

## COURSE SPECIFICATION

**Choice based Credit System (CBCS) Scheme and course structure for  
Information Technology 4<sup>th</sup> semester effective from academic session 2016 and onwards**

Course Code	Name of the Subject	Paper Category	Hours/Week			Credits
IT16401CR	Project	Core(CR)	0	0	24	12
IT16402CR	Wireless Communication	Elective (DCE)	3	0	0	3
IT16403CR	Cryptography & network security	Elective (DCE)	3	0	0	3
IT16404DCE	Finite automata & Formal Languages	Elective (DCE)	3	0	0	3
IT16405DCE	Computer Graphics	Elective (DCE)	3	0	0	3
IT16406GE	Programming with C/C++	Elective (GE)	3	0	0	3
IT16407GE	Project Management	Elective (GE)	3	0	0	3
IT16408OE	E Governance	Elective (OE)	3	0	0	3
IT16409OE	Pervasive Computing	Elective (OE)	3	0	0	3
24 Credits						

**Course Code: IT16401CR**  
**Course Title: Project**

**Course Code: IT16402CR**  
**Course Title: Wireless Communications**

**Unit I**

Classification and types of Wireless telephones. Introduction to Cordless, Fixed Wireless(WLL), Wireless with limited mobility(WLL-M) and (Fully)Mobile Wireless phones. Introduction to various generations of mobile phone technologies and future trends.Wireline vs. Wireless portion of mobile communication networks. Mobile-Originated vs. Mobile-Terminated calls. Mobile-Phone numbers vs. Fixed-Phone numbers; Billing Issues.

**Unit II**

Electromagnetic spectrum, its use and allocation to well-known bands. Concept of cells, sectorization, coverage area, frequency reuse, cellular networks & handoffs.

**Unit III**

Wireless Transmission concepts; types of antennas, signal propagation, multipath propagation.Comparison of FDM, TDM and CDM techniques. Basic concepts of Spread Spectrum(SS) technique; Direct Sequence SS versus Frequency Hopping SS.

**Unit IV**

Simplified implementation of IS-95 CDMA using chip sequences. Concept of CDMA(PCS& Cellular) channel; Forward and Reverse CDMA channel for a cell/sector. Concept of(Walsh)Code Channels within a CDMA Channel. Purpose of Pilot, Sync, Paging, Forward Traffic Channels.Purpose of Access & Reverse TCs. Comparison of Cellular and PCS CDMA networks; frequencies and cell-sizes. Advantages/Disadvantages of smaller cell size. Concept of Voice Coding . Components of Mobile Network Infrastructure: MS, BTS, BSC, MSC; their basic functions and characteristics. Types of handoffs in GSM.Use of HLR and VLR in mobile networks.

**References Books:**

1. Andy Dornan, "The Essential Guide to Wireless Communications Applications", Pearson.
2. Jochen Schiller, "Mobile Communications", Pearson.
3. K.Pahlavan, P.Krishnamurthy, "Principles of Wireless Networks", Pearson Education.
4. Andrew Tanenbaum, " Computer Networks(4th Edition)", Pearson Education.
5. T. Rappaport, "Wireless Communications, Principles and Practice (2nd Edition). Pearson Education

**Course Code: IT16403CR**

**Course Title: CRYPTOGRAPHY & NETWORK SECURITY**

### **Unit I**

Fundamentals of network security, Secure channels via encryption. Block ciphers and encryption modes. Message Authentication Codes., Stream ciphers. Authentication mechanisms. Kerberos. Public key cryptography, RSA scheme. SSL scheme..

### **UNIT II**

Basics: Introduction, Protocol Structure Specification and Modeling: Validation Models, Correctness requirements, Protocol Design, Finite State machines

### **UNIT III**

Mechanics of Routing Protocols, Internet working with Dissimilar Protocols, Future of Routing, Protocol

Designing: Simplicity VS flexibility VS Optimality, Overhead and scaling, Operation above Capacity, forward compatibility, Migration: Routing Algorithms and addressing parameters, making multi-protocol operation possible, Robustness, determinism VS Scalability, performance for correctness

### **UNIT IV**

Design Tools: A protocol Simulator, A Protocol Validator, using the validator, Network Security: Features Security in Wireless, Adhoc and Sensor Networks

### **Reference Books:**

1. William Stallings ,” cryptography and Network Security”, Pearson Education
2. Interconnections: Bridges, Routers switches and Internet-working protocols Radia Perlman (Pearson education) 2. IP Routing Fundamentals Mark Sportack (Pearson Education)
3. Design and Validation Computer Protocols : Gerard J. Holzmann (Prentice Hall)

**Course Code: IT16404DCE**

**Course Title: Fine automata & Formal Languages**

**Unit I**

Basic concepts of theory of computation: Formal Languages and Grammars, Finite State Transducers, Finite-State Automata and Regular Languages, Limitations of Finite-Memory Programs.

**Unit II**

Recursive finite-domain programs, Recursion, Pushdown Transducers, Context-Free Languages, Limitations of Recursive Finite-Domain Programs

**Unit III**

Turing Machines. Programs and Turing Transducers, Universal Turing Transducers, Undecidability.

**Unit IV**

Introduction to resource-bounded computation, Time and Space, A Time Hierarchy, Nondeterministic Polynomial Time, some *NP*-Complete Problems

**Text Book:**

1. Hopcroft, J., and Ullman, J. (1979), "*Introduction to Automata Theory, Languages and Computation*", Pearson Education.

1. P. Linz, "*Introduction to Formal Languages and Automata*", 3rd edition, 2000, Jones and Barlett, PWS Publishing Company.

**Suggested Readings:**

1. Eiton Gurarri : *Introduction to Theory of computation*, Computer Science press

2. Hopcroft J, R. Motwani, and J. Ullman, "*Introduction to Automata Theory, Languages and Computation*", 3rd Ed. 2006, Pearson Education.

**Course Code: IT16405DCE**  
**Course Title: Computer Graphics**

**Unit I**

Introduction to Computer Graphics. Applications of Computer Graphics. Graphic Display Devices\_ Raster, Refresh, Random. Display Buffer, Concept of Double Buffering and Segmentation of Display Buffer. Use of Lookup tables. OpenGL API.

**Unit II**

2-D Graphics. Cartesian and Homogeneous Coordinate Systems. Line drawing algorithms (Bresenham's and DDA). Circle and Ellipse Drawing Algorithms. 2-Dimensional Transformations. Concepts of Window & Viewport, Window to Viewport Transformations. Filling, Boundary and Floodfill algorithms.

**Unit III:**

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations. 3-Dimensional Transformations. Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection.

**Unit IV**

Curves and Surfaces, Splines, Spline specification, Interpolated & Approximated Splines. Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. B-Splines curves and surfaces. Fractals - Fractal Generation Procedure.

Text Book : Hearn and Baker "Computer Graphics" 2nd Edition , Pearson Education.

**Reference Books**

1. W.M.Newman and Sproull. "Principles of interactive Computer Graphics" ,TMH
2. Steven Harrington." Computer Graphics a Programming Approach" McGraw Hill.
3. Plastock and Kelley. "Schaums outline of theory and problems of computer Graphics"
4. David F Frogers and J Alan Adams. "Procedural Elements of Computer Graphics" McGraw Hill
5. David F Rogers and J Alan Adams. "Mathematical Elements of Computer Graphics" McGraw Hill
6. James. D. Foley, A Vandam etal "Computer Graphics" Pearson.

**Course code:- IT16406GE**

**Course Title: Programming with C / C++**

### **Unit I**

Arrays: Declaration; initialization; 2-dimensional and 3-dimensional array, passing array to function, strings and string functions, and character arrays. Pointers: variables, swapping data, swapping address v/s data, misuse of address operators, pointers and arrays , pointers to pointers , strings , pointer arithmetic, additional operators , portability, pointers to functions, using pointers with arrays , void pointers .Structures and unions: syntax and use, members, structures as function arguments, structure pointers, array of structures as arguments, passing array of structure members, call by reference.

### **Unit II:**

Functions; prototype, passing parameters, storage classes, identifier visibility, Recursive functions. Command-line arguments. Scope rules, Multi-file programming, Introduction to macros. File processing in C and C++. Introduction to graphics, graphic initialization, graphic modes, drivers, basic drawing functions, Animations- concept and implementation, Building graphical user interface.

### **Unit III**

Introduction to classes and objects; Constructor; destructor; Operator overloading; Function overloading; function overriding; friend function; copy constructor; Inheritance: Single , Multiple, and Multilevel Inheritance; Virtual function and Polymorphism: Dynamic binding, Static binding; Virtual functions; Pure virtual function; concrete implementation of virtual functions; Dynamic binding call mechanism; Implementation of polymorphism; virtual destructors.

### **Unit IV**

Templates: Function Templates, Class Templates, Member Function Template and Template Arguments, Exception Handling, Standard Template Library

### **Reference Books:**

1. FOSTER AND FOSTER “C by discovery” RRI penram.
2. YASHWANT KANETKAR “Let us C” PHI.
3. E. BALAGURUSWAMI “Programming in ANSI C” Tata McGraw Hill.
4. BJARNE STROUSTRUP “The C++ programming language” Pearson Education.
5. HERBERT SCHILD “C++ The complete Reference” Tata McGraw Hill.
6. ROBERT LAFORE “Object orientation with C++ Programming” Waite Group.

**Course Code: IT16407GE**  
**Course Title: Project Management**



**Course Code: IT16408OE**  
**Course Title: e Governance**

**Course Code: IT16409OE**  
**Course Title: Pervasive Computing**

**Unit I**

Technologies : Past, Present, Future , Pervasive Computing , The pervasive computing market, m-Business , Conclusions and Challenges , Future , Application Examples , Device Technology : Hardware , Human-machine interfaces , Biometrics , Operating Systems , Java for Pervasive devices , Device Connectivity : Protocols , Security , Device Management , Web Application Concepts : History of World wide Web . World Wide Web Architecture, Protocols, Transcoding, Client Authentication via the Internet.

**Unit II**

WAP : Introduction , Components of the WAP architecture , WAP infrastructure , WAP Security Issues , Wireless Markup Language , WAP push , Products , i-mode , Voice Technology : Basics of Speech Recognition , voice standards , speech applications , speech and pervasive computing , security, Personal Digital assistants : History , Device Categories , PDA Operating Systems , Device Characteristics , Software Components , Standards , Mobile Applications , PDA browsers.

**Unit III**

Architecture : Server Side Programming in Java : J2EE and overview , Servlets, Enterprise Java Beans , Java Server Pages , Extensible Markup Language , Web services , Model-View-Controller Pattern, Pervasive web application architecture : Background , scalability and availability , Development of pervasive computing web applications , Pervasive application architecture.

**Unit IV**

Example Application:Introduction , User Interface overview , Architecture , Implementation. Access from PCs: Smart Card-based authentication via the Internet , Ordering goods , Access via WAP : WAP functionality , Implementation , Access from Personal Digital Assistants: Extending the example application to personal digital assistants. Implementation for synchronized devices, for intermittently connected devices, for connected devices. Access via voice : Extending the example application to voice access , Implementation.

**Reference Books :**

1. JochenBurkhardt, Dr. Horst Henn , Stefan Hepper , Klaus Rintdorff, Thomas schack “ Pervasive Computing “ Technology and Architecture of Mobile Internet Applications , Pearson Education.