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Employee Code** | **Employee Name** | **Employee Grade** | **Years Of Experience** | **Basic Pay** |
| A001 | ARJUN | E1 | 01 | 12000.00 |
| A006 | Anand | E1 | 01 | 12450.00 |
| A010 | Rajesh | E2 | 03 | 14500.00 |
| A002 | Mohan | E2 | 02 | 13000.00 |
| A005 | John | E2 | 01 | 14500.00 |
| A009 | Denial Smith | E2 | 04 | 17500.00 |
| A004 | Williams | E1 | 01 | 12000.00 |

Perform the following functions on the file:

1. Sort the file on EmpCode.
2. Sort the file on

(i) Decreasing order of basic pay

(ii) Increasing order of years of experience.

1. Display the number of employees whose details are included in the file.
2. Display all records with ‘smith’ a part of employee name.
3. Display all records with EmpName starting with ‘B’.
4. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.
5. Store in ‘file 1’ the names of all employees whose basic pay is between 10000 and 15000.
6. Display records of all employees who are not in grade E2.

**Recommended Readings:**

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Data Structures using C Laboratory (2)  **Code:CS2308**

**Programme: Integrated MSC IT Semester: II**

**Rationale** To gain practical knowledge by implementing various data structures learnt in thetheory parts. These may be applied further in several real-world problem solving.

**Catalog Description:** This subject covers the basic concepts of different data structures which arebasic building blocks of Programming and problem solving.

**Pre-requisites:** Computer programming, problem solving and Advanced Data Structures Theory

**List of Programs (39 hours)**

**Part A**

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

**Part B**

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.

6. Sort N numbers using merge sort.

**Recommended Readings:**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum’s outline series Data structures Tata McGraw-hill
3. Robert Kruse Data Structures and program designing using ‘C’
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, Ausenstein Maoshe & M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Operating Systems Laboratory (2)** | Code: **CS2217** |
| Programme: **Integrated MSC IT** | Semester: II |
| **Rationale:** The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing inputfrom the keyboard, sending output to the display screen, keeping track of filesand directories on the disk, and controlling peripheral devices such as disk drives and printers. | |
| **Catalog Description:** This course covers the concept of operating system and its applications. | |
| **Pre-requisites:** Computer Programming, Data structures, DBMS | |
| **Course Outline: (39 hours)**  **Laboratory Session**: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments. (Atleast 8 Experiments to be conducted)  **Experiment 01:**  Write a C/JAVA program for Round Robin CPU scheduling algorithm  **Experiment 02:**  Write a C/JAVA program for SJF CPU scheduling algorithm  **Experiment 03:**  Write a C/JAVA program for FCFS CPU scheduling algorithm  **Experiment 04:**  Write a C/JAVA program for priority CPU scheduling algorithm  **Experiment 05:**  Write a C/JAVA program to illustrate the following Command using system Calls  a) cat b) ls c) mv  **Experiment 06:**  Write a C/JAVA program that illustrates the creation of child process using fork() system call  **Experiment 07:**  Write a C/JAVA program that implements producer consumer problem using semaphore system calls.  **Experiment 08:**  Write a C/JAVA program to illustrate inter process communication using shared memory system calls.  **Experiment 09:**  Write a C/JAVA program to (a) create message queue (b) write to message queue (c) read from message queue  **Experiment 10:**  Write a C/JAVA program to count number of blanks, characters a) Using standard I/O function. b) Using system calls. | |
| **Text books:**   1. Abraham Silberschatz, Peter Baer Galvin & Greg Gagne, “Operating System Concepts”, John Wiley & Sons 2. H M Deitel, “Operating System”, Pearson Education | |
| **Reference Books:**   1. Crowley, “Operating Systems: A Design Oriented Approach” , TMH 2. William Stallings, “Operating Systems: Internals And Design Principles”, PHI | |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 40%  End Semester Exam: 60% | |
| **Academic Council Approval:** | |

**SEMESTER III**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Object Oriented Programming with C++ (3)  **Code:CS2309**

**Programme: Integrated MSC IT Semester: III**

**Rationale:**

The main objective is to learn the basic concept and techniques which form the object oriented programming paradigm. Object-oriented programming is a new way of thinking about problem using models organizes around real world concept. The Fundamental construct is the object which combines both data-structure and behavior in a single entity which is in contrast to conventional programming in which data-structure and behavior are loosely connected.

**Catalog Description:**

This course mainly covers the object-oriented concepts and their aspectsUsing C++.

**Pre-requisites:** Basic Concepts of C programming and Problem Solving Ability

**Course Outline:**

**UNIT I: INTRODUCTION (08 Hours)**

Evolution of programming methodologies-Procedure oriented versus Object Oriented Programming-characteristics of OOP, Basics of OOP, Merits and Demerits of OOP.

**Data Types:** Different data types, operators and expressions in C++, Keywords in C++.

**Input and Output:** Comparison of stido.h and iostream.h, cin and cout.

**Decision and loop:**

Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and goto statements, Looping statements- for loop, while loop, Do-while loop.

**Arrays, String and Structures:** Fundamentals-Single dimensional, multi-dimensional arrays, fundamentals of strings, different methods to accept strings, different string manipulations, array of strings, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and Unions, Enumerated data types-declaration and their usage

**UNIT II: OBJECTS, CLASSES AND FUNCTIONS (08 Hours)**

**Class:** Definition-defining the class, defining data members and member functions, Access specifier-private, public, protected, objects as function arguments, returning objects from the function, scope resolution operator, and member function defined outside the class, difference between class and structure, array as class member data, Array of objects.

**Functions in C++:**

Function definition, function declaration, Built-in functions, user defined functions, calling the function, passing parameter-actual and formal, different methods of calling the function call by value, call by reference using reference as parameter and pointer as parameter, overload function-different types of arguments-different number of arguments, inline function, default argument, storage classes-automatic, external, static, register.

**Constructor and Destructor:**

Constructors-constructor with argument, constructor without arguments, constructor with default arguments, Dynamic constructor, constructor overloading, copy constructor, destructors, Manipulating private data members.

**UNIT III:OPERATOR OVERLOADING & INHERITANCE (08 Hours)**

**Operator overloading:**

Defining operator overloading, overloading unary operator, overloading binary operator, manipulation of string using overloaded operator, rules for overloading operator. Data conversion: conversion between Basic types, conversion between objects & Basic types, conversion between objects of different classes.

**Inheritance:**

Base Class & derived class, defining derived classes, protected access specifier, public inheritance and private inheritance-member accessibility, constructors and destructors in derived classes, Level of inheritance-single inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance.

**UNIT IV: POINTERS & VIRTUAL FUNCTION (08 Hours)**

**Pointer:**

Pointer declaration and Access, Pointer to void, pointer and arrays, pointer constant and pointer variable, pointer and functions, pointer, call by pointer arrays, array of pointers to string, printer sort, memory management-new and delete, pointer to object-referencing members using pointers, self containing class, this pointer, returning values using this pointer.

**Virtual function:**

Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract class, virtual base class.

**Friend functions and static function:**

Purpose, defining friend functions, friend classes, static function, accessing static function numbering positive objects.

**UNIT V:IO OPERATIONS & EXCEPTIONS (07 Hours)**

**Templates and Exception Handling:** Introduction to templates, class templates, function templates, Member function templates, Template arguments, Exception handling.

**Console IO Operator:**

C++ stream and C++ stream classes, unformatted I/O operators, formatted I/O operators-manipulators-user defined manipulators.

**Files :** Class for file stream operators, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple object, stream class, file pointer-specifying the position, specifying the object, tellg() function, seekg() function. Command line arguments.

**TEXT BOOK:**

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications

**REFERENCE BOOKS:**

1. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
2. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications
3. Lippman: C++ Primer, 3/e Pearson Education
4. C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.
5. Let us C++ by YeshwanthKanetkar

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Engineering & Technology**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit **: Environmental Studies (2)** | Code: **UN1122** |
| Programme:**Integrated MSC IT** | Semester: **III** |
| **Rationale:** To create awareness on the various environmental pollution aspects and issues.   * To give a comprehensive insight into natural resources, ecosystem and biodiversity * To educate the ways and means to protect the environment from various types of pollution. * To impart some fundamental knowledge on human welfare measures. | |
| **Catalog Description:** This subject covers the introductory concept of environmental studies such as Ecosystem, Biodiversity, Environmental Pollution, Human Population, etc. | |
| **Pre-requisites:** Preliminary knowledge on environmental science | |
| **Course Outline:**  **1. Introduction To Environmental Studies And Natural Resources (06 hours)**   * Definition, scope and importance, Need for public awareness * Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people. * Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. * Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer/pesticide problems, water logging, salinity, case studies. * Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies. * Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam’s-benefits and problems. * Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. * Role of an individual in conservation of natural resources.   **2. ECOSYSTEM AND BIODIVERSITY (07 hours)**   * 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 (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) * Introduction to biodiversity – definition: genetic, species and ecosystem diversity * 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-spots of biodiversity * Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts * Conservation of biodiversity   **3. ENVIRONMENTAL POLLUTION (06 hours)**   * Definition * Causes, 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   **4. SOCIAL ISSUES AND THE ENVIRONMENT (05 hours)**   * From unsustainable to sustainable development * Urban problems related to energy * Water conservation, rain water harvesting, watershed management * Resettlement and rehabilitation of people; its problems and concerns, case studies * Environmental ethics: issues and possible solutions * Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents/holocaust, case studies * Wasteland reclamation * Consumerism and waste products   **5. HUMAN POPULATION AND THE ENVIRONMENT (02 hours)**   * Population growth, variation among nations * Population explosion- family welfare program * Environment and human health | |
| **Text books:**   1. Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, PHI Learning education Pvt., Ltd., second edition, ISBN 81-297-0277-0, 2004. 2. Miller T.G. jr., “Environmental Science”, Wadsworth publishing co. 3. Townsend C., Harper J and Michael Begon, “Essentials of Ecology”, Blackwell science. 4. 4. Trivedi R.K. and P.K. Goel, “Introduction to air pollution”, techno-science publications. | |
| **Reference Books:**   1. Bharuchaerach, “The Biodiversity of India”, Mapin publishing Pvt. Ltd., Ahmedabad India, 2. Trivedi R.K., “Handbook of Environmental Laws”, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro media. 3. Cunningham, W.P.Cooper, T.H.Gorhani, “Environmental Encyclopedia”, Jaico Publ., House, Mumbai, 2001. 4. Wager K.D., “Environmental Management”, W.B. Saunders Co., Philadelphia, USA, 1998. | |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% | |
| **Academic Council Approval:** | |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Relational Database Management Systems (3) **Code:CS2311**

**Programme: Integrated MSC IT Semester: III**

**Rationale:**

A database management system (DBMS) is collection of software meant to manage a Database. Many popular databases currently in use are based on the relational database model. RDBMSs have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more.

**Catalog Description:**

The course covers the basic concepts of databases in general with anemphasis on relational databases, modeling techniques and writing queries. Normalizationtechniques, Transaction processing, Concurrency Control techniques and Recovery of databases against crashes are also covered.

**Pre-requisites:** Data Structures

**Course Outline:**

**Unit I- Introduction to Database Management System (09 hours)**

Introduction of Database, DBMS, Characteristics of database approach, Advantages of DBMS

Data models, schemas, Three schema architecture - The external level, the conceptual level and The internal level. Data Independence, Database languages and Interfaces, Roles of Database Administrator, Introduction to Data Models (Hierarchical, Network and Relation), Client/Server Architecture, Introduction to Distributed Database, Classification of DBMS, Entity type, Entity sets, Attributes and keys. The ER Model, ER Diagram & Database design with the ER Model

**Unit II - RDBMS (08 hours)**

Introduction, Relational Model -Concepts, Characteristics. Relational operations (Insert, delete, update, select, project, rename, union, intersection, minus, Join, division), Transactions and ER mapping (Examples). Normalization of RDBMS (1NF, 2NF, 3NF and 4NF) and inference rules.

**Unit III – SQL (06 hours)**

Introduction to Unit. DBMS v/s RDBMS, Introduction to SQL, Data types, Constraints, Commands in SQL (Create table, Drop command, Alter command), queries in SQL, Statements in SQL (Insert, delete and update), Features of SQL, Manipulation of data, Tables in SQL

**Unit IV - PL/SQL (10 hours)**

Introduction, Approaches to database programming, with function calls, Embedded SQL using CURSORs, Dynamic SQL, SQL commands in Java, Retrieving multiple triples using Iterators, Advantages of PL/SQL and features of PL/SQL - blocks structure, error handling, input and output designing, variables and constant, data abstraction, control structures and subprogram

Fundamentals of PL/SQL - character sets, lexical, delimeters, identifiers, declarations, scope and visibility, Static and dynamic and static SQL, Implicit and explicit locking

**Unit V. -Oracle, Trigger and wrapping (06 hours)**

Introduction to Unit , Functions/responsibilities of DBA, Oracle product details, Oracle files, System and User process, Oracle Memory, protecting data, Oracle backup & recovery , Triggers - types, uses, data access for triggers, PL/SQL Packages and Wrapping

.

**Books for Reference**

1. S. Sudarshan, Henry F. Korth, AviSilberschatz, Database System Concepts, Edition 6, McGraw Hill Publications, 2010
2. Ivan Bayross, “SQL, PL/SQL”, Bpb Publications”
3. Kevin Loney, “Oracle Complete Reference”, Bpb Publications”
4. Steven Feuerstein, “PL/SQL”,bestpractisesBpb Publications”
5. Liebschuty, “The Oracle Cook Book”, BPB Publication
6. Michael Abbey, Michael J.Corey, “Oracle A Beginners Guide”. TMH Publication
7. Oracle Unleashed (Chapter 1,2,3,4,5 and 9)

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Security Threats and Trends (3) **Code:CS2313**

**Programme: Integrated MSC IT Semester: III**

**Rationale: -**

Security threats and trends are very important in Information technology. Each year, the Information Security Forum, a nonprofit association that researches and analyzes security and risk management issues, releases its 'Threat Horizon' report to provide a forward-looking view of the biggest security threats over a two-year period. Here are the top 9 threats to watch for through 2017.

**Catalog Description:**

Student can learn**,** technical & procedural controls to address Viruses & Worms, Malware & Botnets,Managerial, technical& procedural controls to address Malware, Trojans & Botnets, Trojans & Rootkits,concepts, their working methods , their security implications and the managerial , technical and procedural controls to address RATs, Cyber Warfare**,** to Advanced Persistent Threats &Information Warfare, concepts, their working methods, their security implications and the managerial, technical and procedural controls to address these threats.

**Pre-requisites:** Basic understanding of different threat elements like malware, virus and worms and damage caused by them.

**Course Outline:**

**Unit I : Unit I: Viruses & Worms (10Hours)**

Introduction to Viruses &Worms**,** the concept of how Viruses & Worms work, the various types of Viruses &Worms, the infection vectors of Viruses &Worms, managerial, technical & procedural controls to address Viruses & Worms

**Unit II: Malware & Botnets (10Hours)**

Introduction to Malware & Botnets, the concept of how Malware, Trojans & Botnets work, the concept of Honeynets and Honeypots, Managerial, technical& procedural controls to address Malware, Trojans & Botnets

**Unit III: Trojans & Rootkits (10 Hours)**

Introduction to Remote Access Trojans & Rootkits, concepts, their working methods , their security implications and the managerial , technical and procedural controls to address RATs

**Unit IV: Cyber Warfare (09 Hours)**

Introduction to Advanced Persistent Threats &Information Warfare, concepts, their working methods, their security implications and the managerial, technical and procedural controls to address these threats

**Text Book:**

1. Information warfare: corporate attack and defense in a digital world, William Hutchinson, Matt Warren, Pub: Butterworth-Heinemann (April 3, 2001)
2. Information security: protecting the global enterprise, Donald L. Pipkin, Pub: Prentice Hall; 1 edition (May 22, 2000)
3. Intrusion detection: an introduction to Internet surveillance, Edward G. Amoroso, Pub: ntrusion Net Books; 1 edition (February 15, 1999)

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Designing Enterprise Network I (3)  **Code:CS2314**

**Programme: Integrated MSC IT Semester: III**

**Rationale**:

Cisco IP Routing (ROUTE) is a vendor certification program and is a qualifying examination for Cisco Certified Network Professional CCNP. It tests for knowledge and skills necessary to use advanced IP addressing and routing in implementing scalable and secure Cisco ISR routers connected to LANs and WANs.

The unit will explore the complete process of implementing Cisco IP Routing and by the end of it; the students will have the skills and the knowledge to take up the Cisco IP Routing (ROUTE) certification examination

**Catalog Description:**

This unit aims to train the students with skills necessary to use advanced IP addressing and routing in implementing scalable and secure Cisco ISR routers connected to LANs and WANs.  It also covers configuration of secure routing solutions to support branch offices and mobile workers of a specific organization

**Pre-requisites:**Networking Concepts

**Course Outline:**

**Unit-I: (09hours)**

**Networking Fundamentals:** The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, Fundamentals of WANs, Fundamentals of IPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications, **Ethernet LANs and Switches:** Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching

**Unit II: (10 hours)**

**IP Version 4 Addressing and Subnetting:** Perspectives on IPv4 Subnetting, Analyzing Classfull IPv4 Networks, Analyzing Subnet Masks, Analyzing Existing Subnets, **Implementing IP Version 4:** Operating Cisco Routers, Configuring IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts, Troubleshooting LAN Switching.

**Unit III:LAN Routing (10 hours)**

Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); Passive Interface

**Unit IV:IPv4 Services and IP Version 6 (10 hours)**

Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security, Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing

**Reference Books:**

1. Network Warrior, SECOND EDITION, by ***Gary A. Donahue***
2. CCNA Routing and Switching 200-120 Official Cert Guide Library by Wendell Odom

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Object Oriented Programming with C++ Laboratory (2)**Code:CS2310**

**Programme: Integrated MSC IT Semester: III**

**Rationale:**

The main objective is to learn the basic concept and techniques which form the object oriented programming paradigm. Object-oriented programming is a new way of thinking about problem using models organizes around real world concept. The Fundamental construct is the object which combines both data-structure and behavior in a single entity which is in contrast to conventional programming in which data-structure and behavior are loosely connected.

**Catalog Description:**

This course mainly covers the object-oriented concepts and their aspects using C++.

**Pre-requisites:** Programming constructs and problem solving.

**Course Outline:**

**Part A (20 Hours)**

1. Number of vowels and number of characters in a string.
2. Write a function called zero smaller () that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a man() program to access this function.
3. Demonstration of array of object.
4. Using this pointer to return a value (Return by reference).
5. Pointer sort.
6. Demonstration of virtual function.
7. Demonstration of static function.
8. Accessing a particular record in a student's file.

**Part B (19 Hours)**

1. Using different methods to write programs to implement function overloading with default arguments for the following problems :
2. To find whether a given number is prime.
3. To find the factorial of a number
4. Write a program to create a database for a bank account contains Name, Account no, Account type, Balance, Including the following a) Constructors b) destructors call) default constructors d) input and output function ; input and output for 10 people using different methods.
5. Create a class to hold information of a husband and another for the wife. Using friend functions give the total salary of the family.
6. Write a program to overload the following operators (any 3)
7. Binary operator '+' to concatenate 2 strings
8. Relational operator '<' to find whether one data is less than the other
9. Unary operator '++' to find the next date of a given date.
10. Create a base class for a stack and implement push and pop operation. Include a derived class to check for stack criteria such as a) stack empty b)stack full c) stack overflow d) stack underflow.
11. Create a database using concepts of files for a student including the following fields : Student- name, Student's Reg No, Student's Attendance (overall % of attendance); and enter data for 10 students and output the same in proper format.
12. Using operator overloading concept implement arithmetic manipulation on two complex numbers.

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Relational Database Management Systems Laboratory (2)**Code:CS2312**

**Programme: Integrated MSC IT Semester: III**

**Rationale**:

The unit explores the basics of databases along with the explanation of relational databases, its design, its management and the interactive SQL.

**Catalog Description:**

The aim of the unit is to provide a functional knowledge of databases to the learners. The complete concept and uses of databases will be provided to the students along with the knowledge of using SQL

**Pre-requisites:** Concepts learnt in DBMS theory class prior to individual experiments

1. Create User in Oracle Database and grant and revoke the privileges and use of commit savepoint roleback command.
2. Create the following:

        (a) Synonym sequences and Index

        (b) Create alter and update views.

1. Create PL/SQL program using cursors, control structure, exception handling
2. Create following:

        (a) Simple Triggers

        (b) Package using procedures and functions.

1. Create  the  table  for

        (a) COMPANY database

        (b) STUDENT database and Insert five records for each attribute.

1. Illustrate the use of SELECT statement
2. Conditional retrieval - WHERE clause
3. Query sorted - ORDER BY clause
4. Perform following:

          (a) UNION, INTERSECTION and MINUS operations on tables.

          (b) UPDATE, ALTER, DELETE, DROP operations on tables

1. Query multiple tables using JOIN operation.
2. Grouping the result of query - GROUP BY clause and HAVING clause
3. Query multiple tables using   NATURAL and OUTER JOIN operation.

**TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006

2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.

3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Designing Enterprise Network I Laboratory (2) **Code:CS2315**

**Programme: Integrated MSC IT Semester: III**

**Rationale:**

Cisco IP Routing (ROUTE) is a vendor certification program and is a qualifying examination for Cisco Certified Network Professional CCNP. It tests for knowledge and skills necessary to use advanced IP addressing and routing in implementing scalable and secure Cisco ISR routers connected to LANs and WANs.

The unit will explore the complete process of implementing Cisco IP Routing and by the end of it; the students will have the skills and the knowledge to take up the Cisco IP Routing (ROUTE) certification examination

**Catalog Description:**

This unit aims to train the students with skills necessary to use advanced IP addressing and routing in implementing scalable and secure Cisco ISR routers connected to LANs and WANs.  It also covers configuration of secure routing solutions to support branch offices and mobile workers of a specific organization

**Pre-requisites:**

Laboratory Session: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments. (At least 8 Experiments to be conducted)

**Course Outline: (39 hours)**

**Experiment No. 01:**

1. Switch Configuration - Basic Commands

**Experiment No. 02:**

1. Switch Configuration - Switch Port Security

**Experiment No. 03:**

1. Router - Configuration

**Experiment No. 04:**

1. Configuration of IP Address for a Router

**Experiment No. 05:**

1. Setting up of Passwords

**Experiment No. 06:**

1. PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication

**Experiment No. 07:**

1. Configuration of Static and Dynamic Routing

**Experiment No. 08:**

1. Configuration of Default Route

**Experiment No. 09:**

1. Implementation of EIGRP

**Experiment No. 10:**

1. Implementation of OSPF

**Experiment No. 11:**

1. VLAN Configuration

**Experiment No. 12:**

1. Switch Troubleshooting

**Experiment No. 13:**

1. Configuration of Access-lists - Standard & Extended ACLs

**Experiment No. 14:**

Cisco Discovery Protocol

**Experiment No. 15:**

1. DHCP, DHCP Relay & DHCP Exclusions

**Experiment No. 16:**

Configuring Logging to a Remote Syslog Server

**Text books:**

1. Horowitz, Sahani and Mehta, “Fundamentals of data structures in C++” Galgotia Pub.

2. Seymour Lipschuts, “Data Structures”, Schaum’s series, Tata-McGraw-Hill

**Reference Books:**

1.A. M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New Delhi.

2. D. S. Malik, “Data Structures Using C++”, Cengage Pub.

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**SEMESTER IV**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Formal Language and Automata Theory (3)** | Code: **CS2150** |
| Programme: **Integrated MSC IT** | Semester: **IV** |
| **Rationale: Automata Theory** is an exciting, theoretical branch of computer science. The word **automaton** itself, closely related to the word "automation", denotes automatic processes carrying out the production of specific processes. Simply stated, automata theory deals with the logic of computation with respect to simple machines, referred to as **automata**. Through automata, computer scientists are able to understand how machines compute functions and solve problems and more importantly, what it means for a function to be defined as *computable* or for a question to be described as *decidable.* | |
| **Catalog Description:** This subject covers the concepts of automation and its different uses. | |
| **Pre-requisites:** Problem solving ability and mathematical concepts. | |
| **Course Outline:**   1. **INTRODUCTION (08 hours)** 2. Introduction to languages 3. Kleene closures 4. Arithmetic expressions 5. Alphabets 6. Definition of grammar 7. Production rules, sentences, sentential forms 8. Language definitions, derivations 9. **REGULAR LANGUAGES (06 hours)** 10. Definition 11. Pumping lemma of regular sets 12. Chomsky hierarchy of languages 13. Context sensitive language 14. **FINITE AUTOMATA (06 hours)** 15. Finite automaton (FA) 16. Deterministic, non-deterministic and their equivalence 17. Equivalence of regular expressions and FA 18. Moore and Mealy machines 19. Applications and limitations of FA 20. **CONTEXT FREE LANGUAGE (06 hours)** 21. Relations between classes of languages 22. Context Free Grammar (CFG) 23. Derivation trees 24. Ambiguity simplification 25. Normal forms 26. Applications 27. **PUSHDOWN AUTOMATA (06 hours)** 28. Pushdown automata (PDA): definitions 29. Context free languages (CFL) 30. Construction of PDA for simple CFLs 31. Linear bounded automata 32. Pumping Lemma for CFL. 33. **TURING MACHINES (07 hours)** 34. Turing machines 35. Introduction to computability 36. Universal Turing Machines (UTM) 37. Types of Turing Machines 38. Techniques for construction of Turing machines 39. Decidability and halting problem | |
| **Text books:**   1. John E. Hopcroft, Rajeev Motwani , Jeffrey D. Ullman,” Introduction To Automata Theory, Languages, And Computation , Pearson 2. K.L.P. Mishra,”The Theory of computer science” | |
| **Reference Books:**   1. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH 2. Papadimitrou, C. and Lewis, C.L., “Elements of the Theory of Computation”, PHI | |
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|  | |
| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% | |
| **Academic Council Approval:** | |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Programming in JAVA (3) **Code:CS2316**

**Programme: Integrated MSC IT Semester: IV**

**Rationale**:

Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decreases in the development time, and reduces cost of production to an extent. The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc.

Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones. This unit focuses on the concepts of object oriented programming language and the different constructs for creating applications in java.

**Catalog Description:**

To provide students with an understanding of the object oriented concepts which helps in the field of programming, management of data, etc. and of Java programming which helps to explore the object oriented nature of the language and the multi-platform versatility offered by it.

**Pre-requisites:** Programming constructs and problem solving

**Course Outline:**

**Unit I: Introduction to Software Engineering (08 Hours)**

Software Life Cycle – Steps involved in Software Development,Introduction to SDLC models: Water fall model, Prototyping and Spiral model, Requirements Analysis - SRS – DFD – ER Diagrams – Decision tables – Decision Trees

**Unit II: Introduction to Object Oriented Programming (08 Hours)**

Classes and Objects, Object Oriented Programming Concepts, Access Specifiers and Access Modifiers, Introduction to Java, Java Virtual Machine

**Unit III: Basic Java Programming, Packages and Interfaces (08 Hours)**

Variables, Data Types, Control flow statements – if, else, switch, for, while, Arrays, Strings, Java classes, Java methods, Java.util, java.io, java.net, java.sql, java.applet, etc Collection Framework, Generics, Wrapper classes.

**Unit IV:Exceptions and I/O Handling (08 Hours)**

Errors and Exceptions, Exception handling, Streams, Readers and Writers, Programming with Files, Multithreaded programming, networking – Socket Programming

**Unit V: User Interface and Advanced Concepts (07 Hours)**

User Interface Components, AWT, Swing, Event Handling, Layouts, Forms, Applets, Annotations

**Books for References:**

1. Java Complete Reference by Herbert Schildt
2. Programming with Java by Balaguruswamy
3. Pankaj Jalote, Software Engineering, Narosa Publications
4. Roger S Pressman, Software Engineering, McGraw Hill Publications

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:Software Engineering** (3) **Code:CS2318**

**Programme: Integrated MSC IT Semester: IV**

**Rationale:**

Software engineering incorporates various accepted methodologies to design software.

This subject gives a detailed description of the entire process of developing a software project and

also the issues associated after development.

**Catalog Description**:

This course covers the introductory concepts of software engineering and itsdesign.

**Pre-requisites**: Basic Concepts of Programming Languages, Data Structures and Algorithms andProblem solving approach.

**Course Outline:**

**Unit I: Software Product and Process**  (07 **Hours)**

Introduction, S/W Engineering Paradigm –Verification and Validation, Life Cycle models, System Engineering, Computer based system, Business Process Engineering, Product Engineering - Overview

**Unit II: Software Requirements (08 Hours)**

Functional and Non-functional, Software Document – Requirement Engineering Process, Feasibility Studies ,Software Prototyping – Prototyping in the Software Process , Data – Functional and Behavioral Models , Structured Analysis and Data Dictionary

**Unit III: Analysis, Design, Concepts and Principles (08 Hours)**

Systems Engineering - Analysis Concepts, Design Process and Concepts- Modular Design, Design Heuristic – Architectural Design, Data Design, User Interface Design, Real Time Software Design ,System Design – Real Time Executives , Data Acquisition System , Monitoring And Control System.

**Unit IV: Testing (08 Hours)**

Taxonomy Of Software Testing , Types Of S/W Test - Black Box Testing – Testing Boundary Conditions, Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms, Regression Testing, Unit Testing, Integration Testing, Validation Testing ; System Testing And Debugging; Software Implementation Techniques.

**Unit V: Software Project Management (08 Hours)**

Measures And Measurements – ZIPF’s Law ,Software Cost Estimation, Function Point Models -

COCOMO Mode, Delphi Method, Scheduling – Earned Value Analysis,Error Tracking; Software Configuration Management ,Program Evolution Dynamics, Software Maintenance, Project Planning

Project Scheduling, Risk Management – CASE Tools

**Recommended Readings:**

1. Ian Sommerville, “Software engineering”, Seventh Edition, Pearson Education Asia, 2007
2. Roger S. Pressman, “Software Engineering – A practitioner’s Approach”, Sixth Edition, McGraw-Hill International Edition, 2005

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Ethical Hacking Fundamentals (3) **Code:CS2319**

**Programme: Integrated MSC IT Semester: IV**

**Rationale**:

The Unit Primarily covers the Ethical hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System hacking techniques and a broad knowledge about white box and black box testing.

The Unit describes a wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session hijacking and severe vulnerabilities that can be seen in Web Applications. The Unit also covers hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls.

The Unit not only captures valuable information on vulnerabilities and threats but also covers an effective way of report making methodology that can helps the top level management to take immediate decisions on mitigating the threats.

**Catalog Description:**

To enable students to better understand the Ethical hacking concepts and various phases of hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques. To familiarize them with the wide range of attacks in a Networking environment and to enable him/her to prepare a well defined vulnerability reporting procedure along with the remediation techniques

**Pre-requisites:**

Understanding of web application, its vulnerabilities and attacks in a Networking environment

**Course Outline:**

**Unit-I: Introduction to Ethical Hacking (09 hours)**

Hacking Methodology, Process of hacking. **Footprinting and Scanning:** Footprinting, Scanning. **Enumeration:** Enumeration. **System hacking and Trojans:** System hacking, Trojans and Black Box Vs White Box Techniques.

**Unit-II: Attacking Methodology (10 hours)**

Denial of Service, Sniffers. **Session hijacking and hacking Web Servers:** Session hijacking, hacking Web Servers. **Web Application Vulnerabilities and Web Based Password Cracking:** Web Application Vulnerabilities, Web Based Password Cracking Techniques

**Unit-III: Web and Networking Hacking (10 hours)**

SQL Injection, hacking Wireless Networking. **Viruses, Worms and Physical Security:** Viruses and Worms, Physical Security. **Linux hacking:** Linux hacking. **Evading IDS and Firewalls:** Evading IDS and Firewalls

**Unit-IV: Report Writing and Mitigation (10 hours)**

Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

**Text books:**

1. Hacking Exposed 7th Edition, by Stuart McClure, Joel Scambray, George Kurtz – McGraw hill- 2010

**Reference Books:**

1. Basic of hacking and Penetration – Patrick Engerbrestson 2010

**Grading System**: The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Desktop Operating System (3)  **Code:CS2321**

**Programme: Integrated MSC IT Semester: III**

**Course Outline: Unit-I:Introduction to Operating System (08hours)**

Introduction to Operating System, Evolution of operating system, Structure of Operating, OS Operations OS Organizations, Distributed Systems, Open source Operating systems, Process Management, Memory Management, Storage Management, Computing Environment.

**Unit-II: Installing, upgrading and managing Windows (08hours)**

Gathering hardware devices, preparing to install windows, upgrading and migrating, Clean and Image based installation, Configuring Application Compatibility, administrating windows features, Disk management, and installing and configuring device drivers

**Unit-III: File Access, Printers and Network connectivity with Windows08hours)**

Introduction to Authentication and Authorization, Managing file access , Shared Folders, File compression, file archiving, managing printers, connecting windows client with server, configuring ipv4 & ipv6 connectivity, Implementing APIPA, Introduction to Name resolution, troubleshooting network issues, Overview of wireless network, configuring wireless network.

**Unit-IV:Securing, Optimizing and maintaining windows Client** (0**8hours**)

Overview of local security management, local security policy settings, EFS and Bitlocker, Application restrictions, UAC, Windows Firewall, Administrating IE8, Windows Defender.

**Unit-V: Configuring Mobile Computing and Remote Access in windows** (07**hours**)

Configure Mobile computer and device settings, Remote desktop, remote assistance, direct access, branch cache.

**Text books:**

1. Milan Milenkovic - Operating Systems – TATA McGRAW hILL, 2009

**Reference Books:**

1. Operating Systems Fundamentals D. Irtegov, 2005
2. A Short Introduction to Operating Systems (M. Burgess), 2010
3. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 2010

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Programming in JAVA Laboratory (2)  **Code:CS2317**

**Programme: Integrated MSC IT Semester: IV**

**Rationale:**

To gain practical knowledge by implementing various features of Java learnt in thetheory parts. These may be applied further in several real-world problem solving and may designeffective GUI

**Catalog Description:**

This course covers some basic programming in JAVA.

**Pre-requisites:** Basics of C and C++

**Course Outline:**

The List of Programs

Part A (**35 Hours)**

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

**Part B (10 Hours)**

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number f lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a textfileld that allows only numeric value and in specified length.
5. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Ethical Hacking Fundamentals Laboratory (2)  **Code:CS2320**

**Programme: Integrated MSC IT Semester: III**

**Rationale:**

The Unit Primarily covers the Ethical Hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System Hacking techniques and a broad knowledge about white box and black box testing.

The Unit describes a wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session Hijacking and severe vulnerabilities that can be seen in Web Applications. The Unit also covers Hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls.

The Unit not only captures valuable information on vulnerabilities and threats but also covers an effective way of report making methodology that can helps the top level management to take immediate decisions on mitigating the threats.

**Catalog Description:**.

To enable students to better understand the Ethical Hacking concepts and various phases of Hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques. To familiarize them with the wide range of attacks in a Networking environment and to enable him/her to prepare a well defined vulnerability reporting procedure along with the remediation techniques.

**Pre-requisites:**

Laboratory Session: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments. (At least 8 Experiments to be conducted)

**Experiment No. 01:**

1. Passive Reconnaissance using “Who is” and Online tools

**Experiment No. 02**

1. Active Reconnaissance using “Sampad” and web site details

**Experiment No. 03**

1. Full Scan, Half Open Scan and Stealth scan using “nmap”

**Experiment No. 04**

1. UDP and Ping Scanning using “Advance Lan Scanner” and “Superscan”

**Experiment No. 05**

1. Packet crafting using “Packet creator” tools

**Experiment No. 06**

1. Exploiting NetBIOS vulnerability

**Experiment No. 07**

1. Password Revelation from browsers and social networking application

**Experiment No. 08**

1. Creating and Analyzing spoofed emails

**Experiment No. 09**

1. Creating and Analyzing Trojans

**Experiment No. 10**

1. OS password cracking

**Text books:**

1. Information Systems Security: Security Management, Metrics, Frameworks And Best Practices - Nina Godbole, ISC2 Press, 2010

**Reference Books:**

1. Information Security Management handbook, Volume 4 - Micki Krause, ISC2 Press, 2007

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Desktop Operating System Laboratory (2)  **Code:CS2322**

**Programme: Integrated MSC IT Semester: IV**

**Rationale:**

Operating system is the basics of any technology or application that is being developed. A good understanding of any OS is very much essential for every computer technology aspirant to reap maximum performance out of the machines. File systems, storage mechanisms, security aspects, Protocols functioning and policy implementations are some of the basic concepts learnt in this subject.

**Catalog Description:**

Students are taught basic principles of OS like Structure, different types of system like distributed and Open, ways the memory is organized and storage management topics. In the very next chapter, they will be taught to install, manage and upgrade to the current OS Version. Network connectivity and File access are the two important aspects of OS which are very much essential for establishing contacts with other computers to communicate. Computers become very vulnerable and exposed to threats the moment they become a part of a network and it becomes imperative to learn security concepts and methods to safeguard your data. In the final unit, students will learn the methods to administer and manage their windows remotely.

**Pre-requisites:** Basic operations of computer

**List of Experiments:**

**Hardware and Network Fundamentals (13 hours)**

1. Identification of the Logic gates ICs.
2. Identify the PC components.
3. Trouble shooting & Testing ATX power Supply.
4. Configuring & Installing Printer.
5. Configuring & Installing Scanner.
6. Configuring & Installing NIC.
7. Configuring & Installing Sound Card.
8. Configuring & Installing Graphics Card.
9. Implement Command line Utilities- Internal-External DOS Commands.
10. Configure System Management Utilities.
11. IP trouble shooting and configuration in windows.
12. Make the Straight, Crossover & Roll over cables.
13. Setup wireless ad-hoc connection between two PCs.
14. Implementing Monitoring/Analysis of Network Traffic by Capturing Packet using Wire-Shark.
15. Install and configure FTP server for the File Server.
16. Installing and configuring DNS for the Workgroup Network.
17. Installing and configuring DhCP for Providing IP Addressing.
18. Installing and configuration of Local & Network printers.
19. Implement ICS (Internet Connection Sharing).
20. Configuration of proxy server.

**Fundamentals of Operating System-I (13 hours)**

1. Installing Windows 7
2. Using Windows Upgrade Advisor or Upgrade Assistance
3. Migrating to Windows 7 using Windows Easy Transfer and User State Migration Tool.
4. Capturing image of existing installed operating system and deploy it to another system using imagex.
5. Configuring disk partitions, Virtual hD in Disk Management.
6. Installing and Configuring device drivers.
7. Configuring User Account Control Policy.
8. Configuring Shared Folders.
9. Configuring NTFS permissions.
10. Encrypting and compressing Files.
11. Installing printer and configuring basic functions.
12. Configuring wireless Ad-hoc network.
13. Configuring Local Security policies.
14. Configuring Bit Locker and Bit Locker to Go.
15. Configuring application restriction using software restriction policy and AppLocker.
16. Configuring Basic and Advanced Windows Firewall.
17. Configuring IE8 properties.
18. Configure scanning using Windows Defender.
19. Configure Remote Desktop and Remote Assistance.
20. Configuring home Group.

**System Configuration and Maintenance (13 hours)**

1. Verifying I/O addresses, DMA channels, IRQ numbers from System Information.
2. Installing Display adapter drivers.
3. Installing Sound adapter drivers.
4. Installing Network Adapter driver and assigning IP address.
5. Checking power voltages coming SMPS using Multimeter.
6. Configuring disk partitions using FDISK, Diskpart and Disk Management.
7. Assembling and disassembling the system.
8. Defraging a Partition.
9. Backing up and Restoring files and Folders.
10. Configuring BIOS setup.
11. Installing Operating Systems ( Windows XP, Windows 7, Linux )
12. Installing and uninstalling softwares.
13. Installing Drivers of all the hardware devices.

**Recommended Readings:**

**Text books:**

1. Milan Milenkovic - Operating Systems – TATA McGRAW hILL, 2009

**Reference Books:**

1. Operating Systems Fundamentals D. Irtegov, 2005
2. A Short Introduction to Operating Systems (M. Burgess), 2010
3. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 2010

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**SEMESTER V**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Information Security Fundamentals(3) **Code:CS2323**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

The Unit Primarily covers the Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security. It explains the formation of Security policy at various levels inside the Organization and provides the definition Procedures, Standard and Guidelines.

The Unit emphasizes the need of Performing Asset Classification and Declassification, Retention and Disposal of Information Asset also it identifies the various levels of Authorization for access Viz., Owner, Custodian and User.

The Unit Covers the different types of Access Controls and Physical security measures to safeguard the Assets and conclusively, it deals with the Digital Rights Management also covering the concepts of Common Authentication protocols and Real world Protocols.

**Catalog Description:**

To enable students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. And also to get familiarize with Asset management along with the objective to create awareness in Digital Rights management.

**Unit-I: INTRODUCTION TO INFORMATION SECURITY (9 hours)**

Definition and Evolution of Information Security, Basic Principles and critical concepts,

Components of Information System, Balancing Information Security and Access, Security professional in the organization

**Unit-II:The Need for IT Security (10 hours)**

Business needs - Protecting functionality and data, Safeguarding technology assets - Threats- to Intellectual property, Espionage and trespass, Sabotage and vandalism, Attacks - Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, Spam, Social Engineering

**Unit-III: Risk Management (10 hours)**

Definition and Identifying Risk, Assessing risk and impact based on probability of occurrence, Basics for risk documentation, Risk mitigation strategy options, Categories used for classifying controls

**Unit-IV: Network Infrastructure Security and Connectivity (10 hours)**

Understanding Infrastructure Security: device based and process-based security, Network Monitoring : Firewall, Intrusion Detection System, Intrusion Prevention system, OS and Network Hardening, Application Hardening, Physical and Network Security - Physical and Network Security- Policies, Standards and Guidelines

**Reference Books:**

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
2. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Data Centre Fundamentals (3) **Code:CS2324**

**Programme: Integrated MSC IT Semester: V**

**Rationale**: Significance, setting-up and Services provided by data centers

**Catalog Description:**Data centre fundamentals helps students to understand the basic concepts of data centre architecture, network infrastructure in a data centre, server frames fault tolerance, data centre availability, network implementation and disaster recovery

**Pre-requisites:**Basic knowledge of computers**.**

**Course Outline:**

**Unit-I:**

**Overview of Data Centers (07 hours)**

Data Centers Defined, Data Center Goals, Data Center Facilities, Roles of Data Centers in the Enterprise, Roles of Data Centers in the Service Provider Environment, , Application Architecture Models. The Client/Server Model and Its Evolution, The n-Tier Model, Multitier Architecture Application Environment, Data Center Architecture.

**Unit-II :**

**Data Center Requirements (08 hours)**

Data Center Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and hVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe from Natural hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard.

**Unit-III:**

**Data Center Design (08 hours)**

Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism

**Unit-IV:Introduction to Server Farms (08 hours)**

Typesof server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet data center, corporate data center, software defined data center, data center topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, Data Center Transport Layer, Data Center Services, IP Infrastructure Services, Application Services, Security Services, Storage Services.

**Unit-V:Business Continuity and Disaster Recovery fundamentals (08 hours)**

Business continuance infrastructure services, the need for redundancy,, Information availability , BC terminology , BC planning life cycle , BC technology solutions , backup and recovery considerations , backup technologies , Uses of local replicas , Local replication technologies , Restore and restart considerations , Modes of remote replications , remote replication technologies

**Reference Books:**

1. IP Storage Networking by : Gary Oreinstein, Addison Wesley Professional, 2006
2. Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley; 1 edition (April 6, 2009)
3. Administering Data-Centers, Kailash Jayswal, Wiley; 1 edition (November 28, 2005

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:Computer Forensics** (3) **Code:CS2325**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

Computer Forensics deals with the development of tools and software to gather evidences from computers, without corrupting the information contained. A relatively new field, it is quickly gaining momentum as the complexities in the crimes are on the rise and it has become imperative to treat each cyber crime with diligence.

**Catalog Description:**

Students are taught about different forms of cyber crime and its implications and duties of professionals employed at different levels towards analyzing and controlling cyber crime. Methods to recover data from storage devices are covered in following chapters. Different forensic techniques and cyber laws are also dealt in detail.

**Pre-requisites:** basic knowledge of computers

**Course Outline:**

**Unit-I: Computer Forensics (09hours)**

Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure.

**Unit-II: Storage Devices & Data Recovery Methods (09hours)**

Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques.

**Unit-III: Forensics Techniques (09hours)**

Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – header option of SMTP, POP3, IMAP

**Unit-IV: Cyber Law (09hours)**

Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment).

**Text books:**

1. Guide to Computer Forensics and Investigations – 3rd Edition –B. Nelson, et al, - Cengage, 2010 BBS

**Reference Books:**

1. Hacking Exposed Computer Forensics – Aaron Philipp, David Cowen, Chris Davis, Pub: McGraw hill-2011

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Server Operating System I (3)  **Code:CS2327**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

Windows Server 2008 R2 Foundation is an operating system that enables core IT resources, such as file and print sharing, remote access, and security. It provides a network foundation from which you can centrally manage settings on your computers that are based on the Windows® operating system, and upon which you can run the most popular business applications. It also provides a familiar Windows user experience that helps you manage users and safeguard business information.

This unit explores the method to install, upgrade, deploy the Windows Server. Also, the learners will have the functional knowledge of configuring core network services and the active directory of Windows Server

**Catalog Description:**

This unit provides the knowledge and skills necessary to plan and implement a Windows Server 2008 and Windows Server 2008 R2 environment. It incorporates both the planning of the server infrastructure and key aspects of the implementation, management and maintenance of Active Directory and Network Infrastructure.  It covers the most important job tasks for Server Administrators who are responsible for the planning, operations, and day-to-day maintenance of Windows Server 2008 and Windows Server 2008 R2 servers in the enterprise

**Pre-requisites:** Basic knowledge of Windows server

**Course Outline:**

**Unit-I: Installing and Configuring Windows Server 2008 (10 hours)**

History of Server OS, Introduction to windows server 2003 & 2008, Overview of Windows Server 2008, Installing Windows Server 2008, Managing Server Roles and Features, Configuring and Managing Windows Server 2008 Server Core, Choosing a Deployment Technology, Deploying Windows Server 2008, Introduction and Creation of Users accounts

**Unit-II:Configuring Networking and Network Services (10 hours)**

Configuring IPv6 Addressing, Migrating from IPv4 to IPv6, DhCP and DNS Enhancements in Windows Server 2008, Configuring zones, Configuring DNS server settings, Configuring zone transfer and Replication, Configuring and Managing Windows Firewall with Advanced Security.

**Unit-III:Configuring and Managing Active Directory Domain Services (10 hours)**

Active Directory Enhancements in Windows Server 2008 and 2008 R2, Installing and Configuring Domain Controllers, Configuring Read-Only Domain Controllers, Configuring Fine-Grained Password Policies, Sites and Global Catalog, Managing Active Directory Objects with Windows PowerShell, Active Directory Database Management, Replication between the Domain Controllers.

**Unit-IV: Managing Group Policy in Active Directory Domain Services (10 hours)**

Group Policy Enhancements in Windows Server 2008,Managing Security with Group Policy, Managing Clients with Group Policy Preferences, Server Management in Windows Server 2008: Managing Windows Server with Server Manager,Managing Server Updates by Using WSUS, Managing Backup and Restore by Using Windows Server Backup, Managing Event Logs and Auditing, Performance and Resource Management.

**Text books:**

1. Microsoft Windows Server 2008: A Beginner's Guide, [Marty Matthews](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Marty+Matthews%22), McGraw-hill Osborne Media; 1 edition (February 14, 2008)
2. 70-642:Windows Server 2008 Network Infrastructure Configuration (MOC) from John Wiley & Sons, 2009
3. 70-643: Windows Server 2008 Applications Infrastructure Configuration Textbook (MOC) from John Wiley & Sons, 2010

**Reference Books:**

1. Windows Server 2008: the definitive guide By Jonathan hassell, O’Reilly, 2008
2. MCTS: Windows Server 2008 Network Infrastructure Configuration Study Guide  By William Panek, T lor Wentworth, James , O’Reilly, 2011
3. MCTS Windows Server 2008 Applications Infrastructure Configuration Study. By Joel Stidley, Sybex, 2010

**Grading System: The final grade shall be based on the followings:-**

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Principles of Virtualization (3) **Code:CS2329**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility in organizations.

This unit explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server hyper V

**Catalog Description:**

To enable students to understand Virtualization, planning for a virtual implementation and also prepare for different vendor technologies available in the field of Virtualization.

**Pre-requisites:** Basic understanding of need for virtualization, implementation and benefits

**Course Outline:**

**Unit-I: Basics of Virtualization (08 hours)**

Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery

**Unit-II: Deploying and Managing an Enterprise Desktop Virtualization Environment (8 hours)**

configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

**Unit-III: Deploying and Managing a Presentation Virtualization Environment (08 hours)**

Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

**Unit-IV: Accessing published applications (08 hours)**

Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings

**Unit : V**

**Understanding Virtualization Software (08 hours)**

List of virtualization Software available . Vmware- introduction to Vsphere, ESXi, VCenter Server  and Vsphere client. Creating Virtual Machine..  Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots.  Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals

**Reference Books:**

1. Virtualization with Microsoft Virtual Server 2005 by Twan Grotenhuis, Rogier Dittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006.
2. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008.
3. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. halter, EBook, 2005.

**Grading System: The final grade shall be based on the followings:-**

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Computer Forensics Laboratory(2) **Code:CS2326**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

Computer Forensics deals with the development of tools and software to gather evidences from computers, without corrupting the information contained. A relatively new field, it is quickly gaining momentum as the complexities in the crimes are on the rise and it has become imperative to treat each cyber crime with diligence.

**Catalog Description:**

Students are taught about different forms of cyber crime and its implications and duties of professionals employed at different levels towards analyzing and controlling cyber crime. Methods to recover data from storage devices are covered in following chapters. Different forensic techniques and cyber laws are also dealt in detail.

**Pre-requisites:** basic knowledge of computers

**Course Outline (39 hours)**

**Experiment No. 01:**

Physical Collection of electronic evidence using forensic standards

**Experiment No. 02**

Dismantling and re-building PCs in order to access the storage media safely

**Experiment No. 03**

Boot sequence and Power On Self Test mode analysis

**Experiment No. 04**

Examination of File systems of Windows, Linux and Mac

**Experiment No. 05**

Analysing Word processing and Graphic file format

**Experiment No. 06**

Network data sniffing and analysing

**Experiment No. 07**

Password and encryption techniques

**Experiment No. 08**

Internet forensic and Malware analysis

**Experiment No. 09**

Data recovery techniques for hard drive

**Experiment No. 10**

Data recovery techniques for Pen drive and CD

**Reference Books:**

Hacking Exposed Computer Forensics – Aaron Philipp, David Cowen, Chris Davis, Pub: McGraw hill-2011

**Grading System: The final grade shall be based on the following:-**

**Internal Evaluation: 40%**

**End Semester Exam: 60%**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Server Operating System I Laboratory (2) **Code:CS2328**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

Windows Server 2008 R2 Foundation is an operating system that enables core IT resources, such as file and print sharing, remote access, and security. It provides a network foundation from which you can centrally manage settings on your computers that are based on the Windows® operating system, and upon which you can run the most popular business applications. It also provides a familiar Windows user experience that helps you manage users and safeguard business information.

This unit explores the method to install, upgrade, deploy the Windows Server. Also, the learners will have the functional knowledge of configuring core network services and the active directory of Windows Server.

**Catalog Description:**

This unit provides the knowledge and skills necessary to plan and implement a Windows Server 2008 and Windows Server 2008 R2 environment. It incorporates both the planning of the server infrastructure and key aspects of the implementation, management and maintenance of Active Directory and Network Infrastructure.  It covers the most important job tasks for Server Administrators who are responsible for the planning, operations, and day-to-day maintenance of Windows Server 2008 and Windows Server 2008 R2 servers in the enterprise.

**Pre-requisites:**

Basic knowledge of concepts covered in Server Operating System-I theory sessions.

**Course Outline (39 hours)**

**Experiment No. 01:SE PROHIBITED**

1. Installing Windows Server and Configuring Post-Installation Settings
2. Deploying Windows Server 2008
3. Creating User and Group Accounts
4. Installation of windows Vista/win 7 and Joining to Domain

**Experiment No. 02**

1. Configuring Networking and Network Services

**Experiment No. 03**

1. Configuring Active Directory Domain Services
2. Managing AD DS Objects and Database

**Experiment No. 04**

1. Managing Windows Server 2008
2. Managing Group Policies
3. Managing Client Security with Group Policy
4. Managing Clients with Group Policy Preferences

**Text books:**

1. Microsoft Windows Server 2008: A Beginner's Guide, **Marty Matthews**, McGraw-hill Osborne Media; 1 edition (February 14, 2008)
2. 70-642:Windows Server 2008 Network Infrastructure Configuration (MOC) from John Wiley & Sons, 2009
3. 70-643: Windows Server 2008 Applications Infrastructure Configuration Textbook (MOC) from John Wiley & Sons, 2010

**Reference Books:**

1. Windows Server 2008: the definitive guide By Jonathan hassell, O’Reilly, 2008
2. MCTS: Windows Server 2008 Network Infrastructure Configuration Study Guide  By William Panek, T lor Wentworth, James , O’Reilly, 2011
3. MCTS Windows Server 2008 Applications Infrastructure Configuration Study. By Joel Stidley, Sybex, 2010:

**Grading System: The final grade shall be based on the following:-**

**Internal Evaluation: 40%**

**End Semester Exam: 60%**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Principle of Virtualization Laboratory (2)  **Code:CS2330**

**Programme: Integrated MSC IT Semester: V**

**Rationale:**

Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility in organizations.

This unit explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server Hyper V.

**Catalog Description:**

To enable students to understand Virtualization, planning for a virtual implementation and also prepare for different vendor technologies available in the field of Virtualization.

**Pre-requisites:** Basic understanding of need for virtualization, implementation and benefits

**Course Outline: (39 hours)**

The experiments include:

1. Installing Vmware ESXi server.
2. Installing Vmware vCenter with all the prerequisites.
3. Creating Virtual Machines using vCenter server.
4. Modifying Virtual Machine settings.
5. Clone a VM.

**Recommended Readings:**

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**SEMESTER VI**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Cryptography (3)  **Code:CS2331**

**Programme: Integrated MSC IT Semester: VI**

**Rationale**:

Security is ubiquitous. With the advent of e-commerce and electronic transactions, theneed for development of secured systems has grown tremendously. Cryptography is the study ofbuilding ciphers to ensure the confidentiality and integrity of information. Along with it is theactivity of analyzing the strength of a cipher by subjecting it to several forms attack.

**Catalog Description:**

This course covers the basic concepts of Cryptography, certain cryptographicalgorithms and its applications.

**Pre-requisites:**

Basic concepts of Discrete Mathematics (probability theory, modular arithmetic)and problem solving approach

**Course Outline:**

**Unit-I: (09hours)**

**INTRODUCTION TO CRYPTOGRAPHY**

Cryptographic concepts, methodologies &practices, Symmetric& Asymmetric cryptography, public& private keys, Cryptographic algorithms and uses, Construction& use of Digital signatures

**Unit-II: (09hours)**

**TYPES OF ALGORITHMS**

The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography & Quantum Cryptography

**Unit-III: (09hours)**

**KEY MANAGEMENT**

The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery and life span and how these functions affect cryptographic integrity

**Unit-IV: Application of Cryptography (09hours)**

Major key distribution methods and algorithms including Kerberos, ISAKMP etc., Vulnerabilities to cryptographic functions, the Use and functions of Certifying Authorities (CAs),Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions

**Text books:**

1. Cryptography: An Introduction by V. V. I Ashchenko, Pub: American Mathematical Society - 2002

**Reference Books:**

1. Cryptanalytic attacks on RSA – by Song Y. Yan 2005
2. Official (ISC)2 Guide to the CISSP CBK, Second Edition - harold F. Tipton 2005
3. Cryptography demystified –by John E. hershey 2000

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Computer Graphics (3)** | Code: **CS2166** |
| Programme:**Integrated MSC IT** | Semester:**VI** |
| **Rationale:**Computer graphics deals with the study of technology and techniques for generating and displaying images of natural and synthetic objects. It is an exciting field with a wide range of applications including entertainment, graphical user interfaces, industrial modeling, molecular modeling, surgery planning, virtual reality, and visualization | |
| **Catalog Description:**  This course will introduce the basic principles, concepts, and algorithms in computer graphics. Students will learn mathematical and computational techniques for modeling, representing, and displaying 3D geometric objects. | |
| **Pre-requisites:** Fundamental concepts of Algorithms and mathematical approach | |
| **Course Outline:**   1. **INTRODUCTION (09 hours)** 2. Introduction to computer graphics 3. Graphic Displays- Random scandisplays, Raster scan displays, Frame buffer and video controller 4. Points and lines, Line drawing algorithms 5. Circle generating algorithms – midpoint and parallel version 6. **TRANSFORMATION AND CLIPPING (10 hours)** 7. Viewing pipeline, Viewing transformations, Pipeline 8. 2-D Clipping algorithms-Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm 9. Line clipping against non-rectangular clip windows 10. Polygon clipping – Sutherland Hodgeman polygon clipping 11. Weiler and Atherton polygon clipping, Curve clipping, Textclipping 12. **3 D VIEW (10 hours)** 13. 3-D geometric primitives 14. 3-D Object representation 15. 3-D Transformation 16. 3-D viewing 17. Projections 18. 3-D Clipping. 19. **PROJECTIONS (10 hours)** 20. Parallel and perspective projections 21. Vanishing points 22. Hidden line elimination – Back face Removal 23. Z- Buffer algorithm, scan line algorithm 24. Image processing : introduction – digital image representation 25. Relationship between pixels 26. Gray level histogram : equalization 27. Edge detection – Robert,Sobel, Canny edge detectors. 28. Scene segmentation and labeling : region-labeling algorithm , perimeter | |
| **Text books:**   1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education 2. William M. Newman and Robert F. Sproull, “Principles of Interactive Computer Graphics”, McGraw Hill 3. Amrendra N Sinha and Arun D Udai,” Computer Graphics”, TMH | |
| **Reference Books:**   1. Donald Hearn and M Pauline Baker, “Computer Graphics with OpenGL”, Pearsoneducation 2. Steven Harrington, “Computer Graphics: A Programming Approach” , TMH 3. Rogers, “ Procedural Elements of Computer Graphics”, McGraw Hill | |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% | |
| **Academic Council Approval:** | |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Virtualization and Cloud Security (3)  **Code:CS2332**

**Programme: Integrated MSC IT Semester: VI**

**Rationale:**

Server virtualization is today’s most rapidly-evolving and widely-deployed technologies. highly beneficial to organizations in terms of cost and ease of deployment and management of virtualized servers, deploying desktop, application and network virtualization is in demand.

**Catalog Description:**

Beginning from basics of virtualization and Cloud Security, students proceed to more detailed topics in Cloud like Cloud Trust Protocol & Transparency and Cloud Controls Matrix.

**Pre-requisites:** Basic knowledge of Cloud Technology and aspects

**Course Outline:**

**Unit I: Introduction to Virtualization & Cloud (11hours)**

Virtualization and Cloud computing concepts - Private cloud Vs Public cloud, IAAS, PAAS & SAAS concepts, Virtualization security concerns – hypervisor and host/Platform Security, Security communications between - Guest instances, hosts and Guests

**Unit 2: Cloud Security (08hours)**

Cloud Security vulnerabilities and mitigating controls, Cloud Trust Protocol, Cloud Controls Matrix, and Complete Certificate of Cloud Security Knowledge (CCSK)

**Unit III: Cloud Trust Protocol & Transparency (08hours)**

Introduction to Cloud Trust Protocol & Transparency, Cloud Trust Protocol and Transparency, Transparency as a Service, Concepts, Security, Privacy & Compliance aspects of cloud

**Unit IV: Cloud Controls Matrix &Top Cloud Threats (12hours)**

Introduction to Cloud Controls Matrix & Top Cloud Threats, Cloud Controls Matrix, Trusted Cloud Initiative architecture and reference model, Requirements of Security as a Service (Secaas) model, Top Security threats to the cloud model.

**Recommended Readings:**

1. Visible Ops Private Cloud – Andi Mann, Kurt Miline and Jeanne Morain, IT Process Institute, Inc.; first edition (April 8, 2011)
2. Cloud Computing Explained – John Rhoton 2009

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Server Operating System II (3)  **Code:CS2333**

**Programme: Integrated MSC IT Semester: VI**

**Rationale:**

RHEL is a high performing operating system that. RhEL 6 is the sixth generation of the long term and predictable operating platform. With the flexibility to deploy on physical hardware, as a virtual host, as a virtual guest or in the cloud, Red hat Enterprise Linux 6 is the ideal foundation for next-generation datacenters. The fresh system administrators need to have a strong functional knowledge of RhEL 6 in any current IT work environment.

The unit explores the security and network access controls in Linux, organizing network system and Mail Services, Securing Data and Account Management.

**Catalog Description:**

To enable the students to attain the skills required to manage and administer systems and servers using Linux Operating System. The operating system used for this unit is Red hat Enterprise Linux 6 (RhEL 6)

**Pre-requisites:** Basic Knowledge of Server

**Unit 1**: **Fundamentals of Linux:** (07 **lectures)**

Development of Linux, Linux Distributions. Structure of Linux Operating System,Logging In and General Orientation,The X Window System, KDE, GNOME. Navigating the File Systems, Managing Files, File Permission and Access, Shell Basics, Shell Advanced Features, File Name Generation. Common Unix commands

**Unit 2: Administration of Linux OS: (08 hours)**

Installing Linux, Configuring Disk Devices, Creating and Managing File Systems, File System Backup, Kickstart Installation, Linux Boot Loaders, Linux Kernel Management, Managing User Accounts, Understanding File Listing, Ownership and Permission, Managing Software using RPM, Connecting to Network, Linux Network Services, Setting up a Printer

**Unit 3: Input and Output Redirection: (08 hours)**

Input Redirection, Output Redirection, Error Redirection, Filter, Pipes. Networking in Linux: Network Connectivity, IP address, Accessing Remote system, Transferring files, and Internet configuration. Process Control: Identifying Process, Managing Process, Background Processing, Putting jobs in Background. Offline File Storage: Storing files to Media Booting process and User

**Unit 4: Linux Basic networking and naming service: (08 hours)**

Introduction to Networking, Networking, Internet Network Services, Dynamic DNS, Electronic Messaging, Apache , NIS and Network File Sharing: NIS, Network File Sharing, SAMBA. Security: Defining System Security Policies, System Authentication Services and Security, Securing Services, Securing Data and Communication

**Unit 5 : The Unix File System (08 hours)**

**Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode -**

Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link

**Reference books:**

1. The Complete Reference, LinuxSixth Edition by Richard Petersen.
2. Red hat ®Enterprise Linux® 6 Administration by Sander van Vugt
3. Linux System Administration by Paul Cobbaut.

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Network Security (3)  **Code:CS2335**

**Programme: Integrated MSC IT Semester: VI**

**Rationale**:

The power of computers can be witnessed when multiple computers are connected to form a network and start sharing information amongst them. But when this happens, the entire network becomes an open source and exposed to threats due to many users who log into these networks and their environments.Therefore it becomes important to learn about Network Security, in order to safeguard our networks from hackers and damages. Learning network concepts therefore becomes significant and no study of computers is complete without them.

**Catalog Description:**

Students will learn about firewall, access management, authentication methods and Wireless LAN security and Network Admission Control. They are to assess vulnerabilities and methods to scan them. Different types of attacks like application attack, network attack and deterring attack are explained to students, along with methods to administer a secure network. Various topics like Security and Policy Management, Security Framework and Regulatory Compliance and best Practices Framework are dealt with in the final unit, along with some case studies.

**Pre-requisites:** Basic networking concepts

**Course Outline:**

**Unit-I: Introduction to Network Security** (08**hours**)

Perimeter Security - Overview of Network Security, Access Control, Device Security, Security features on Switches, Firewall, Types of firewall, Attack vector and Mitigation techniques; Access Management - Securing Management Access, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and Network Admission Control (NAC).

**Unit-II: (0**8**hours)**

**Threats, Vulnerabilities and Attacks**

Threat; Vulnerabilities – vulnerability assessment and vulnerability scanning; Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks; Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements; Administering a Secure Network – Network Administrative Principles and Securing Network Application

**Unit-III: NETWORK SECURITY MANAGEMENT (0**8**hours)**

Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN).

**Unit-IV: Network Security Controls** (08**hours**)

Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS), Deploying IPS and IPS High Availability; Host Intrusion Prevention; Anomaly Detection and Mitigation.

**Unit-V: (0**7**hours)**

**Network Management**

Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies.

**Text books:**

1. Security + Guide to Network Security Fundamentals – Fourth Edition by Mark Ciampa, Course Technology, Cengage Learning -2012

**Reference Books:**

1. CCIE Professional Development Series Network Security Technologies and Solutions by Yusuf Bhaiji - CCIE No. 9305, CISCO Press, 2008
2. Network Security with OpenSSL By Pravir Chandra, Matt Messier, John Viega, O'Reilly – 2002

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit:**Computer Graphics Laboratory (2)** | Code:**CS2199** |
| Programme:**Integrated MSC IT** | Semester: **VI** |

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| **Rationale:**This course will help the students practically learn plotting of certain 2D and 3D objects in science and technology, computer aided design, animations, etc which has several real-life applications. |
| **Catalog Description:** Implementation of various algorithms on plotting 2D and 3D objects, transformations, etc |
| **Pre-requisites:** Fundamental concepts of Programming (C/C++), Computer Graphics Theory |
| **Course Outline: (39 hours)**  **Laboratory Session**: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments. (Atleast 8 experiments to be conducted)  **Experiment No. 01:**  Write a C/C++ program to implement DDA Line Drawing Algorithm.  **Experiment No. 02:**  Implementation of BRESENHAM’S Line Algorithm  **Experiment No. 03:**  Implementation of Midpoint Circle Algorithm  **Experiment No. 04:**  Implementation of Midpoint Ellipse Algorithm  **Experiment No. 05:**  Implementation of Two Dimensional Transformations  **Experiment No. 06:**  Implementation of Rotation Of Triangle And Line  **Experiment No. 07:**  Implementation of Two Dimensional Composite Transformations  **Experiment No. 08:**  Implementation of Implementation Of Line, Circle And Ellipse Attributes  **Experiment No. 09:**  Implementation of COHEN SUTHERLAND Line Clipping Algorithm  **Experiment No. 10:**  Implementation of SUTHERLAND HODGEMAN Polygon Clipping Algorithm |
| **Text books:**   1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education |
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| **E-Resources:**   1. <http://www.dailyfreecode.com/tutorial_simple_cpp-16/computer-graphics-215.aspx> 2. <http://graphics-program.blogspot.in/> 3. <http://www.cglabprograms.com/> |
| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 40%  End Semester Exam: 60% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Server Operating System II Laboratory (2) **Code:CS2334**

**Programme: Integrated MSC IT Semester: VI**

**Rationale:**

RHEL is a high performing operating system that. RhEL 6 is the sixth generation of the long term and predictable operating platform. With the flexibility to deploy on physical hardware, as a virtual host, as a virtual guest or in the cloud, Red hat Enterprise Linux 6 is the ideal foundation for next-generation datacenters. The fresh system administrators need to have a strong functional knowledge of RhEL 6 in any current IT work environment.

The unit explores the security and network access controls in Linux, organizing network system and Mail Services, Securing Data and Account Management

**Catalog Description:**

To enable the students to attain the skills required to manage and administer systems and servers using Linux Operating System. The operating system used for this unit is Red hat Enterprise Linux 6 (RhEL 6)

**Pre-requisites:**Basic Knowledge of Server

**Course Outline: (39 hours)**

**The Lab Experiments for Server Operating System II are:**

1. Configure the following tasks & verify it. (hint - use grep/cut/tr/sed)

a) List the lines containing "/sbin/nologin" from the /etc/passwd file.

b) List only lines of output from ps, which lists running processes that contain the string "init".

c) Display the list of GIDs from /etc/passwd file.

d) Alter all the letters that starts from range "a-f" to "A-F" in /etc/passwd file.

1. Create an alias named eth0:0 using below credentials in RhEL 5 and verify it.

(a) IP ADRESS = 172.16.0.1 (b) 255.255.0.0

(c) Default Gateway = 172.16.0.254 (d) DNS 1 = 4.2.2.1

3. Configure password policy for user john with below arguments in RhEL 5. After configuration verify the policy applied.

(a) Minimum password age = 4 days

(b) Maximum password age = 15 days

(c) Inactive days = 2 days

(d) Account Expiration date = 6 months from today

4. Configure the following tasks:

1. Add user accounts to your system: Joshua, alex, dax, bryan, zak, ed and manager. Assign each user this password: 123@iMs.
2. Add the groups to your system: sales with GID: 1000, hR with GID: 1100 and web with GID: 1200.
3. Add Joshua and alex to the sales group, dax and bryan to the hR group, zak and ed to the web group and add manager to all of these groups.
4. Login with each user & verify using id command that they are in the appropriate groups.

5. Use ACL to accomplish these tasks:

(a) Create groups named Admin and Web.

(b) Create users named John and Jimmy.

(c) Create a new directory named /depts/tech/. Change the permission so that root is the owner and Admin is the group owner.

(d) se ACL to give full permission for /depts/tech/ to the Web group.

(e) Allow John read/execute but not write permission on the /depts/tech/ directory.

(f) Allow Jimmy full permission on the /depts/tech/ directory.

1. You are tasked with finding all SUID & SGID files under the / directories.

1. Configure your system that boots to run level 3 by default. Configure X server using command in run level 3.

8. Devise a ps command that does the following. (hint: sort/ps/top)

* + 1. List all processes.
    2. For each process, prints the information which displays the percentage of CPU usage, the process ID & name of the command that created it.
    3. The output is sorted by the %cpu value from highest to lowest

9. Explain the suid, sgid & sticky bit permission with example

10. Customize the Bash prompt as per given tasks (hint - PS1) (a) Display the current value of primary prompt string.

(b) Changes prompt to print a static string "ITIMS -'".

(c) Restore the original prompt.

(d) Insert the bash history prompt special character "\!" between the hostname and dollar-sign.

11. Configure given tasks for package management: (hint: use rpm command)

(a) Check whether ftp package is installed or not.

(b) If it is not installed, install it & verify it.

(c) Display the configuration files available through this package.

(d) Be sure that ftp service must be enabled at startup.

12. Use rpm queries to answer the following questions.

1. What files are in the "initscripts" package?
2. Which installed packages have "gnome" in their names?
3. Which RPM provides /etc/inittab?
4. Prepare a cron job that take the backup of /home at 5:00pm on every Saturday.

1. Change your system date to 1:00pm March 1990.
2. Copy /etc/fstab file to /tmp directory as newfstab file. The user owner is Jack and group owner is admin. Give full permission to user owner and read, write permission to group owner. No permission to others.

1. Configure your system such that SELinux must be in enforcing mode and firewall is enables and ssh service is not allowed through your firewall.

1. Configure ftp server such that anonymous can download and upload the data to ftp server. Deny users John and Carel to access the ftp server. Note that your ftp server must be accessible in your private network only. It can't be accessible in another network.

18. Create a RAID level 1 on /dev/md0 device by creating two equal partitions of 100MB size and mount it on /data. The RAID device must be mounted at the time of system startup.

19. Configure LVM in volume group named volgrp by creating 2 partitions of 100MB size and mount it on /exam directory. The initial size of LVM is approximately 40MB and after extending the size of LVM is 80MB.

20. Configure the DhCP server such that your DhCP server will able to provide IP configuration to 65 systems in your network.

21. Configure the station as NFS server such that /share directory is shared & only accessible in your network. This NFS share should be automatically mounted on remote client using autofs. On remote client system, NFS share should be mounted on /data/share directory.

22. Configure stationx.example.com for quota such that when user neo type

dd if=/dev/zero of=/quota/somefile bs=1024 count=30, he succeed.

When he typed d if=/dev/zero of=/quota/somefile bs=1024 count=70 he fails.

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Network Security Laboratory(2)  **Code:CS2336**

**Programme: Integrated MSC IT Semester: VI**

**Rationale:**

The power of computers can be witnessed when multiple computers are connected to form a network and start sharing information amongst them. But when this happens, the entire network becomes an open source and exposed to threats due to many users who log into these networks and their environments.Therefore it becomes important to learn about Network Security, in order to safeguard our networks from hackers and damages. Learning network concepts therefore becomes significant and no study of computers is complete without them.

**Catalog Description:**

Students will learn about firewall, access management, authentication methods and Wireless LAN security and Network Admission Control. They are to assess vulnerabilities and methods to scan them. Different types of attacks like application attack, network attack and deterring attack are explained to students, along with methods to administer a secure network. Various topics like Security and Policy Management, Security Framework and Regulatory Compliance and best Practices Framework are dealt with in the final unit, along with some case studies.

**Pre-requisites:** Basic networking concepts

**Course Outline: (39 hours)**

**Experiment No: 01**

Firewall Configuration

**Experiment No: 02**

VPN Configuration

**Experiment No: 03**

IDS Configuration

**Experiment No: 04**

Router Security

**Experiment No: 05**

Traffic Monitoring using WireShark

**TEXT BOOKS:**

1. Security + Guide to Network Security Fundamentals – Fourth Edition by Mark Ciampa, Course Technology, Cengage Learning -2012

**REFERENCE BOOKS:**

1. CCIE Professional Development Series Network Security Technologies and Solutions by Yusuf Bhaiji - CCIE No. 9305, CISCO Press, 2008
2. Network Security with OpenSSL By Pravir Chandra, Matt Messier, John Viega, O'Reilly – 2002

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Mini Project (4)  **Code:CS2337**

**Programme: Integrated MSC IT Semester: VI**

Details for Mini Project will be provided at the commencement of the semester

**SEMESTER VII**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Design and Analysis of Algorithms (3)** | Code: **CS2225** |
| Programme: **Integrated MSC IT** | Semester: **VII** |

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| **Rationale:** In order to develop efficient software systems, it is essential that efficient algorithms and appropriate data structures are used. The purpose of this course is to think more about some algorithms for putting things in order and to use tools to compare different algorithms. |
| **Catalog Description:** This course will help the students to develop efficient data structures and algorithms in a systematic manner. |
| **Pre-requisites:** Basics of programming and Data structures |
| **Course Outline:**   1. **ALGORITM ANALYSIS (05 hours)** 2. Efficiency of Algorithms, Average and Worst – Case Analysis 3. Asymptotic Notation 4. Time and Space Complexity 5. Recurrences – Substitution Method, Iteration Method and Master Method 6. Sorting: Quick Sort, Heap Sort, Radix Sort, 7. Analysis of Sorting Algorithms – Insertion Sorting, Heaps, Maintaining the Heap Property, Building Heap, Heap Sort Algorithm, Priority Heap 8. Randomized Version of Quick Sort 9. **ALGORTHM DESIGN TECHNIQUES (05 hours)** 10. AVL Tree 11. Red-Black Trees: Steps involved in Insertion and Deletion, Rotations 12. Heap: Binomial Heaps, Fibonacci Heaps 13. B-Trees 14. **GRAPHALGORITHMS (07 hours)** 15. Minimum Spanning Trees – Prim’s and Kruskal’s Algorithms 16. Single Source Shortest Paths - Bellman Ford Algorithms 17. All Pair Shortest Paths – Warshall’s and Floyd’s Algorithms 18. **ALGORITHM DESIGN AND ANALYSIS TECHNIQUES (13 hours)** 19. Divide and Conquer: Merge Sort, Integer Multiplication Problem, Strassen’s Algorithm 20. Dynamic Programming: Matrix-Chain Multiplication, Longest Common Sequence, Optimal Binary Search Trees 21. Greedy Algorithms: Knapsack Problem, Back Tracking, 8 Queens Problem 22. Branch And Bound : The Method, Application To 0/1 Knapsack Traveling Salesman Problems and Efficiency Considerations Travelling Salesman Problem 23. **NP HARD AND NP COMPLETE PROBLEMS (05 hours)** 24. Polynomial Time 25. The Classes Of P and NP 26. NP-Hard Graph Problems 27. NP- Completeness of the Satisfiability Problem and Polynomial- Space-Bounded Problem. |
| **Text books:**   1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Prentice Hall of India |
| **Reference Books:**   1. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Galgotia publication 2. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” PearsonEducation 3. RCT Lee, SS Tseng, RC Chang and YT Tsai, “Introduction to the Design and Analysis of Algorithms”, Mc Graw Hill 4. J. Kleinberg & E. Tardos,”Algorithm Design, Pearson Education”, New Delhi, 2006 5. G. Brassard & P. Bratley,” Fundamentals of Algorithms”, PHI, New Delhi |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Database Security (3)  **Code:CS2338**

**Programme: Integrated MSC IT Semester: VII**

**Rationale**: The objective of the course is to learn the fundamental concepts of DB and apply the same for learning various security issues that the can affect the DB. Students will also learn various control measures that addresses the DB Security issues.

**Catalog Description:**Included in the course are units covering DB security management system and concepts of NoSQL like ACID. They will also learn some best practices for protecting DB.

**Pre-requisites**: None

**Course Outline:**

**Unit 1: Concepts of Database Security Management System (09 hours)**

Concept of Least Privilege in User ID for databases. Concept of NoSQL databases

Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs’, Economics/Cost, Flexible Data models. Challenges of NoSQL like Maturity, Support, Analytics and Business Intelligence, Administration & Expertise.

**Unit 2: Concepts of NoSQL (10 hours)**

Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability) guarantees in NoSQL databases as compared to traditional RDBMS databases.

Horizontal scalability benefits of NoSQL Databases compared to traditional Databases,

Protecting Database - Understanding permissions, Creating and Using database roles, using schemas for security, Managing object ownership, protecting data through views and stored procedures, configuring cross-database security, Managing execution-plan visibility.

**Unit 3: Concepts of Key Value & Tuple Store Databases (10 hours)**

Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases

Concept of Graph Databases, Concept of Multimodel Databases, Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature

**Unit 4: SQL Server & Auditing (10 hours)**

Concept of Object Databases, Concept of Grid & Cloud Databases, Concept of XML databases

Concept of Multidimensional and Multivalue Databases, Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing.

**Text Book:**

1. Database security by Silvana Castano, 2nd Edition, Pub: Addison-Wesley Professional , 2008
2. Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKIT publishing, 2012

**Reference Books:**

1. Handbook of database security: Applications and Trends Michael Gertz, Sushil Jajodia, Pub: Springer, Lib. Of congress. 2008
2. Implementing database security and auditing: a guide for DBAs, ...Ron Ben-Natan, Pub: Elsevier, 2005

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Introduction to Cloud Computing(3) **Code:CS2339**

**Programme: Integrated MSC IT Semester: VII**

**Rationale**: Cloud computing is a colloquial expression used to describe a variety of differentcomputing concepts that involve a large number of computers involves a large number ofcomputers that are connected through a real-time communication network. In science, cloudcomputing is a synonym for distributed computing over a network and means the ability to run aprogram on many connected computers at the same time.

**Catalog Description:**

It covers basic concepts of cloud types, services and security etc.

**Pre-requisites:**

Distributed systems

**Course Outline:**

**Unit 1: Introduction (08 hours)**

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

**Unit 2: Cloud Computing Companies and Migrating to Cloud (07 hours)**

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

**Unit 3: Cloud Cost Management and Selection of Cloud Provider (08 hours)**

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, Selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

**Unit 4: Governance in the Cloud (08 hours)**

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

**Unit-5 ten cloud do an do nots.: (08 hours)**

Don’t be reactive,do consider the cloud a financial issue, don’t go alone, do think about your architecture, don’t neglect governance, don’t forget about business purpose, do make security the centerpiece of your strategy, don’t apply the cloud to everything, don’t forget about Service Management, do start with a pilot project.

**TEXT BOOK:**

1. Cloud Computing: Principles and Paradigms, Rajkumar Buyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011

**REFERENCE BOOKS:**

1. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
2. Handbook on Cloud Computing, Borivoje Furht, Armando Escalante, Springer, 2010

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Designing Enterprise Network II (3)  **Code:CS2340**

**Programme: Integrated MSC IT Semester: VII**

**Rationale**: This course takes students through the second level of Networking concepts like where main focus is on understanding the principles of routing and functioning of different routing protocols.

**Catalog Description:**After studying the basic concepts of networking like OSI layers, TCP/ IP models and concept of subnetting, students will no learn advanced topics like TCP and UDP operations, IPv4 and IPv6 technologies. The course also teaches students in-depth functioning of Routing protocols, specifically Advanced Routing. They will learn to identify different types of WAN networks and understand their workings.

**Pre-requisites**: Networking concepts

**Course Outline:**

**Unit-I (07 hours)**

**Basic Network Principles:** Explain IP operations,Explain TCP operations, Explain UDP operations,**Layer 3 Technologies:** IPv4 addressing, IPv6 addressing, Static Routing, Default Routing, Routing Protocol Types**.**

**Unit-II Routing: (07 hours)**

Administrative Distance, Filtering with Any Protocol, Routing Information Protocol version2, Routing Information Protocol next generation.

**Unit-III Routing Protocols:** (0**7 hours)**

Enhanced Interior Gateway Routing Protocol, Open Shortest Path First, Redistribution, Manual and Autosummarization, ROUTE maps.

**Unit-IV: Advanced Routing:** (0**7 hours)**

Manual and Autosummarization, ROUTE maps, Loop prevention mechanisms, Border Gateway Protocol**,** VPN Routing and Forwarding instances lite**,**VPN Technologies.

**Unit V: WAN Technologies: (07 hours)**

Identify different Wide Area Network Technologies, Wide Area Network serial connection, Point-to-Point Protocol (PPP) connection, Explain Frame Relay.

**Recommended Readings**

1. Network Warrior, SECOND EDITION, by ***Gary A. Donahue***
2. CCNA Routing and Switching 200-120 Official Cert Guide Library by Wendell Odom

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Advanced Virtualization (3) **Code:CS2342**

**Programme: Integrated MSC IT Semester: VII**

**Rationale**: Virtualization may be defined as the process of creating something that is not real; like operating system, a server, a storage device or network resources. Presently three areas of Virtualization are being studied, developed and applied by computer professionals all over the globe and they are network virtualization, storage virtualization and server virtualization. To understand any of these streams in detail, it is highly recommended to know the fundamentals of virtualization and some commonly used products like VMware.

**Catalog Description:**Students can learn in detail about aVMware workstation- desktop virtualization software.

**Pre-requisites**: Basic Virtualization concepts

**Course Outline:**

**Unit 1: VMware Workstation (07 hours)**

What is VMware workstation ?, journey to the present version from the first version, different features and enhancement of the version , Limitation of the VMware workstation,

**Unit 2: VMware ESX and ESXi (08 hours)**

VMware ESX and ESXi (ESX/ESXi 5.5), Introduce the architecture of ESX and ESXi, journey to the present version starting from the first version, Known limitations , Managing the configuration of ESX/ESXi, Managing the Installation and configuration of vCenter Server components, Manage vCenter Server inventory objects

**Unit 3: Networking (08 hours)**

Networking: Create, configure, and manage vNetwork standard switches, Create, configure, and manage network connections, Create, configure, and manage port groups, Storage: Configure ESX/ESXi with iSCSI, NFS, Create and manage vSphere datastores

**Unit 4: Virtual Machines (08 hours)**

Virtual Machines:Deploy virtual machines using VMware vCenter Converter, Resource Monitoring, Control virtual machine access to CPU, memory, and I/O resources, Introduce VM kernel methods for optimizing CPU and memory usage Monitor resource usage using vCenter Server performance graphs and alarms, Data Protection: Back up and recover virtual machines using VMware Data Recovery

**Unit 5: Scalability (08 hours)**

Scalability: Manage multiple vCenter Server inventories using VMware vCenter Linked Mode, Manage ESX/ESXi configuration compliance using Host Profiles, Create, configure, and manage vNetwork distributed switches, network connections, and port groups, Configure and manage a VMware Distributed Resource Scheduler cluster High Availability, Configure and manage a VMware High Availability cluster, Configure fault-tolerant virtual machines using VMware Fault Tolerance, Patch Management: Manage patching and patch compliance using vCenter Update Manager

**Text Books:**

1. Virtualization: a beginner's guide - Danielle Ruest, Nelson Ruest , McGraw-Hill Prof Med, 2011,
2. Mastering VMware vSphere 5.5 by Scott Lowe

**Reference Books:**

1. Virtualization for Dummies, Bernard Golden, For Dummies; 1 edition (December 5, 2007)

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Elective I: (3)

Hacktivism Cyber Warfare and Cyber Terrorism(3)**Code:CS2017**

**Programme: Integrated MSC IT Semester: VII**

Hacktivists and cyber terrorists are a serious threat to information world and the extent of damage possibly caused due to their activities is reaching alarming levels. The reason for this is the availability of better software, tools, techniques and organizational methods. One of the possible methods to stop these attacks is to understand these concepts better and develop programs to protect your personal and organizational information from these attacks.

**Catalog Description:**

Students will learn about hacktivism and cyber terrorism and the extent of damage they cause to an organization. Learning about the current trends in hacktivism will allow them to develop ways to protect their valuable data from these attacks. Topics relating to cyberwarfare and defensive measures are taught in the following chapters.

**Pre-requisites:** understanding of importance of data and need to protect it, threats and hacking

**Course Outline:**

**UNIT I : Introduction to hacktivism, Cyber warfare and Cyber terrorism (09lectures)**

Define hacktivism, Define Cyberwarfare, Define Cyberterrorism, Impact of hacktivism, cyberwarfare and cyberterrorism to society and business. Types of Information warfare strategies and activities, Economic Impact of Information warfare.

**UNIT II: Current trends in hacktivism (09lectures)**

Current trends in hacktivism including wikileaks, anonymous and lulz movements, political nature of hacktivism, players involved in hacktivism and discuss the recent incidents, Countermeasures to protect against such incidents. Defensive strategies for Private Companies, Surviving Offensive Ruinous and Containment.

**UNIT III: Nature of Cyberwarfare (12lectures)**

5 types of modern warfare including cyberwarfare, Strategic nature of cyberwarfare, Computer Network Attack (CNA) and Computer Network Exploitation (CNE), how to deploy CNA and CNE assets within a strategic context in support of obtaining a kinetic goal, Review historic attacks and learn new cyber warfare models that can be used to analyze a state-sponsored attack, Current trends in Cyberwarfare and Cyberterrorism including the players and groups involved, Analyze the resent incidents of Cyberwarfare and Cyberterrorism

**UNIT IV: Defensive Measures (09lectures)**

Defence in Depth and real life examples of how to apply it to network defense. Why information assurance of computer equipment is critical to defend the network from nefarious attacks. Use Defense tools.

**TEXT BOOKS:**

1. Cyber security – From Luxury to Necessity by Balaji Srimoolanathan, Pub: Frost & Sullivan, 2011
2. Information Warfare and Security (Addison Wesley, 1998) Dorothy E Denning
3. Cyberterrorism – The Jihadi Cyber terror Threat – By Dorothy E Denning – Naval Postgraduate school, 2009
4. Information Warfare – how to survive Cyber attacks – Michael Erbschloe, Osborne/McGraw hill, 2008

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006**  **Course with Credit:**Elective I: **Trusted Systems (3**) Code : CS2018  **Programme: Integrated MSC IT Semester: VII** |
| **Rationale:**To provide the key knowledge to the students about the nature and challenges of trusting a system or trusted system in Computer Security.  **Catalog Description:**The student could gain knowledge of trusted systems |
| **Pre-requisites:** Cryptography, Computer Security |
| **Course Outline:**   1. **Introduction (02 Lectures)**   What is a "Trusted System"? ,A system that someone trusts ,A system built to meet a set of  rigorously defined criteria .   1. **Trust Issues in System Design(05 Lectures)**   Processor/System States ,The Security Kernel: isolation of security functionality ,The Reference Monitor ,Structure and Function of every line of code ,Integrity of the Compiler ,Layering vs. Hierarchical design of the Operating System ,Trusted Path   1. **The Multilevel Security Problem (07 Lectures)**   Objects ,The Object Reuse problem ,Subjects ,Function and Ubiquity of the Reference Monitor ,Discretionary Access Control (DAC) ,The Military Model ,The Bell-:LaPadula Model ,Mandatory Access Control (MAC) ,Lattice Model ,The Biba Integrity Model ,The Take-Grant Model ,Role-based Access Control   1. **Techniques to Provide Database Security (06 Lectures)**   Statistical Rules for Sub-Query Responses to Confound Inference,Encryption ,Partitioning Integrity Lock ,Trusted Front-End ,Poly-instantiation and its problems.   1. **Assurance and Formal Specification (05 Lectures)**   Code Correspondence Proofs ,Mathematical Verification ,Validation ,Compiler Integrity   1. **Trusted Systems Standards (03 Lectures)**   The NCSC’s Rainbow Series ,ITSEC and CTCPEC ,The Common Criteria   1. **Application of Standards (02 Lectures)**   Evaluation ,Certification Accreditation.   1. **The Wiley Hacker (04 Lectures)**   Evaluating, Enhancing, and Maintaining the Security Configuration of a System,Checking the System Configuration.,Enhancing the Security of the System ,Continual Monitoring of Security Effectiveness   1. **Coming Back Down to Earth (02 Lectures)**   Trusting a System vs. a Trusted System,Product Availability , Product Performance, and Price   1. **Hands-on Experience in the Administration of Systems for Trustworthiness**   **(02 Lectures)** |
| **Text books:**   1. Pipkin, Donald L. (1997). *Halting the Hacker: A Practical Guide to Computer Security.* Prentice-Hall PTRD. 2. Gollman, “Computer Security”, John Wiley and Sons Ltd., 1998. |
| **Reference Books:**   1. M. Rhodes-Ousley, B. Rothke, A. Taylor, “Network Security (The Complete Reference),” McGraw-Hill Osborne Media, 2003. |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:IT Governance, Risk and Information Security Management** (3)  **Code:2344**

**Programme: Integrated MSC IT Semester: VII**

**Rationale:**

The Unit Primarily covers the importance of IT and IS Governances and the best practices followed by the Role of Steering committee and Chief Information Security Officer. The Unit also deals with the Risk management and the Information Security Management Practices including hiring, Training, Promotion, Performance Evaluation, Required Vacations and Termination Policies, Sourcing Practices and Strategy for Information Security. The Unit also covers the Committee of Sponsoring Organizations and its importance and applicability, Sarbannes Oxley Act and its implications to the Industry.

The Unit explains the Information Security auditing Standards and Relationship existing between Standards, Guidelines and Procedures. Conclusively it deals with the Risk Assessment techniques and Computer Assisted Audit techniques along with the procedure to create Audit Reports.

**Catalog Description:**

To enable students to get in-depth knowledge on IT Governance, IT Security and their relationship with corporate management. To familiarize with the Risk, Organizational Change management and Information Security Auditing processes

**Pre-requisites:** Knowledge of information security

**Course Outline:**

**Unit I : Introduction to Ethical hacking (10 Hours)**

1. Hacking Methodology
2. Process of Malicious hacking
3. Footprinting and Scanning
4. Enumeration
5. System hacking and Trojans
6. Black Box Vs White Box Techniques

**Unit II : Hacking Methodology (09 Hours)**

1. Denial of Service, Sniffers
2. Session hijacking and hacking Web Servers
3. Web Application Vulnerabilities and Web Techniques Based Password Cracking

**Unit III: Web and Network hacking (10 Hours)**

1. SQL Injection
2. Hacking Wireless Networking
3. Worms and Physical Security
4. Linux hacking
5. Evading IDS and Firewalls

**Unit IV: Report writing & Mitigation (10 Hours)**

1. Introduction
2. Requirements- low level & high level reporting of Penetration testing results.
3. Demonstration of vulnerabilities
4. Mitigation of issues identified including tracking

**Recommended Readings:**

1. hacking Exposed 7th Edition, by Stuart McClure, Joel Scambray, George Kurtz – McGraw hill- 2010
2. Basic of hacking and Penetration – Patrick Engerbrestson 2010
3. Certified Ethical hacker All-in-One – Matt Walker 2011

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Designing Enterprise Network II Laboratory (2) **Code:CS2341**

**Programme: Integrated MSC IT Semester: VII**

**Rationale**: This course takes students through the second level of Networking concepts like where main focus is on understanding the principles of routing and functioning of different routing protocols.

**Catalog Description:**After studying the basic concepts of networking like OSI layers, TCP/ IP models and concept of subnetting, students will no learn advanced topics like TCP and UDP operations, IPv4 and IPv6 technologies. The course also teaches students in-depth functioning of Routing protocols, specifically Advanced Routing. They will learn to identify different types of WAN networks and understand their workings.

**Pre-requisites**: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments.

**Course Outline:**

**Experiment No 1:**

Static Routing, Default Routing

**Experiment No 2:**

EIGRP Routing , EIGRP Split-Horizon

**Experiment No 3:**

OSPF Routing, Multi-Area OSPF Routing

**Experiment No 4:**

Switching Introduction, VLANs , Trunking, VTP

**Experiment No 5:**

Spanning Tree Protocol , Rapid Spanning Tree Protocol, Per VLAN Spanning Tree Protocol ,Inter-VLAN Routing

**Experiment No 6:**

Standard ACL, Extended ACL , Named ACL

**Experiment No 7:**

DHCP, DHCP Relay & DHCP Exclusions

**Experiment No 8:**

Static Inside Source Address Translation, Dynamic NAT,Overloading an Inside Global Address

**Experiment No 9:**

Frame-Relay on a Point-to-Point Interface, Frame-Relay on Multi-Point Interfaces

**Experiment No 10:**

HDLC ,PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication

**Reference Books:**

1. Network Warrior, SECOND EDITION, by ***Gary A. Donahue***
2. CCNA Routing and Switching 200-120 Official Cert Guide Library by Wendell Odom

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: Design and Analysis of Algorithms Laboratory (2) | Code: **CS2178** |
| Programme: **Integrated MSC IT** | Semester: **VII** |

**Rationale:** This course will help the students to develop efficient data structures and algorithms in a systematic manner.

**Catalog Description:** This course will help the students to develop efficient data structures and algorithms in a systematic manner.

**Pre-requisites:** Data structures and Basics of C programming

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| **Course Outline:** |
| **Laboratory Session**: 3 hours per week to grasp the concepts learnt in theory class. Following are the list of sample experiments. (Atleast 8 Experiments to be conducted). |
| The students are advised to follow the following steps for each experiment. |
| 1. Problem definition |
| 2. Algorithm Design |
| 3. Program development in C language |
| 4. Execution of the program and demonstration to the faculty members |
| 5. Maintain a suitable observation book for the same  **Experiment No. 1**  Implementation of SELECTION SORT  **Experiment No. 2**  Implementation of HEAP SORT  **Experiment No. 3**  Implementation of QUICK SORT  **Experiment No. 4**  Implementation of MERGE SORT  **Experiment No. 5**  Implementation of KRUSKAL ALGORITHM  **Experiment No. 6**  Implementation of PRIM’S ALGORITHM  **Experiment No. 7**  Implementation of KNAPSACK PROBLEM  **Experiment No. 8**  Implementation of MULTISTAGE GRAPH  **Experiment No. 9**  Implementation of ALL PAIR SHORTEST PATH ALGORITHM  **Experiment No. 10**  Implementation of EIGHT QUEEN PROBLEM  **Experiment No. 11**  Implementation of TRAVELING SALES MAN Problem |
| **Text books:**   1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Prentice Hall of India |
| **Reference Books:**   1. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Galgotia publication 2. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” PearsonEducation 3. RCT Lee, SS Tseng, RC Chang and YT Tsai, “Introduction to the Design and Analysis of Algorithms”, McGraw Hill 4. J. Kleinberg & E. Tardos,”Algorithm Design, Pearson Education”, New Delhi, 2006 5. G. Brassard & P. Bratley,” Fundamentals of Algorithms”, PHI, New Delhi |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 40%  End Semester Exam: 60% |

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Advanced Virtualization Laboratory (2) **Code:CS2343**

**Programme: Integrated MSC IT Semester: VII**

**Rationale**: Virtualization may be defined as the process of creating something that is not real; like operating system, a server, a storage device or network resources. Presently three areas of Virtualization are being studied, developed and applied by computer professionals all over the globe and they are network virtualization, storage virtualization and server virtualization. To understand any of these streams in detail, it is highly recommended to know the fundamentals of virtualization and some commonly used products like VMware.

**Catalog Description:**Students will conduct lab programs to reinforce the concepts the theory concepts they have been taught.

**Pre-requisites:**VMware, Windows 7, ESX and ESXi

**Course Outline: (39 hours)**

**List of Experiments:**

1. How to install VMware Workstation, and virtualization of physical Machine.
2. How to install Windows 7, RedHat and software upgrade in VMware Workstation.
3. How to customize you VMware Workstation to the way of your working and editing existing VM Machine by changing the configuration of virtual Machine.
4. How to install Windows Server 2008 and 2012 in VMware Workstation.
5. Installation of ESX and ESXi (ESX/ESXi 5.5/6).
6. Configuration of ESX/ESXi with ISCSi.
7. Create, configure and manage vNetwork standard Switches, Network connection.
8. Create, configure to manage port groups, storage.
9. Create and manage Vsphere Datastores.
10. Installation and configuration of vCenter Server components.
11. How to manage Multiple vCenter inventories using VMware vCenter linked mode, manage ESX/ESXi configuration compliance using Host profiles.
12. Configure and manage VMware High availability cluster, configure fault-tolerant virtual machines using Fault Tolerance.

**Text Books:**

1. Virtualization: a beginner's guide - Danielle Ruest, Nelson Ruest , McGraw-Hill Prof Med, 2011,
2. Mastering VMware vSphere 5.5 by Scott Lowe

**Reference Books:**

1. Virtualization for Dummies, Bernard Golden, For Dummies; 1 edition (December 5, 2007)

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 40%

End Semester Exam: 60%

**Academic Council Approval:**

**SEMESTER VIII**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Compiler Design (3)** | Code: **CS2185** |
| Programme: **Integrated MSC IT** | Semester: **VIII** |

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| **Rationale:** At the end of the course, the students will have the necessary knowledge & expertise to design and implement a simple compiler. This course helps to understand, design and implement a lexical analyzer, parser, understand code generation schemes and learn about code optimization and runtime environment  **Catalog Description:** Study of different phases of program compilation process. Students will be exposed to Lex, Yacc, ANTLR, etc. |
| **Pre-requisites:** Automata Theory, Systems Programming |
| **Course Outline:**   1. **INTRODUCTION(05 hours)** 2. Definition of a compiler 3. Difference between a compiler and interpreter 4. Linker 5. Loader 6. Phases of a compiler 7. Compiler construction tools 8. **LEXICAL ANALYSIS(06 hours)** 9. Role of Lexical Analyzer 10. Input Buffering 11. Specification of Tokens 12. Introduction to Lex, Yacc 13. **SYNTAX AND SEMANTIC ANALYSIS(06 hours)** 14. Role of the parser 15. Top-down parsing and Bottom-up parsing 16. LL-1 parsing and Recursive parsing 17. LR Parsers, SLR Parser 18. Canonical LR Parser, LALR Parser 19. Predictive Parsing 20. Error handling 21. **INTERMEDIATE CODE GENERATION(06 hours)** 22. Intermediate code : its need 23. Declarations, Boolean Expressions, 3-address code 24. Routines for intermediate code generation 25. Procedure calls 26. **CODE OPTIMIZATION(06 hours)** 27. Principal Sources of optimization 28. Optimization of basic Blocks 29. Flow Graphs 30. Introduction to Global Data Flow Analysis 31. Storage Allocation strategies 32. Procedural optimization 33. Loop optimization 34. **CODE GENERATIONAND RUNTIME ENVIRONMENTS(06 hours)** 35. Issues in the design of code generator 36. Runtime storage management 37. Register Allocation 38. DAG representation of basic blocks   **VII. LEX AND YACC(04 hours)**   1. Lex and Yacc – The simplest Lex program 2. Recognizing Words With LEX 3. Symbol Tables, Grammars 4. Parser-Lexer Communication 5. A YACC Parser 6. Running LEX and YACC 7. Using LEX - Regular Expression |
| **Text books:**   1. K. Muneeswaran, “Compiler Design”, Oxford University Press   2.    Alfred Aho, Ravi Sethi, Jeffrey D Ullman, “Compilers: Principles, Techniques and Tools”, Pearson Education Asia, 2003 |
| **Reference Books:**  1.    Allen I. Holub, “Compiler Design in C”, Prentice Hall of India, 2003  2.    C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings  3.    J.P. Bennet, “Introduction to Compiler Techniques”, 2nd Edition, Tata McGraw-Hill |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Advanced Server Operating System I (3) **Code:CS2345**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:**

Server Operating System concept play major role in production industries, for workstations as well as servers. Understanding the fundamentals of any server operating system Whether it's switching fromWindows Server 2003 to 2012 or to Linux-based servers. The practical explorer of server operating will make you understand the advanced configuration.

**Catalog Description:**

Student can understand the Configuring File and Print Services

Configure a file server, Configure Distributed File System (DFS), Configure shadow copy services, Configure backup and restore, Manage Disk Quotas, Configure and monitor print services, Installing and Configuring Web Servers and Applications with Internet Information Services 7.5 **,** Configuring Network Application Services, Configure Windows Media Server, Configure Microsoft Windows SharePoint Services server options, Installing and Configuring AD LDS, Installing and Configuring AD FS, Overview of AD RMS, Installing and Configuring AD RMS, Configuring Network Policy Server and Remote Access Services, Overview of Network Policy Server, Configuring a Network Policy Server, Configuring Remote Access, Managing Direct Access in Windows Server 2008 R2, Implementing Network Access Protection.

**Pre-requisites:** Basic understanding of Server OS

**Course Outline:**

**Unit 1: Configuring File and Print Services (09 Hours)**

Configure a file server, Configure Distributed File System (DFS), Configure shadow copy services, Configure backup and restore, Manage Disk Quotas, Configure and monitor print services

**Unit 2: Installing and Configuring Web Servers and Applications with Internet Information Services 7.5 (10 Hours)**

Managing the Web Server Role, Configuring Web Applications and Sites, Configuring a File Transfer Protocol Server and a Simple Mail Transfer Protocol Server, Configuring Secure Websites and Servers.

**Unit 3: Configuring Network Application Services: (10 Hours)**

Configure Windows Media Server, Configure Microsoft Windows SharePoint Services server options, Installing and Configuring AD LDS, Installing and Configuring AD FS, Overview of AD RMS, Installing and Configuring AD RMS.

**Unit 4: Configuring Network Policy Server and Remote Access Services (10 Hours)**

Overview of Network Policy Server, Configuring a Network Policy Server, Configuring Remote Access,

Managing Direct Access in Windows Server 2008 R2, Implementing Network Access Protection.

**Reference Books:**

* 1. Mastering Microsoft Windows server 2008 R2 by Mark minasi,Darril Gibson, Aidan Finn, Wiendy henny,Byron hynes
  2. Windows Server 2008 R2 Unleased by Rand Morimoto,Michel Noel,Omar Droubi, ross Mistry, Chris Amaris

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Application Web Security (3)  **Code:CS2348**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:** Methodical study and application of concepts is very important as it paves way to user-friendly and functional applications. Equally important is providing security features to your web applications so that information and data can be protected. These constants depend on the environment in which applications are being deployed and therefore it becomes important to learn these concepts in depth.

Software Development Life Cycle as we all know is the standard for every software developer to create applications and is a means to achieve highest output within stipulated time.

**Catalog Description:** Students will learn to recognize the appropriate security parameters needed for specific environments and about implementation and default issues. They will learn about the concepts in Software Development Life Cycle, particularly emphasizing on application development methods. The final unit deals with aspects of Java and its security.

**Pre-requisites:** none

**Course Outline:**

**Unit I: Introduction to Web Security and its Application (09 Hours)**

Different environments demand different security, Environment versus Application controls, Complexity of Functionality, Data Types, formats and Length, Implementation and Default Issues, Failure states

**Unit II: Phases in Software Development Life Cycle (10 Hours)**

System Development & Management of Development, Life-Cycle Phases including Project Initiation, Functional Design analysis & Planning, System Design specifications, Software development, Installation and Implementation, Operational Maintenance and Disposal, Separation of duties in the application development lifecycle in the development, testing and Production environments

**Unit III: Application Development Methodology (10 Hours)**

Different software development methods including waterfall, spiral, joint analysis development, Rapid application development and clean room, Application Development Methodology, Object Management Architecture (OMA), Object Request Brokers (ORBs), Common Object Request Broker Architecture (CORBA),

Computer Aided Software Engineering (CASE), Prototyping, Common Object Model (COM), Distributed Component Object Model (DCOM), Distributed Computing Environment and Mobile Code

**Unit IV: Features of Java and its Security (10 Hours)**

Enterprise Java Beans, Expert Systems and Knowledge-Based Systems, Artificial Neural Networks, Object code versus Machine code, Features of Java, Java Security, Active X and Component Object Model (COM), Security issues resulting from Logic Bombs, Malware & Trojan Horses and their impact on Applications

Various types of attacks including Denial of Service (DOS), Distributed Denial of Service (DDOS), SMURF, Fraggle, SYN Flood, Teardrop, DNS Dos attacks, Timing attacks, Secure DNS and counter measures

**Text Books**

All in one CISSP Exam guide by Shon Harris, 6th Edition, McGraw Hill, 2013

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**OSI layer and Security (3) **Code:CS2349**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:**

OSI model is a conceptual model developed to explain the basic working of communication system through the concept of abstraction layers. Seven layers are defined as standards and multiple protocols operate at each level and carry out specific tasks. A sound knowledge of OSI layer, its protocols and their specific functions is very important for any computer professional to harness the full capabilities of the system and deliver best output.

**Catalog Description:**

Different layers of OSI model are explained to the students, along with protocols in each category. The functions of each protocol are taught in subsequent chapters.

**Pre-requisites:** Basic knowledge of computers

**Course Outline:**

**UNIT I : OPEN SYSTEMS INTERCONNECTION (OSI) MODEL (9 Hours)**

Introduction to the 7 layers of the OSI model, concept of the OSI model, the Application Layer, the Presentation Layer, the Session Layer, the Transport Layer, the Network Layer, the Data Link Layer &the Physical layer

**UNIT II: SECURITY PROTOCOLS - APPLICATION LAYER (11 Hours)**

Introduction to Protocol concepts, Border Gateway Protocol (BGP), Dynamic host Configuration Protocol (DhCP), Domain Name System (DNS), File Transfer Protocol (FTP),hyper Text Transfer Protocol (hTTP), Lightweight Directory Access Protocol (LDAP), Media Gateway Control Protocol (MGCP), Network News Transfer Protocol (NNTP), Network Time Protocol (NTP), Post Office Protocol (POP), Internet Message Access Protocol (IMAP), Routing Information Protocol (RIP), Remote Procedure Call (RPC), Real Time Streaming Protocol (RTSP), Session Initiation Protocol (SIP), Simple Mail Transport Protocol (SMTP), Simple Network Management Protocol (SNMP), Socket Secure (SOCKS), Secure Shell (SSh), Remote Terminal Control Protocol (Telnet), Transport Layer Security/Secure Sockets Layer (TLS/SSL), extensible Messaging & Presence Protocol (XMPP), Wireless Application Protocol (WAP) & Internet Relay Chat (IRC)

**UNIT III: TRANSPORT LAYER (09 Hours)**

Introduction to Transport Layer, TCP/IP, User Datagram Protocol (UDP), Real-time Transport Protocol (RTP), Datagram Congestion Control Protocol (DCCP), Stream Control Transmission Protocol (SCTP), Resource reservation Protocol (RSVP)&Explicit Congestion Notification (ECN).

**UNIT IV: NETWORK LAYER (10 Hours)**

Introduction to Network Layer**,** Internet Protocol Version 4 (IP4), Internet Protocol Version 6 (IP6), Internet Protocol Security (IPSEC), Internet Control Message Protocol (ICMP) & Internet Group Management Protocol (IGMP)

**Data Link Layer:** Introduction to Data Link Layer, the Address Resolution Protocol (ARP), the Open Shortest Path First (OSPF), the Neighbor Discovery Protocol (NDP),the Tunneling Protocol (Tunnels) &the Point to Point Protocol (PPP)

**TEXT BOOKS:**

1. Internet security protocols: protecting IP traffic by Uyless D. Black, Pub: Prentice hall PTR; 1st edition (July 24, 2000)
2. TCP/IP Distributed System –Vivek Acharya, Pub: Firewall Media / Laxmi Publications-2006

**REFERENCE BOOKS:**

Security Protocols by Pavel Ocenasek, 2010

**Grading System:** The final grade shall be based on the followings:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Advanced Network Security (3)  **Code:CS2350**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale**: Security is one of the significant aspects that need to be emphasized and its issues addressed, in order to achieve ideal conditions in a corporate environment. After having studied the basic networking concepts like network protocols, different types of network and their strengths, students will, in this course, learn about advanced topics like Threats, Firewall and Security management.

**Catalog Description:**Students will learn Threats and its classification, Denial of Service the principles of Secure Network design which enables them to understand the ideal conditions under which one can be designed and some best practices.

**Pre-requisites**: Basic network security concepts

**Course Outline:**

**Unit-I (09 hours)**

Threat classification, Principles of Secure Network Design – Defence in depth, least privilege, data protection, accountability and authentication

**Unit-II (10 hours)**

Introduction to Firewall, Various types of Firewall. DMZ, Security Policy components, Network Security Testing Tools and Techniques, Network scanning and Vulnerability analysis

**Unit-III (10 hours)**

Checkpoint GAIA OS installation, configuration of network administrator, Configuring Internal and Externals network IP, Access Control, Authentication , Configuring Network Address Translation (NAT)

**Unit-IV (10 hours)**

Anti-virus and URL filtering , Securing VoIP, Protocol Specific Security and Content Security

**Text Books:**

1. Network security hacks By Andrew Lockhart, O'Reilly Media; Second Edition edition (November 6, 2006)
2. Checkpoint Next Generation Security Administration By Drew Simonis, Daniel Kligerman, Corey Pincock, 2010

**Reference Books:**

1. Checkpoint by [Nicholson Baker](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22Nicholson+Baker%22), O’Reilly, 2009
2. Assessing Network Security By Kevin Lam, David LeBlanc, Ben Smith, Sybex, 2008

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:** Elective II:Cloud Computing Solution(3)  **Code:CS2025**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:**

Windows Azure is a cloud computing platform and infrastructure, for building, deploying and managing applications and services through a global network of Microsoft-managed data centers.

**Catalog Description:**

Students can learn the basics of cloud technology in Windows Azure services like computer service, network service, data service and App service. Programming with windows azure is also covered in depth.

Pre-requisites: Basic understanding of Cloud Technology

**Unit 1**: **Introduction** (08 **hours)**

Introduction to  MS. Azure, Virtual Machines: Creating Virtual Machines, Difference Between Basic and Standard VMs,Logging in to a VM and Working, Attaching an empty hard Disk to VM, hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM,Creating a VM from a custom Image, Shut down VM without Getting Billed,VM Pricing

**Unit 2: Managing Infrastructure in Azure (07 hours)**

Managing Infrastructure in Azure: Azure Virtual Networks, highly Available Azure Virtual Machines, Virtual Machine Configuration Management, Customizing Azure Virtual Machine Networking. Load Balancing: Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer

**Unit 3: Windows Azure (08 hours)**

Azure Storage: What is a Storage Account,Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control Automation: Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script,

**Unit 4: SQL Azure (08 hours)**

SQL Azure: Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Tables, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.

**Unit 5 : Websites                                                                                                       (08 hours)**

Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Defaultpage for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between Free, Shared, Basic and Standard websites, Creating a website using Visual studio.

**Text Book:**

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

**Reference Books:**

1. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg,  Andrzej  M. Goscinski, Wiley, 2011
2. Windows Azure Step By step by Roberto Brunetti.

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Elective-II: Mobile and Wireless Security (3)  **Code:CS2026**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:**

Basic understanding of server security in wireless is very important for any system administrator. As organizations move through the normal cycle of replacing their PBXes, VoIP can be viewed as a logical choice for converged messaging, call centres and interactive multimedia collaboration.

**Catalog Description:**

Students can learn the basics of mobile communications, wireless security, VOIP security, mobile forensics and data extraction.

**Pre-requisites:** Basic understanding of wireless technology and mobile.

**Course Outline:**

**Unit I: Introduction to Mobile Communication (15 Hours)**

Mobile & Telecommunication protocols and their vulnerabilities, Managerial, technical and procedural controls to address Mobile & Telecommunication vulnerabilities.

**Unit II: Wireless Security (15 Hours)**

Wireless protocols and their vulnerabilities, Managerial, technical and procedural controls to address Wireless vulnerabilities.

**Unit III: Voice over Internet Protocol (VOIP) Security (15 Hours)**

VOIP concepts, protocols and vulnerabilities, Managerial, technical and procedural controls to address VOIP vulnerabilities.

**Unit IV: Mobile Forensics & Data Extraction (15 Hours)**

Mobile forensics process- Seizure, Data acquisition types - Physical, Logical, Manual, External & Internal memory, Storage, analysis using tools & techniques

**Recommended Readings:**

1. Computer security handbook, Seymour Bosworth, Michel E. Kabay
2. Securing wireless LANs: a practical guide for network managers, Gilbert held
3. Mobile telecommunications protocols for data networks by Anna hać

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Personal and Effective Communication (2)  **Code:CS2351**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale**: Communication by talking is considered as the most effective and less-complicated method in every aspect of life; be in professional or personal. It is important to learn to effectively communicate your ideas and thoughts with the other person by talking to them. The objective of this course is to equip students with the fundamental concepts of communication thus enabling them to handle themselves well in a professional level. Students are encouraged to maintain effective conversation amongst the groups, carry on group discussions and hold debates. Extempore is another aspect dealt in this course which brings out the subject knowledge from students and teach them to look at any subject from multiple angles and propose their views to the team.

**Catalog Description:**This course is divided into three parts : personality development, Writing and Speaking Skills wherein each unit teaches the students traits that could be developed and improvised upon to make them better individuals, leaders and change-makers. It talks about some of the best practices one has to learn and implement in both personal and professional lives, in order to overcome any hurdles they may face and manage conflicts in their life.

**Pre-requisites**: NA

**Unit I (09 hours)**

**Personality Enhancement**

Concept of Personality, Understanding Personality, Self Assessment & Body Language,

Self Grooming and Attitude.

**Unit II (08 hours)**

**Writing Skills**

Business Writing: Letter Writing (Formal and Informal), Application Writing, E-Mail Writing

**Unit III (09 hours)**

**Speaking Skills**

Conversations, GDs, Presentations, Debate, Extempore

**Recommended Readings**

1. The Art of Winning Conversation by Morey Stettner
2. [Presentation Zen](http://www.amazon.com/Presentation-Zen-Simple-Design-Delivery/dp/0321811984?tag=inccom028-20) by [Garr Reynolds](https://twitter.com/presentationzen).

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | | |
| Course with Credit: **Compiler Design Laboratory (2)** | Code:**CS2187** | |
| Programme: **Integrated MSC IT** | Semester: **VIII** | |
| **Rationale:** To gain basic insight in various steps of program compilation process | |
| **Pre-requisites:** Concepts learnt in theory class of Automata Theory, Compiler Design  **Course outline:** | |
| **Laboratory Session**: 3 hours per week to grasp the concepts learnt in theory class. Some of the sample experiments are listed below. (Atleast 8 Experiments to be conducted)  **Experiment No. 01:**  Write a LEX program to identify a simple and a compound statement.  **Experiment No. 02:**  Write a LEX Program to count the number of keywords and identifiers in a sentence.  **Experiment No. 03:**  Write a LEX program to convert an octal number to decimal number.  **Experiment No. 04:**  Write a YACC program to check the validity of an arithmetic expression.  **Experiment No. 05:**  Write a YACC Program to identify an input for the grammar anb (n≥10)  **Experiment No. 06:**  Write an ANTLR grammar to accept the Pascal statement READ (Value) and print a parse tree for the same.  **Experiment No. 07:**  Write an ANTLR grammar to perform basic arithmetic operation in a calculator.  **Experiment No. 08:**  Write an ANTLR grammar to accept a block of PASCAL statements between begin and end and print the parse tree for the same.  **Experiment No. 09:**  Write an ANTLR grammar to decide whether given sentence is simple or compound. | |
| **Text books:**   1. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings | |
| **Reference Books:** Instructor’s manual, Handouts | |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 40%  End Semester Exam: 60% | |
| **Academic Council Approval:** | |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Advanced Server Operating System I Laboratory(2) **Code:CS2346**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:**

Server Operating System concept play major role in production industries, for workstations as well as servers. Understanding the fundamentals of any server operating system Whether it's switching from Windows Server 2003 to 2012 or to Linux-based servers. The practical explorer of server operating will make you understand the advanced configuration.

**Catalog Description:**

Whatever they studied in theory they will understand the concepts by configuring of DFS replication of SYSVOL, Configure the default site, create an additional site, Global Catalogue server, Installing and Configuring IIS and Creating a Website in IIS , Implementing FTP and SMTP Services in IIS , Implementing Security on Websites , Configuring AD LDS, Configuring AD RMS, Configuring Network Policy Server and Remote Access Services.

**Pre-requisites:** Basic knowledge of Server OS

**Course Outline: (39 hours)**

**UNIT1:**

**Lab A:** Configuring DFS replication of SYSVOL

**Lab B:** Configure the default site, create an additional site.

**Lab C:** Configure Global Catalogue server

**Unit 2:**

**Lab A:** Installing and Configuring IIS and Creating a Website in IIS

**Lab B:** Implementing FTP and SMTP Services in IIS

**Lab C:** Implementing Security on Websites

**Unit 3:**

**Lab A:** Configuring AD LDS

**Lab B:** Configuring AD RMS

**Unit 4:**

**Lab A:** Configuring Network Policy Server and Remote Access Services

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Application Web Security Laboratory (2) **Code:CS2348**

**Programme: Integrated MSC IT Semester: VIII**

**Rationale:**

Methodical study and application of concepts is very important as it paves way to user-friendly and functional applications. Equally important is providing security features to your web applications so that information and data can be protected. These constants depend on the environment in which applications are being deployed and therefore it becomes important to learn these concepts in depth.

Software Development Life Cycle as we all know is the standard for every software developer to create applications and is a means to achieve highest output within stipulated time.

**Catalog Description:** Students will put to test the aspects they have learnt in the corresponding theory classes and perform the tasks mentioned in the experiments list. This will reinforce their theory knowledge and help them understand the results better.

**Pre-requisites:** Application development and concepts of SDLC

**Course Outline: (39 hours)**

**Laboratory sessions**

1. Analyzing application Buffer overflow
2. Analyzing SQL Injection vulnerability
3. Analyzing Cross Site Scripting vulnerability
4. Performing DoS and DDoS attack on web sites
5. Smurf Attack using pocket creator tool
6. ARP Poisoning Attack
7. Performing Man in the Middle Attack
8. DNS dysfunction attack
9. Network sniffing and collection of information in the network
10. Proxy server configuration to capture data from the server to node

**NA**

**NA**

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30 %

End Semester Exam: 70%

**Academic Council Approval:**

**SEMESTER IX**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Information Technology Infrastructure Library (ITIL)(3) **Code:CS2353**

**Programme: Integrated MSC IT Semester: IX**

**Rationale :**

ITIL-compatible tools to better interact with your global partners, and in addition, sticking to strict ITIL standards from a single vendor can help process integrations go seamlessly and ensure all parties are speaking the same technical language.

It is always an advantage to understand what types of ITIL tools your global partners are working with and how they rate them. Knowing that the tools your global partners to work and verified by a third party as being compatible with ITIL frameworks is another way to keep a homogenous IT environment and ease interactions with other global companies using similar preapproved tools. Managing staff, providing services to customers and creating efficiencies for less money can be daunting tasks for any IT organization.

**Catalog Description:**

Student can understand the Fundamentals of ITIL with the following basic concepts Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process. Service Design Lifecycle Stage. The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process. Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment, Management Process, the Service Asset and Configuration, Management Process, Knowledge Management. Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfillment Process, The Access Management Process, The Problem Management Process ,Continual Service Improvement :Continual Service Improvement, Lifecycle Stage.

**Pre-requisites:** Management topics

**Course Outline:**

**UNIT I : ITIL OVERVIEW AND SERVICE STRATEGY (10 hours)**

ITIL history, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process

**UNIT II: SERVICE DESIGN (10 hours)**

Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, TheInformation Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process

**UNIT III: SERVICE TRANSITION (08 hours)**

Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment, Management Process, the Service Asset and Configuration, Management Process, Knowledge Management.

**UNIT IV: SERVICE OPERATION ,CONTINUAL SERVICE IMPROVEMENT (11 hours)**

Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfillment Process, The Access Management Process, The Problem Management Process ,Continual Service Improvement :Continual Service Improvement, Lifecycle Stage

**REFERENCE BOOKS:**

1. Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010
2. hP operation Manual from hP, 2010
3. A Guide to Service Desk Concepts Donna Knapp From Cengage Learning, 2010
4. The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers, 2008
5. Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair John Wiley and Sons, 2008
6. It Service Desk: What You Need To Know For It Operations Management Michael, Johnson Tebbo, 2010
7. help Desk, Service Desk Best Practice handbook: Building, Running and Managing Effective Support - Ready to Use Supporting Documents Bringing ITIL Theory Into Practice Gerard Blokdijk, Ivanka Menken Emereo Pvt Ltd, 2009
8. ITIL V3 Foundation Complete Certification Kit - Study Guide Book and Online, By Tim Malone, Michael Wedemeyer, Gerard Blokdijk Lulu.com, 2008
9. The Shortcut Guide to Improving IT Service Support Through ITIL, Rebecca herold Realtimepublishers.com, 2009
10. The official introduction to the ITIL service lifecycle By OGC - Office of Government Commerce The Stationery Office, 2010.

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Disaster Recovery and Business Continuity Management(3) **Code:CS2354**

**Programme: Integrated MSC IT Semester: IX**

**Rationale:**

Primarily the unit covers the importance of having a Business Continuity Planning, Disaster recovery planning for Organization and emphasizes the Standard practices proposed by the NIST SP 800-34 Emergency Action Plan for recovery.

The Unit gives a broad coverage on the different phases of BCP that consist of Project Management and Initiation, Business Impact Analysis, Recovery Strategies, Planning Development and Implementation.

The Unit emphasizes the various methods of Technical Data Recovery procedures that can be immediately taken on the event of a Service Disruption and also allocating the roles and responsibilities for Various Key personnel.

The Unit also gives importance to the Testing, Maintenance and Training process. A wide variety of testing process that involves full interruption, walk through, Check listing, Simulation and Parallel are explained in detail

**Catalog Description:**

To enable learner to familiarize with the concept and importance of Business Continuity Planning for an Organization and to make aware of the recovery strategies on the event of Service Disruption, Testing and Maintenance also the training methodology to educate the user community.

**Pre-requisites:** Project management fundamentals

**Unit 1**: **Business Continuity Management (BCP)** (0**9 hours)**

Introduction to Business Continuity Planning (BCP), Business Resumption Plan (BRP) or Disaster Recovery Plan (DRP), Common terminologies used in BCP and DRP, NIST SP800-34 Emergency Action plan which includes the phases of Recover/Resume, Protect and Sustain, Causes of Disasters

**Unit 2: Stages in BCP (10 hours)**

BCP objectives. Information Protection Environment. Security Technology and Tools. Steps involved in creating a BCP, Phase 1: Project Management and Initiation. Phase 2: Business Impact Analysis. Phase 3: Recovery Strategies, Phase 4: Plan Development and Implementation

**Unit 3: Business Recovery strategies: (10 hours)**

Facility and Supply Recovery strategies. User Recovery strategies. Technical Recovery strategies, Data Recovery strategies, Activation Phase- Major Disaster or Disruption, Intermediate Disaster or Disruption, Minor Disaster, Activating BC/DR Teams, Developing Triggers, Transition Trigger. Defining BC/DR Team and Key Personnel, Defining Tasks, Assigning Resources, Communication Plan.

**Unit 4: Testing, Maintenance, Awareness & Training Mechanisms (10hours)**

Different types of tests including structured walk-through, checklist test, simulation, parallel test and full interruption test. Steps required to maintain a BCP. Requirements for BCP awareness and training, Visit a business organization of your choice and prepare a Business Continuity Plan for the same using the learning from this course.

**Text Book:**

1. Business Continuity and Disaster Recovery Planning – Susan Snedaker, Pub: Syngress, 2007
2. Crisis Management Mastering Skills – harvard Business School, 2004

**Reference Books:**

1. Disaster Recovery Planning: Preparing – Jon William Toigo, 3rd Edition, 2012

**Grading System:** The final grade shall be based on the followings:-

**Internal Evaluation: 30%**

**End Semester Exam: 70%**

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Elective-III: Exchange Server (3)  **Code:CS2034**

**Programme: Integrated MSC IT Semester: IX**

**Rationale:**

E-mail has become a very powerful today in business communication and helps people organize their work and schedule very efficiently. Exchange server is at the center of email system and understanding its working becomes very important to harness the full capabilities of e-mail systems.More advanced topics in Exchange server like virtualization, power shell and exchange management helps professionals to maintain exchange server efficiently.

**Catalog Description:**

Beginning from understanding the basic concepts of E-mail like its architecture, organization of files and their availability, students will move on to learn more topics in Exchange server like content storage, content management, client connectivity and so on. Subsequent chapters aim at delivering knowledge about recovery and compliance of Exchange servers, followed by Virtualization.

**Pre-requisites:** Basic computer knowledge and E-mail systems

**Course Outline:**

**Unit 1: Putting Exchange Server 2013 into context**  **(06 Hours)**

Why Email Important , what Is Messaging Servers, Exchange Server, About Messaging Services,

Many Modes of Access, The Universal Inbox, Architecture Overview. Controlling Mailbox Growth, Personal Folders or PST Files, Email Archiving, Public Folders.

**Unit 2 : Introducing Change in Exchange Server 2013 (07 Hours)**

Getting to Know Exchange Server 2013, Exchange Server Architecture, x64 Processor Requirement, Windows Server 2008 R2 and Windows Server 2012, Installer, Service Pack, and Patching Improvements Server Roles, Edge Transport Services, Unified Messaging, Client Connectivity. The Managed Store, high-Availability Features

Content Storage, Exchange Server Management, Improved Message and Content Control, Built-in Archiving, Message Transport Rules, Message Classifications, Rights Management, Service Message Protection Programming Interfaces, New and Improved Outlook Web App, Mobile Clients and Improved Security.

**Unit 3 : Understanding Availability, Recovery, and Compliance (06 Hours)**

Changing from a Technology to a Business Viewpoint. What’s in a Name, Backup and Recovery, Disaster Recovery, Management Frameworks, A Closer Look at Availability, Storage Availability , An Overview of Exchange Storage, Direct Attached Storage, Storage Area Networks, Compliance and Governance, The Bottom Line.

**Unit 4: Virtualization Server Exchange 2013 (06 Hours)**

Virtualization Overview, Understanding Virtualized Exchange, Understanding Your Exchange Environment Effects of Virtualization, Environmental Impact, Space Impact, Complexity Impact, Additional Considerations, Virtualization Requirements, hardware Requirements, Software Requirements, Operations, Deciding What to Virtualized, Exchange Roles ,Testing, Possible Virtualization Scenarios, Small Office/Remote or Branch Office , Site Resilience, Mobile Access.

**Unit 5: Introducing Power Shell and Exchange Management Shell (08 Hours)**

Why Use Power Shell, Understanding the Command Syntax, Verbs and Nouns, The -Identity Parameter, Camlet Parameters, Alias, Object-oriented Use of Power Shell, Filtering Output, Formatting Output, Directing Output to Other Camlets, Power Shell v3 , Remote Power Shell, Tips and Tricks, Managing Output, Running Scripts, Running Scheduled Power Shell Scripts, Debugging and Troubleshooting from Power Shell, Auto discover Concepts, What Auto discover Provides , how Auto discover Works.

**Unit 6: Getting Exchange Server Running. (06 Hours)**

Hardware, Operating Systems, Configuring Windows, Understanding Server Role and Configuration,

Active Directory Requirements, Installing Exchange Server 2013, GUI-based Installation, Command-line Installation, Post-installation Configuration Steps, Final Configuration.

**Reference Books:**

1. Mastering Exchange server 2013 by David Elfassy

**Grading System:** The final grade shall be based on the following:

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Elective-III: Advanced Storage Management (3) **Code:CS2035**

**Programme: Integrated MSC IT Semester: IX**

**Rationale**: Data is at the center of any IT system and plays a very significant role in whichever form it is present. While it is the input to some IT Operations, data as an Output is also equally important. With the uncontrollable growth we are witnessing in IT Sector, Data is also growing exponentially and Data storage aspect is gaining prominence all over. This course is intended at imparting knowledge in students about data storage, its requirements in terms of hardware and ecosystem and so on.

**Catalog Description:**Students will begin with a chapter on introduction to data storage and quickly proceed to understanding the hardware and ecosystem requirements. The way Protocols lay the foundation for OSI model, storage protocols are what makes it possible and students will understand various storage protocols like RAID, iSCSI and Fiber Channel.

**Pre-requisites**:Fundamentals of storage management

**Course Outline:**

**Unit 1: Introduction to Data-Storage (07 hours)**

Importance of Data, Data Growth and Demands on Data, Storage Evolution, Storage Topologies, DAS – Advantages and Limitation, NAS – Advantages and Limitation, SAN – Advantages and Limitation, Comparing DAS, NAS and SAN

**Unit 2: Storage Hardware & Ecosystem (08 hours)**

Host Bus Adapters, SFPs, FC Cables and Connectors, SCSI/SATA/SAS Cables and, Connectors, Disk Drive, Host Bus Adapters, JBODs, External Storage Boxes, Tape Drive, Tape Library, Fiber Channel, Switches, Bridges, FC Appliances,

**Unit 3: Storage Protocols (08 hours)**

ATA and SATA, SPI – Parallel SCSI, Limitations of Parallel SCSI, SAS – Serial Attached, SCSI, SAS Topology, SAS Devices, Benefits of SAS

**Unit 4: iSCSI , RAID , Fibre Channel (08 hours)**

iSCSI Topology, iSCSI Initiators and Targets, iSCSI Names and Addresses, Speeding Up, iSCSI, iSCSI Advantages, iSCSI Limitation, Comparing Storage Protocols ,

**RAID**

why RAID, RAID Levels, RAID 0 – 6, DP, Nested RAID Terminology, Comparison of RAID Levels, RAID Characteristics, RAID Performance, RAID in Software, RAID in Hardware

**Fiber Channel**

FC Topologies, FC Ports, FC Protocol Layers, FC WWNs, FC Addresses, FC Frame, FC Flow Control, Zoning, LUN Masking, FC Strength and Limitation

**Unit 5: Storage Security and Managing the Storage infrastructure (08 hours)**

Storage Security framework, Risk Triad, storage security domains, security implementation in storage networking

**Managing the Storage Infrastructure**

Monitoring the storage infrastructure, storage management activities, storage infrastructure management challenges , developing an ideal solution.

**Text Book:**

* Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill Publication, 2003

**Reference Book:**

Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Elective-IV: **Transition from Campus to Corporate** (3)**Code:CS2045**

**Programme: Integrated MSC IT Semester: IX**

**Rationale**: The objective of the course is to prepare the students for the BIG day in their life; the day they will enter the corporate world with high hopes of achieving their dream. The foremost step in this direction for students will be to clear the interviews with good score. This course teaches students significant aspects that they need to learn and practice in order to clear their interviews with flying colors. In the corporate world, they are tested for their technical knowledge, skills, applicational knowledge and their ability to perform under tight deadlines and quality checks. Hence, professionalism, corporate etiquettes and communication become extremely important. This course equips the students will all these and more. It covers topics like analytical skills, group discussion and so on

**Catalog Description:**The course is divided in to four parts : Communication, Analytical Skills, Group Discussion and Interview Skills, each unit dealing with imparting significant inter-personal skills in the students by overcoming their barriers, anxieties and fears. Students are encouraged to actively participate in GD’s and hold debates. They are prepared to face the corporate world, which they will find an entirely new environment from campus.

**Pre-requisites**: None

**Course Outline:**

1. **Barriers to Communication (10 hours)**

Improving Communication Skills, Non-verbal communication, Body language, Value of time, Importance of Listening, Emotional Intelligence 2. Analytical Skills

1. **Analytical Skills: (09 hours)**

Introduction and Relevance, Newspaper Article Analysis, Analysis of a Video

1. **Group Discussion (10 hours)**

Group Discussion: Introduction, Group Discussion: Do’s and Don’ts, Mock Group Discussion

1. **Interview Skills (10 hours)**

Preparation & Resume Building, Types of Interviews, Do’s & Don’ts of Interviews, Personal Interview: Introduction, Personal Interview: Do’s and Don’ts, Mock Personal Interview

**Recommended Readings**

* 1. Campus to Corporate from Ashutosh Sharma

# Campus to Corporate  Your Roadmap to Employability by Gangadhar Joshi

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

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| **The Assam Kaziranga University,**  **School of Computing Sciences**  **Koraikhowa, Jorhat, Assam-785006** | |
| Course with Credit: **Enterprise Resource Planning (3)** | Code: **CS2044** |
| Programme: **Integrated MSC IT** | Semester: I**X** |

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| **Rationale:** An Enterprise Resource Planning (ERP) system is software that runs all business areas of an organization including accounting and finance, HR, sales and distribution, production, purchasing and inventory. It is cross-functional, process-centred, real time, and based on industry best practices, from service to manufacturing to not-for-profit. It is important that business and systems engineers obtain working knowledge of these systems as in their careers they will be ERP users, auditors, consultants, and/or developers. |
| **Catalog Description:** Basics of ERP. Implementation issues, Business modules, Products in the area of ERP, Future Trends. |
| **Pre-requisites:** None |
| **Course Outline:**  **I. INTRODUCTION (07 hours)**   1. ERP: An Overview 2. Enterprise: An Overview 3. Benefits of ERP and Related Technologies 4. Business process Reengineering (BPR) 5. Data Warehousing and Data Mining   **II. ERP IMPLEMENTATION (08 hours)**   1. Implementation Lifecycle and Methodology 2. Hidden Costs 3. Organizing the Implementation 4. Vendors, Consultants and Users 5. Contracts with Vendors, Consultants and Employees 6. Project Management and Monitoring   **III. THE BUSINESS MODULES (08 hours)**   1. Business Modules in an ERP Package 2. Finance 3. Manufacturing 4. Human Resources 5. Plant Maintenance 6. Materials Management, Quality Management 7. Sales and Distribution   **IV. ERP MARKET (08 hours)**   1. ERP Marketplace 2. SAP AG 3. Peoplesoft 4. Oracle 5. QAD 6. SSA   **V. ERP-PRESENT AND PUTURE (08 hours)**   1. Turbo Charge the ERP System 2. EIA 3. ERP and E-Commerce 4. ERP and Internet 5. Future Directions |
| **Text books:**   1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill, New Delhi, 2000 2. Mary Sumner, “Enterprise Resource Planning”, Pearson Education, 2007. |
| **Reference Books:**   1. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology, USA, 2001. 2. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI, New Delhi, 2003 |
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| **Grading System:** The final grade shall be based on the following :-  Internal Evaluation: 30%  End Semester Exam: 70% |
| **Academic Council Approval:** |

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Storage Management(3) **Code:CS2355**

**Programme: Integrated MSC IT Semester: IX**

**Rationale**:

The most vital part of a computer system today is data which may be in the form of banking data, a company’s inventory database or a multimedia presentation. This data needs to be safeguarded or managed in such a way that it can be accessed readily or speedily restored in the event of a hardware failure

**Catalog Description:**

In this module, students are introduced to basics of Storage management, for both hardware and software functional knowledge. Different topics covered are backup and recovery, local replication, and process automation, storage provisioning and related techniques.

**Pre-requisites**: Basic understanding of data storage, backup and its significance

**Course Outline:**

**Unit I (07 hours)**

**Introduction to Information storage and Management**Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture,Data Center Infrastructure - Core elements- Key Requirements for Data Center Elements -Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits ,Summary

**Unit II Storage System Environment (08 hours)**

Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host - Operating System - Device Driver -Volume Manager - File System – Application , Application Requirements and Disk Performance, Summary

**Unit III Backup and Recovery (08 hours)**Backup Purpose -Disaster Recovery - Operational Backup –Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods , Backup Process, Backup and Restore Operations, Backup Topologies - Serverless Backup , Backup Technologies -Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library

**Unit IV Local Replication (08 hours)**

Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database , Local Replication Technologies - Host-Based Local Replication - Storage Array-Based Replication , Res tore and Restart Considerations - Tracking Changes to Source and Target , Creating Multiple Replicas, Management Interface

**Unit V Managing the storage Infrastructure (08 hours)**

Monitoring *the* Storage Infrastructure -Parameters Monitored - Components Monitored - Monitoring Examples - Alerts, Storage Management Activities - Availability management - Capacity management - Performance management - Security Management - Reporting- Storage Management Examples, Storage Infrastructure Management Challenges

**Text Book:**

1. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill Publication, 2003

**Reference Book:**

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

**Grading System:** The final grade shall be based on the following :-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Personal and Effective Communication Laboratory (2)**Code:CS2352**

**Programme: Integrated MSC IT Semester:IX**

**Rationale**:

**Catalog Description:**

**Pre-requisites**: None

**Course Outline:**

**Unit I (07 hours)**

**Effective Communication**

Good communication v/s Effective Communication, Characteristics of Effective Communication

Styles of Communication

**Unit II (08 hours)**

Creative Writing

**Paragraph**

Articles, Story Writing

**Unit III (08 hours)**

**Reading Skills**

Newspaper Review & Book Review

**Unit IV (08 hours)**

**General Awareness**

General Knowledge & Current Affairs (Politics, Business, Sports, Science & Technology, & Entertainment)

**Unit V (08 hours)**

**Creativity and Lateral Thinking**

Creativity and Teamwork, Collage Making

**Recommended Readings**

1. **Lateral Thinking by** by Bono Edward De (Author)

# Lateral Thinking: Creativity Step by Step (Perennial Library) by Edward De Bono

### Effective Communication Skillsby MTD Training

**Grading System:** The final grade shall be based on the following:-

Internal Evaluation: 30%

End Semester Exam: 70%

**Academic Council Approval:**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Major Project – Phase I (4) **Code:CS2356**

**Programme: Integrated MSC IT Semester: VI**

Details of the project will be provided later

**SEMESTER X**

**The Assam Kaziranga University,**

**School of Computing Sciences**

**Koraikhowa, Jorhat, Assam-785006**

**Course with Credit:**Major Project – Phase II / Internship (14) **Code:CS2357**

**Programme: Integrated MSC IT Semester: X**

Details of the project / Internship will be provided later