

RUC501 /RUC601		CYBER SECURITY	L-T-P: 3-0-0
Unit	Topic		Proposed Lecture
I	<b>Introduction-</b> Introduction to Information Systems, Types of Information Systems, Development of Information Systems, Introduction to Information Security, Need for Information Security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.		08
II	<b>Application Security-</b> (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards. Digital Signature, Public Key Cryptography		08
III	<b>Developing Secure Information Systems-</b> Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and Intrusion Detection Systems, Backup Security Measures.		08
IV	<b>Security Policies-</b> Development of Policies, WWW Policies, Email Security Policies, Policy Review Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. <b>Evolving Technology Security</b> – Mobile, Cloud, Outsourcing, SCM.		08
V	<b>Information Security Standards-</b> ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law. <b>Case Study</b> – Corporate Security		08
<b>References:</b>			
<ol style="list-style-type: none"> <li>1. Charles P. Pfleeger, Shari Lawerance Pfleeger, “Analysing Computer Security”, Pearson Education India.</li> <li>2. V.K.Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.</li> <li>3. Sarika Gupta &amp; Gaurav Gupta, Information Security and Cyber Laws, Khanna Publishing House</li> <li>4. Anshul Kaushik, Cyber Security, Khanna Publishing House</li> <li>5. Dr.Surya Prakash Tripathi, Ritendra Goyal, Praveen Kumar Shukla ,”Introduction to Information Security and Cyber Law” Willey Dreamtech Press.</li> <li>6. Michael E.Whitman and Herbert J Mattord "Principle of Information Security" Cengage</li> <li>7. Mike Chapple and David Seidl "Cyberwarfare: Information operations in a connected world" Jones &amp; Bartlett Learning</li> <li>8. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.</li> <li>9. CHANDER, HARISH,” Cyber Laws And It Protection ” , PHI Learning Private Limited ,Delhi</li> <li>10. V.K. Jain, Cryptography and Network Security, Khanna Publishing House, Delhi</li> </ol>			

<b>RCS-502: Design and Analysis of Algorithm</b>		3-1-0
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> Algorithms, Analyzing Algorithms, Complexity of Algorithms, Growth of Functions, Performance Measurements, Sorting and Order Statistics - Shell Sort, Quick Sort, Merge Sort, Heap Sort, Comparison of Sorting Algorithms, Sorting in Linear Time.	<b>08</b>
<b>II</b>	<b>Advanced Data Structures:</b> Red-Black Trees, B – Trees, Binomial Heaps, Fibonacci Heaps, Tries, Skip List	<b>08</b>
<b>III</b>	<b>Divide and Conquer</b> with Examples Such as Sorting, Matrix Multiplication, Convex Hull and Searching. <b>Greedy Methods</b> with Examples Such as Optimal Reliability Allocation, Knapsack, Minimum Spanning Trees – Prim’s and Kruskal’s Algorithms, Single Source Shortest Paths - Dijkstra’s and Bellman Ford Algorithms.	<b>08</b>
<b>IV</b>	<b>Dynamic Programming</b> with Examples Such as Knapsack. All Pair Shortest Paths – Warshal’s and Floyd’s Algorithms, Resource Allocation Problem. Backtracking, Branch and Bound with Examples Such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets.	<b>08</b>
<b>V</b>	<b>Selected Topics:</b> Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-Completeness, Approximation Algorithms and Randomized Algorithms	<b>08</b>

**References:**

1. Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Prentice Hall of India.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",
3. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education, 2008.
4. LEE "Design & Analysis of Algorithms (POD)", McGraw Hill
5. Gajendra Sharma, Design & Analysis of Algorithms, Khanna Publishing House
6. Richard E. Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning
7. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.
8. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006.
9. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997
10. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.
11. Harsh Bhasin, "Algorithm Design and Analysis", First Edition, Oxford University Press.
12. Gilles Brassard and Paul Bratley, Algorithmics: Theory and Practice, Prentice Hall, 1995.

**B. Tech. (INFORMATION TECHNOLOGY)  
FIFTH SEMESTER (DETAILED SYLLABUS)**

<b>RCS-501:Database Management Systems</b>		3-0-0
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> Overview, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. Data Modeling Using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationship of Higher Degree.	<b>08</b>
<b>II</b>	<b>Relational data Model and Language:</b> Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus. Introduction on SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and Their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL	<b>08</b>
<b>III</b>	<b>Data Base Design &amp; Normalization:</b> Functional dependencies, normal forms, first, second, 8 third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design	<b>08</b>
<b>IV</b>	<b>Transaction Processing Concept:</b> Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System.	<b>08</b>
<b>V</b>	<b>Concurrency Control Techniques:</b> Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of Oracle.	<b>08</b>

**References:**

1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
2. Date C J, "An Introduction to Database Systems", Addison Wesley
3. Elmasri, Navathe, " Fundamentals of Database Systems", Addison Wesley
4. O'Neil, Databases, Elsevier Pub.
5. RAMAKRISHNAN"Database Management Systems",McGraw Hill
6. Leon & Leon,"Database Management Systems", Vikas Publishing House
7. Bipin C. Desai, " An Introduction to Database Systems", Ggotia Publications
8. Majumdar & Bhattacharya, "Database Management System", TMH
9. R.P. Mahapatra, Database Management System, Khanna Publishing House

**9. Course on 'PHP & MySQL', Spoken Tutorial MOOC**

<b>RAS501 Managerial Economics</b>		<b>L-T-P: 3-0-0</b>
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction of Engineering Economics and Demand Analysis:</b> Meaning and nature of Economics, Relation between science, engineering, technology and economics; Meaning of Demand, Determinants of Demand, Shifts in demand, Law of Demand, Price Elasticity of Demand &Types, Income Elasticity, Cross price Elasticity, Determinants of Elasticity, uses and importance of elasticity.	<b>06</b>
<b>II</b>	<b>Concept of Supply:</b> Law of Supply, Factors affecting Supply, Elasticity of supply. <b>Demand Forecasting:</b> Introduction, Meaning and Forecasting, Methods or Techniques of Demand Forecasting, Criteria for Good Demand Forecasting, Demand Forecasting for a New Product;	<b>06</b>
<b>III</b>	<b>Cost Analysis-</b> Introduction, Types of Costs, Cost-Output Relationship: Cost Function, Cost-Output Relationships in the Short Run, and Cost-Output Relationships in the Long Run; Short run and long run, Break- Even Analysis; Production functions: laws of variable proportions, law of returns; Economies of scale: Internal and external.	<b>06</b>
<b>IV</b>	Market Structure: Market Structure Perfect Competition, Imperfect competition – Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.	<b>06</b>
<b>V</b>	Nature and characteristics of Indian economy, concepts of LPG, elementary concepts of National Income, Inflation and Business Cycles ,Concept of N.I. and Measurement., Meaning of Inflation, Types and causes , Phases of business cycle .Investment decisions for boosting economy(National income and per capital income)	<b>06</b>
<b>References:</b>		
<ol style="list-style-type: none"> <li>1. Premvir Kapoor, Sociology and Economics for Engineers, Khanna Publishing House (Edition 2018)</li> <li>2. Salvatore D, “Principles of Microeconomics”, Oxford University Press.</li> <li>3. Koutsoyiannis A, “Modern Microeconomic”, Macmillan Education Ltd.</li> <li>4. Dwivedi DN, “Principles of Microeconomics”, Pearson Education.</li> <li>5. Cowell, FA, “Microeconomic Principles and Analysis”, Oxford University Press.</li> </ol>		

<b>RCS-503: Principles of Programming Languages</b>		3-0-0
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> Role of Programming Languages: Why Programming Languages, Towards Higher-Level Languages, Programming Paradigms, Programming Environments Language Description: Syntactic Structure, Language Translation Issues: Programming Language Syntax, Stages in Translation, Formal Translation Models	<b>08</b>
<b>II</b>	<b>Data, Data Types, and Basic Statements :</b> Names , Variables , Binding, Type Checking, Scope, Scope Rules , Lifetime and Garbage Collection, Primitive Data Types, Strings, Array Types, Associative Arrays ,Record Types, Union Types, Pointers and References , Arithmetic Expressions , Overloaded Operators, Type Conversions , Relational and Boolean Expressions, Assignment Statements, Mixed Mode Assignments, Control Structures, Selection ,Iterations, Branching, Guarded Statements	<b>08</b>
<b>III</b>	<b>Subprograms and Implementations :</b> Subprograms, Design Issues, Local Referencing, Parameter Passing, Overloaded Methods, Generic Methods, Design Issues for Functions , Semantics of Call and Return, Implementing Simple Subprograms, Stack and Dynamic Local Variables, Nested Subprograms, Dynamic Scoping.	<b>08</b>
<b>IV</b>	<b>Object-Orientation, Concurrency, and Event Handling :</b> Grouping of Data and Operations — Constructs for Programming Structures, Abstraction Information Hiding, Program Design with Modules, Defined Types, Object Oriented Programming — Concept of Object, Inheritance, Derived Classes and Information Hiding – Templates, Semaphores, Monitors, Message Passing, Threads, Statement Level Concurrency Exception Handling (Using C++ and Java as Example Language).	<b>08</b>
<b>V</b>	<b>Functional and Logic Programming Languages :</b> Introduction to Lambda Calculus , Fundamentals of Functional Programming Languages, Programming with Programming with ML, Introduction to Logic and Logic Programming – Programming with Prolog.	<b>08</b>

**References:**

1. “Programming Languages: Design and Implementations” , Terrance W.Pratt, Marvin V. Zelkowitz, T.V.Gopal, Fourth ed., Prentice Hall
2. “Programming Language Design Concept”, David A. Watt, Willey India
3. “Programming languages: Concepts and Constucts”, Ravi Sethi, Second Ed.,Pearson.
4. “Types and programming Languages”, Benjamin C. Pierce. The MIT Press Cambridge, Massachusetts London, England
5. Concepts of Programming Languages, Robert W. Sebesta, 10th Ed.,Pearson

<b>RCS-052: WEB TECHNOLOGIES</b>		3-0-0
<b>Unit</b>	<b>Topic</b>	<b>Proposed Lecture</b>
<b>I</b>	<b>Introduction:</b> Introduction and Web Development Strategies, History of Web and Internet, Protocols Governing Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing. <b>Core Java:</b> Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Event handling, Introduction to AWT, AWT controls, Layout managers	<b>08</b>
<b>II</b>	<b>Web Page Designing:</b> HTML: List, Table, Images, Frames, forms, CSS, Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML, Using XML Processors: DOM and SAX, Dynamic HTML	<b>08</b>
<b>III</b>	<b>Scripting:</b> Java script: Introduction, documents, forms, statements, functions, objects; introduction to AJAX, <b>Networking</b> : Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagram.	<b>08</b>
<b>IV</b>	<b>Enterprise Java Bean:</b> Preparing a Class to be a JavaBeans, Creating a JavaBeans, JavaBeans Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean <b>Java Database Connectivity (JDBC):</b> Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.	<b>08</b>
<b>V</b>	<b>Servlets:</b> Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session <b>Java Server Pages (JSP):</b> Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries..	<b>08</b>
<b>References:</b> <ol style="list-style-type: none"> <li>1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley</li> <li>2. Xavier, C, " Web Technology and Design" , New Age International</li> <li>3. Ivan Bayross," HTML, DHTML, Java Script, Perl &amp; CGI", BPB Publication</li> <li>4. Tanveer Alam, Internet &amp; Java Programming, Khanna Publishing House</li> <li>5. Bhave, "Programming with Java", Pearson Education</li> <li>6. Herbert Schildt, "The Complete Reference:Java", TMH.</li> <li>7. Hans Bergsten, "Java Server Pages", SPD O'Reilly</li> <li>8. Margaret Levine Young, "The Complete Reference Internet", TMH</li> <li>9. Naughton, Schildt, "The Complete Reference JAVA2", TMH</li> <li>10. Balagurusamy E, "Programming in JAVA", TMH</li> </ol>		