UNIVERSITY OF CALICUT

Faculty of Engineering

Curriculum, Scheme of Examinations and Syllabi for B.Tech Degree Programme with effect from Academic Year 2000-2001

CS : Computer Science & Engineering

FIFTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
CS2K 501	Software Engineering	3	1	-	50	3	100
CS2K 502	Numerical Analysis & Optimisation Techniques	3	1	-	50	3	100
CS2K 503	Programming Language Concepts	3	1	-	50	3	100
CS2K 504	Digital Data Communication	3	1	-	50	3	100
CS2K 505	Operating Systems	3	1	-	50	3	100
CS2K 506	Elective I	3	1	-	50	3	100
CS2K 507(P)	**Programming Paradigms Lab**	-	-	3	50	3	100
CS2K 508(P)	**Hardware Lab**	-	-	3	50	3	100
TOTAL		**18**	**6**	**6**	**400**	**-**	**800**

Elective I

CS2K 506A - Computational Complexity

CS2K 506B - Communication Systems

CS2K 506C - Data Modelling & Design

CS2K 506D - Digital Signal Processing

CS2K 506E - Object Oriented Programming

CS2K 506F - VLSI Design

CS2K 501 : SOFTWARE ENGINEERING

(common to all programmes)

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction - FAQs about software engineering - professional and ethical responsibility - system modeling - system engineering process - *the software process* - life cycle models - iteration - specification - design and implementation - validation - evolution - automated process support - *software requirements* - functional and non-functional requirements - user requirements - system requirements - SRS - *requirements engineering processes* - feasibility studies - elicitation and analysis - validation - management - *system models* - context models - behavior models - data models - object models - CASE workbenches

Module II (13 hours)

Software prototyping - prototyping in the software process - rapid prototyping techniques - *formal specification* - formal specification in the software process - interface specification - behavior specification - *architectural design* - system structuring - control models - modular decomposition - domain-specific architectures - distributed systems architecture - *object-oriented design* - objects and classes - an object oriented design process case study - design evolution - *real-time software design* - system design - real time executives - *design with re use* - component-based development - application families - design patterns - *user interface design* - design principles - user interaction - information presentation - user support - interface evaluation

Module III (13 hours)

Dependability - critical systems - availability and reliability - safety - security - critical systems specifications - critical system development - *verification and validation* - planning - software inspection - automated static analysis - clean room software development - *software testing* - defect testing - integration testing - object-oriented testing - testing workbenches - critical system validation - *software evolution* - legacy systems - software change - software maintenance - architectural evolution - software re-engineering - data re-engineering

Module IV (13 hours)

Software project management - project planning - scheduling - risk management - *managing people* - group working - choosing and keeping people - the people capability maturity model - *software cost estimation* - productivity estimation techniques - algorithmic cost modeling, project duration and staffing *quality management* - quality assurance and standards - quality planning - quality control - software measurement and metrics - *process improvement* - process and product quality - process analysis and modeling - process measurement - process CMM - *configuration management* - planning - change management - version and release management - system building - CASE tools for configuration management

Text book

1. *Ian Sommerville, Software Engineering , Pearson Education Asia*

Reference books

1. *Pressman R.S., Software Engineering , McGraw Hill*
2. *Mall R., Fundamentals of Software Engineering , Prentice Hall of India*
3. *Behferooz A. & Hudson F.J., Software E ngineering Fundamentals , Oxford University Press*
4. *Jalote P., An Integrated Approach to Software Engineering , Narosa*

Sessional work assessment

Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total marks	*= 50*

University examina tion pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 15marks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 502 : NUMERICAL ANALYSIS & OPTIMIZATION TECHNIQUES

(common with IT2K 506A)

3 hours lecture and 1 hour tutorial per week

Module I: Numerical analysis I (10 hours)

Errors in numerical calculations - sources of errors - significant digits - numerical solution of polynomial and transcendental equations - bisection method - regula-falsi method - Newton-Raphson method - fixed point method of iteration - rates of convergence of these methods - solution of system of algebraic equations - exact methods - Crout's triangularization method - iterative methods - gauss - seidel and relaxation method - polynomial interpolation - Lagrange interpolation polynomial - divided differences - Newtons` divided difference interpolation polynomial - finite differences - operators Δ,∇,e,δ-gregory - Newton forward and backward difference interpolation polynomials - central differences - stirlings interpolation formulae

Module II: Numerical analysis II (16 hours)

Numerical differentiation - differentiation formulae in the case of equally spaced points - numerical integration - trapezoidal and Simpsons` rules - compounded rules - errors of interpolation and integration formulae numerical solution of ordinary differential equations - single stepmethods - Taylor series method - Eulers` method - modified Eulers` method - Picards` iteration method - runge - kutta methods (2^{nd}, 3^{rd} and 4^{th} order formulae - derivations not required) - multistep methods - Milnes` predictor and corrector formulae

Module III: Optimization techniques I (16 hours)

Optimization methods - mathematical formulation of linear programming problem - simplex method - artificial variables - Charnes M method - two phase technique - duality in linear programming - dual simplex method

Module IV: Optimization techniques II (10 hours)

Transportation assignment and routing problems

Reference books

1. *Sastry S.S., Numerical Analysis , Prentice Hall India*
2. *Froberg, Introduction to Numerical Analysis , Addition Wesley*
3. *Salvadori & Baron, Numerical Methods in Engineering , Prentice Hall India*
4. *Gerald, Applied Numerica l Analysis , Addison Wesley*
5. *Grawin W.W., Introduction to Linear Programming , McGraw Hill*
6. *Gass S.I., Introduction to Linear Programming , Tata McGraw Hill*

Sessional work assessment

Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total ma rks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one

Q III - 2 questions of 15marks each from module I I with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 503 : PROGRAMMING LANGUAGE CONCEPTS

3 hours le cture and 1 hour tutorial per week

Module I (12 hours)

Introduction - role of programming languages - towards higher - level languages - programming paradigms - language description - expression notations - abstract syntax trees - lexical syntax - context-tree grammars - introduction to semantics - imperative programming - statements - syntax - directed control flow - syntactic concerns - handling special cases in loops - types - the role of types - basic types - structured types - procedure activations - introduction to procedures - parameter passing methods - scope rules

Module II (13 hours)

Object oriented programming - grouping of data and operations - constructs for program structuring - information hiding - program design with modules - modules and defined types class declarations - dynamic allocation - templates - object oriented programming - object oriented thinking - inheritance - derived classes and information hiding

Module III (13 hours)

Functional programming - elements of functional programming - a little language of expressions - types - functions declarations - approaches to expression evaluation - lexical scope - type checking - functional programming in a typed language - functional programming with lists - structure of lists - list manipulation - storage allocation for lists

Module IV (14 hours)

Logic programming - computing with relations - introduction to a logic programming language - data structures and control in the language - concurrent programming - parallelism in hardware - implicit synchronization - concurrency as interleaving - liveness properties - safe accon to shaved data - synchronized access to shared variables

Text book

1. *Sethi R., Programming Languages: Concepts & Constructs , Addison Wesley*

Referenc e books

1. *Scott M.L., Programming Language Pragmatics , Harcourt Asia (Morgan Kaufman)*
2. *Sebesta R.W., Concepts of Programming Languages , Addison Wesley*
3. *Tennent R.D., Principles of Programming Languages , Prentice Hall Internatio nal*
4. *Appleby D. & Vandekopple J.J ., Programming Languages : Paradigm & Practice , Tata McGraw Hill*

Sessional work assessment

Assignments	*2x10 = 20*
Tests	*2x15 = 30*

Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 15marks each from module II with choice to answer any one
Q IV - 2 question s of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 504 : DIGITAL DATA COMMUNICATION

(common with IT2K 504)

3 hours lecture and 1 hour tutorial pe r week

Module I (13 hours)

Data communication networks - standards - ISO reference model - internal architecture - protocol implementation issues - transmission media - attenuation and distortion - limited bandwidth - signal types -propagation delay - public carrier circuits - modulation - multiplexing - physical layer interfacing standards

Module II (14 hours)

Data transmission basics - transmission modes - asynchronous and synchronous transmission - bit - character and frame synchronization - coding - error detection methods - parity - block sum check - cyclic redundancy check - data compression - Huffman coding - dynamic Huffman coding - facsimile compression - transmission control circuits - communication control devices

Module III (12 hours)

Protocol basics - error control - stop-and-wait & sliding window protocol - link utilization - selective repeat and go-back-N - link management

Module IV (13 hours)

Data link control protocols - character-oriented protocols - half-duplex protocols - duplex protocols - bit- oriented protocols - high level data link control (HDLC) - LAPB - LAPD - logical link control - protocol operation

Text book

Halsall F., Data Communication, Computer Networks and Open Systems , Addison Wesley

Reference books

1. *Forouzan B. , Introduction to Data Communication and Networking , Tata McGraw Hill*
2. *William Stallings, Data and Computer Communications , PHI*
3. *Prakash C Gupta, Data Communications , PHI*

Sessional work assessment

Assignments 2x10 = 20

Tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 15marks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 505 : OPERATING SYSTEMS

(common with IT2K 505)

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Review of operating system strategies - resources - processes - threads - objects - operating system organization - design factors - functions and implementation considerations - devices - characteristics - controllers - drivers - device management - approaches - buffering - device drivers - typical scenarios such as serial communications - storage devices etc

Module II (12 hours)

Process management - system view - process address space - process and resource abstraction - process hierarchy - scheduling mechanisms - various strategies - synchronization - interacting & coordinating processes - semaphores - deadlock - prevention - avoidance - detection and recovery

Module III (12 hours)

Memory management - issues - memory allocation - dynamic relocation - various management strategies - virtual memory - paging - issues and algorithms - segmentation - typical implementations of paging & segmentation systems

Module IV (16 hours)

File management - files - implementations - storage abstractions - memory mapped files - directories and their implementation - protection and security - policy and mechanism - authentication - authorization - case study of unix kernel and microsoft windows NT (concepts only)

Text book

1. *Nutt G.J., Operating Systems - A Modern Perspective , Addison Wesley*

Reference books

1. *Silberschatz & Galvin, Operating System Concepts , Addison Wesley*
2. *Crowley C., Operating Systems - A Design Oriented Approach , Tata McGraw Hill*
3. *Tanenbaum A.S., Modern Operating Systems , Prentice Hall, Pearson Education*

Sessional work assessment	
Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern
Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 15marks each from module II with choic e to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 506A : COMPUTATIONAL COMPLEXITY

3 hours lecture and 1 h our tutorial per week

Module I (13 hours)

Problems and algorithms - classification of problems - decision - search - optimization and enumeration problems - review of unsolvability - rice theorem - fixed point theorem - degrees of unsolvability - complexity classes - P, NP, co-NP, PSPACE - NP hardness - NP completeness - cook's theorem - reductions - NP ∩ co-NP - primality - pratt's theorem - approximability - weak verifiers and non approximability

Module II (13 hours)

Parallel models and complexity - class NC - P-completeness - lograthimic Space - L and NL - NL completeness - randomized computation - randomized complexity classes RP, BPP, PP etc. - relation between classes

Module III 13 hours

Function (search) problems - classes FP and FNP - FNP completeness - optimization problems - DP completeness - relation with P=NP problem - polynomial hierarchy - counting problems - #P completeness - class ⊕P relation between ⊕P and NP

Module IV 13 hours

One way functions - public key cryptography - class UP - randomized cryptography - alternation and games - AP - completeness - equivalence of AP and PSPACE - PSPACE completeness - games against nature - interactive protocols - classes APP, ABPP and IP - Shamir's theorem (IP=PSPACE) - zero knowledge proofs

Text book

Papadimitirou C.H., Computational Complexity , Addison Wesley

Reference books

1. *Moret, B.M., The Theory of Computation , Addison Wesley*
2. *Bovet D.P. & Crescenzi P., Introduction to the Theory of Complexity , Prentice Hall*

Sessional work assessment

Assignments 2x10 = 20
Tests 2x15 = 30
Total marks = 50

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with c hoice to answer any one
Q III - 2 questions of 15marks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 506B : COMMUNICATION SYSTEMS

(common with IT2K 506B)

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Noise in communication systems - classification - SNR - CNR - noise figure - relationships between noise figures - *voice signal digitization* - PAM - PPM - PWM - PCM - delta modulation - PCM and DM voice signal comparison - TDM of PCM signals - CCITT - *digital radio* - block diagram - ASK - FSK - PSK - QAM - digital demodulation - QAM demodulation

Module II (12 hours)

Line-of sight microwave links - analog line of sight microwave links - digital line of sight microwave links - *communication satellites* - classification - communication satellite systems - orbits - planetary mechanics - launching - stabilization - subsystems and repeaters - *satellite earth stations* - antenna subsystems - transmitter - receiver

Module III (13 hours)

Fibre optic communications - nature of light - optical laws - optical fibres - optical sources - photo detection - *optical communic ation systems* - system parameters - analog optical fibre links - digital optical fibre systems

Module IV (13 hours)

Satellite access - FDM access - TDM access - *satellite links* - satellite link analysis and design - digital satellite link design - *system measurements* - Fourier series - the Z-transform - modulator/demodulator sensitivity measurements - digital microwave link measurements and performance evaluation - *high definition TV* - system specifications

Text book

Kolimbiris H., Digital Communicati on Systems , Pearson Education Asia

Reference books

1. *Freeman R.L., Tele Communication Transmission Hand Book , Wiley*
2. *Panther P.F., Communication System Design , McGraw Hill*
3. *Ramaswami R. & Sivarajan K.N., Optical Networks , Harc ourt Asia*
4. *Gagliardi R.M., Satellite Communications, CBS Publishers*

5. Gowar, Optical Communications, PHI

Sessional work assessment	
Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total marks	*= 50*

University exami nation pattern
Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 15marks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 506C : DATA MODELLING & DESIGN

3 hours lecture and 1 hour tutorial per week

Module I (10 hours)

Overview of object oriented systems - objects - attributes - encapsulation - class hierarchy - polymorphism - inheritance - messages - history of object orientation

Module II (14 hours)

UML - classes - attributes - and operations - class diagrams - generalizations and association constructs - composition and aggregation - collaboration diagrams - sequence diagrams - asynchronous messages and concurrent execution - state diagrams - nested states - concurrent states and synchronization - transient states - architecture and interface diagrams packages - deployment diagrams for hardware artifacts and software constructs - window-layout and window- navigation diagrams

Module III (14 hours)

Encapsulation structure - connascence - domains of object classes - encumbrance - class cohesion - state spaces and behaviour of classes and subclasses - class invariants - preconditions and post conditions - class versus type - principle of type conformance - principle of closed behaviour - case studies

Module IV (14 hours)

Abuses of inheritance - danger of polymorphism - mix-in classes - rings of operations - class cohesion and support of states and behaviour - components and objects - design of a component - lightweight and heavy weight components - advantages and disadvantages of using components - case studies

Text book

Page Jones M., Fundamentals of Object Oriented Design in UML , Pearson Education

Reference books

1. *Booch G., Rumbaugh J. & Jacobsons I., The Unified Modeling Language User G uide, Addison Wesley*
2. *Bahrami A., Object Oriented System Development , McGraw Hill*
3. *Rumbaugh J., Jacobson I. & Booch G., The Unified Modeling Language Reference Manual , Addison Wesley*
4. *Larman C., Applying UML & Patterns: An Int roduction to Object - Oriented Analysis & Design, Addison Wesley*
5. *Pooley R. & Stevens P., Using UML: Software Engineering with Objects & Components, Addison Wesley*

Sessional work assessment

Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 15mar ks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 506D : DIGITAL SIGNAL PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Discrete time signals and systems - discrete signal sequences - linear shift invariant systems - discrete signals - stability and casualty - difference equations - frequency domain representations - fourier transform and its properties - relationship between system representations, review of Z-transforms

Module II (15 hours)

Discrete fourier transform - representation of discrete fourier series - properties of discrete fourier series - periodic convolution - DFT - properties of DFT - computation of DFT - circular convolution - linear convolution using DFT - FFTs - DIT-FFT and DIF-FFT - FFT algorithm for composite N

Module III (13 hours)

Design of digital filters - IIR and FIR filters - low pass analog filter design - Butterworth and Chebyshev filters - design examples - bilinear transformation and impulse invariant techniques - FIR filter design - linear phase characteristics - window method

Module IV (12 hours)

Realization of digital filters - discrete form I and II - cascade and parallel form - finite word length effects in digital filters - quantizer characteristics - saturation overflow - quantization in implementing systems - zero input limit cycles - introduction to DSP processors

Reference books

1. *Proakis & Manolalus, Digital Signal Processing, Principles, Algorithm & Applications , Prentice Hall*
2. *Oppenheim & Schafer, Discrete Time Signal Processing , Prentice Hall*
3. *Ludeman L.C., Fundamentals of Digital Signal Processing , Harper & Row Publishers*
4. *Van Valkenburg M.E., Analog Filter Design , Holt Saunders*
5. *Terrel T.J. & Shark L.K., Digital Signal Processing , Macmillan*

Sessional work assessment	
Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 quest ions of 15marks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 506E : OBJECT ORIENTED PROGRAMMING

(common for all programmes)

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

OOPS and Java basics - Java virtual machine - Java platform API - extended security model - applet classes - exceptions and abstract classes - Java applet writing basics - GUI building with canvas - applet security - creating window applications - writing console applications - utility and math packages

Module II (10 hours)

Swing programming - working with swing components - using the clipboard - input/output streams - printing - working with 2D and 3D Graphics - using audio and video - creating animations

Module III (10 hours)

Java beans development kit - developing beans - notable beans - network programming - client and server Programs - naming and directory services - working with Java management APIS

Module IV (20 hours)

Distributed application architecture - CORBA - RMI and distributed applications - working with remote objects - object serialization and Javaspaces - Java IDL and ORBs, connecting to database - using JDBC - integrating database - support into web applications - Java servlets - JSDK - JAR files - Java native interface

Text books

1. *Campione, Walrath & Huml Tutorial team, The Java Tutorial Continued: The Rest of the JDK, Addison Wesley*
2. *Jamie Jaworski, Java 2 Platform Unleashed: The Comprehensive Solution , SAMS Techmedia*

References books

1. *Holzner S., Java 2, Swings, Servlets, JDBC & Java Beans Programming , IDG Books*
2. *Campione M. & Walrath K. The Java Tutorial: Object -Oriented Programming for the Internet , Addison Wesley*
3. *Naughton Patrick & Herbert Schildt, Java 2: The Complete Reference, Tata McGraw Hill*

Sessional work assessment

Assignments	*2x10 = 20*
Tests	*2x15 = 30*
Total marks	*= 50*

University examination pattern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions of 15marks each from module I with choice to answer any one
Q III - 2 questions of 1 5marks each from module II with choice to answer any one
Q IV - 2 questions of 15marks each from module III with choice to answer any one
Q V - 2 questions of 15marks each from module IV with choice to answer any one

CS2K 506F : VLSI DESIGN

(common with IT2K 506F)

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Introduction to MOS technology - IC technology - MOS and VLSI - NMOS and CMOS fabrication - thermal aspects - MOS circuits tub ties and latch up - wire parasitic - design rules and layouts - multilayer CMOS process - layout diagrams - stick diagrams - hierarchical stick diagrams - layout design analysis tools

Module II (14 hours)

Logic gates - review of combinational logic circuits - basic gate layouts - delay - power consumption - speed power product - wires and delay - combinational logic networks - layout design methods -network delay - cross talk - power optimization - switch logic networks

Module III (12 hours)

Sequential machines - latches and flip flops - sequential system design - subsystem design - pipelining - datapaths - adders - ALU - ROM - RAM - FPGA - PLA - multipliers

Module IV (12 hours)

Floor planning - methods - floor plan of a 4 bit processor - off chip connections - architecture design - register transfer design - architecture for low power - architecture testing - cad systems and algorithms - simulation - layout synthesis

Reference books

1. *Puck Nell D.A. & Eshraghm K., Basic VLSI Design - Systems and Circuits*
2. *Mead C. , Conway L., Introduction to VLSI System, Addison Wesley*
3. *Wayne Wolf, Modern VLSI Design , Phipe*

Sessional work assessment

Assignments	*2×10 = 20*
2 tests	*2×15 = 30*
Total marks	*= 50*

University examination pa ttern

Q I - 8 short type questions of 5 marks each, 2 from each module
Q II - 2 questions A and B of 15marks each from module I with choice to answer any one
Q III - 2 questions A and B of 15marks each from module II with choice to answer any on e
Q IV - 2 questions A and B of 15marks each from module III with choice to answer any one
Q V - 2 questions A and B of 15marks each from module IV with choice to answer any one

CS2K 507(P) : PROGRAMMING PARADIGMS LAB

[common with IT2K 507(P)]

3 hours practical per week

Lab.1: (object-oriented programming in - Java /C+ +) - implementation of abstract data type - binary tree

Lab.2: (object oriented programming) define a base class “shape” and derived classes for rectangle, square, ellipse, circle with proper class hierarchy

Lab.3: (object oriented programming) - define base class for vectors and use inheritance to define complex and real vector with standard operations

Lab.4: (functional programming - in Lisp / scheme / Haskell) - implementation of quick sort

Lab.5: (functional programming) - implementation of binary search tree with insertion, deletion, and search operations

Lab.6: (functional programming) - implementation of set with membership, union, and intersection operations

Lab.7: (logic programming - in prolog / VisiCalc) - program to find the god of two given integers

Lab.8: (logic programming) - program to check whether a given NFA accepts the given string

Lab.9: (concurrent programming - Java / Ada) program to find the least common ancestor of two given nodes in a binary tree

Lab.10: (concurrent programming) - program for the readers and writers problem

Reference books

1. *Sethi R., Programming Languages: Concepts and Constructs , Addison Wesley*
2. *Appleby D. & Vandekopple J.J ., Programming Languages : Paradigm and Practice , Tata McGraw Hill*
3. *Luger & Stubblefield, Artificial Intelligence, Addison Wesley*

Sessional work assessment	
Laboratory practicals and record	*= 30*
Test/s	*= 20*
Total marks	*= 50*

CS2K 508(P) : HARDWARE LAB

[common with IT2K 508(P)]

3 hours practical per week

Lab 1 : Identification of components/cards and PC assembling from components

Lab 2 : Assembly language program for implementing arithmetic operations

Lab 3,4 : Implementation of a file manager using DOS/BIOS interrupts

Lab 5 : TSR (Terminate and Stay Resident) Programming

Lab 6 : ADC interface

Lab 7 : Stepper Motor interface using DAC

Lab 8,9 : Parallel Interface: Printer and HEX keyboard.

Lab 10 : Serial Interface: PC to PC serial interface using MODEM.

Reference books

1. *Messmer H.P., The Indispensable PC Hardware Book , Addison Wesley*
2. *Hall D.V., Microprocessors and Interfacing , Tata McGraw Hill*
3. *Norton P., Dos Internals*

Sessional work assessment	
Laboratory practicals and record	*= 30*
Test/s	*= 20*
Total marks	*= 50*