Maulana Abul Kalam Azad University of Technology, West Bengal

(Formerly West Bengal University of Technology)

Syllabus for B. Tech in Computer Science & Engineering

(Applicable from the academic session 2018-2019)

SEMESTER – V

Software Engineering
Code: ESC501
Contact: 3L

Name of the Course:	**Software Engineering**	
Course Code: **ESC501**	Semester: V	
Duration:6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance: 5 marks
Practical: hrs./week		End Semester Exam:70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/Unit
1	Overview of System Analysis & Design , Business System Concept, System Development Life Cycle, Waterfall Model , Spiral Model, Feasibility Analysis, Technical Feasibility, Cost- Benefit Analysis, COCOMO model. **[10L]**	10	
2	System Design – Context diagram and DFD, Problem Partitioning, Top-Down And Bottom-Up design; Decision tree, decision table and structured English; Functional vs. Object- Oriented approach. **[5L]**	5	
3	Coding & Documentation – Structured Programming, OO Programming, Information Hiding, Reuse, System Documentation. **[4L]** Testing – Levels of Testing, Integration Testing, Test case Specification, Reliability Assessment, Validation & Verification Metrics, Monitoring & Control. **[8L]**	12	
4.	Software Project Management – Project Scheduling, Staffing, Software Configuration Management, Quality Assurance, Project Monitoring. **[7L]**	7	

5	Static and dynamic models, why modeling, UML diagrams: Class diagram, interaction diagram: collaboration diagram, sequence diagram, state chart diagram, activity diagram, implementation diagram. **[10 L]**	10	

Text book and Reference books:

1. Pressman, Software Engineering : A practitioner's approach– (TMH)
2. Pankaj Jalote, Software Engineering- (Wiley-India)
3. N.S. Gill, Software Engineering – (Khanna Publishing House)
4. Rajib Mall, Software Engineering- (PHI)
5. Agarwal and Agarwal, Software Engineering – (PHI)
6. Sommerville, Software Engineering – Pearson
7. Martin L. Shooman, Software Engineering – TMH

Compiler Design
Code: PCC-CS501
Contact: 3L

Name of the Course:	**Compiler Design**		
Course Code: PCC-CS501	Semester:V		
Duration:6 months	Maximum Marks:100		
Teaching Scheme		**Examination Scheme**	
Theory:3 hrs./week		Mid Semester exam: 15	
Tutorial: NIL		Assignment and Quiz: 10 marks	
		Attendance: 5 marks	
Practical: NIL		End Semester Exam:70 Marks	
Credit Points:	3		
Objective:			
1	To understand and list the different stages in the process of compilation.		
2	Identify different methods of lexical analysis		
3	Design top-down and bottom-up parsers		
4	Identify synthesized and inherited attributes		
5	Develop syntax directed translation schemes		

6	Develop algorithms to generate code for a target machine

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction to Compiling** [3L] Compilers, Analysis of the source program, The phases of the compiler, Cousins of the compiler.	3	
2	**Lexical Analysis** [6L] The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, Finite automata, From a regular expression to an NFA, From a regular expression to NFA, From a regular expression to DFA, Design of a lexical analyzer generator (Lex).	6	
3	**Syntax Analysis** [9L] The role of a parser, Context free grammars, Writing a grammar, Top down Parsing, Non-recursive Predictive parsing (LL), Bottom up parsing, Handles, Viable prefixes, Operator precedence parsing, LR parsers (SLR, LALR), Parser generators (YACC). Error Recovery strategies for different parsing techniques.	9	
4	**Syntax directed translation** [5L] Syntax director definitions, Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes.	5	
5	**Type checking** [4L] Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions	4	
6	**Run time environments** [5L] Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Parameter passing (call by value, call by reference, copy restore, call by name), Symbol tables, dynamic storage allocation techniques.	5	
7	**Intermediate code generation** [4L] Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).	4	

8	**Code optimization** [5L] Introduction, Basic blocks & flow graphs, Transformation of basic blocks, Dag representation of basic blocks, The principle sources of optimization, Loops in flow graph, Peephole optimization.	5	
9	**Code generations** [4L] Issues in the design of code generator, a simple code generator, Register allocation & assignment.	4	

Text book and Reference books:

1. Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education.
2. Holub - "Compiler Design in C" - PHI.

Course Outcomes:

On completion of the course students will be able to

1. Understand given grammar specification develop the lexical analyser
2. Design a given parser specification design top-down and bottom-up parsers
3. Develop syntax directed translation schemes
4. Develop algorithms to generate code for a target machine

Operating Systems
Code: PCC-CS502
Contacts: 3L

Name of the Course:	**Operating Systems**		
Course Code: PCC-CS502	Semester: V		
Duration: 6 months	Maximum Marks:100		
Teaching Scheme		**Examination Scheme**	
Theory:3 hrs./week		Mid Semester exam: 15	
Tutorial: NIL		Assignment and Quiz: 10 marks	
		Attendance : 5 marks	
Practical: hrs./week		End Semester Exam :70 Marks	
Credit Points:	3		
Objective:			
1	To learn the mechanisms of OS to handle processes and threads and their communication		
2	To learn the mechanisms involved in memory management in contemporary OS		
3	To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols		
4	To know the components and management aspects of concurrency management		
Pre-Requisite:			

1	Computer Organization &Architecture

Unit	Content	Hrs/Unit	Marks/ Unit
1	**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	3	
2	**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, **Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.	10	
3.	**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problemetc.	5	
4.	**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	5	
5.	**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation– Fixed and variable partition– Internal and External fragmentation and Compaction; Paging: Principle of operation –Page allocation Hardware support for paging, Protection and sharing, Disadvantages of paging. **Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently	8	

	used(LRU).		
6.	**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms **File Management**: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency andperformance. **Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks	6	

Text book and Reference books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3. Operating System Concepts, Ekta Walia, Khanna Publishing House (AICTE Recommended Textbook – 2018)
4. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
5. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
6. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
7. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

Course Outcomes:

On completion of the course students will be able to

1. Create processes and threads.
2. Develop algorithms for process scheduling for a given specification of CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time. Design and implement file management system.

4. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

Object Oriented Programming
Code: PCC-CS503
Contacts: 3L

Name of the Course:	**Object Oriented Programming**	
Course Code: PCC-CS503	Semester: V	
Duration:6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz : 10 marks
		Attendance: 5 marks
Practical: hrs./week		End Semester Exam:70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/Unit
1	Abstract data types and their specification. How to implement an ADT. Concrete state space, concrete invariant, abstraction function. Implementing operations, illustrated by the Text example.	8	
2	Features of object-oriented programming. Encapsulation, object identity, polymorphism – but not inheritance.	8	
3	Inheritance in OO design. Design patterns. Introduction and classification. The iterator pattern.	6	
4	Model-view-controller pattern. Commands as methods and as objects. Implementing OO language features. Memory management.	6	
5	Generic types and collections GUIs. Graphical programming with Scale and Swing . The software development process	6	

Text book and Reference books:

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH
4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHING
5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
6. Ivor Horton's Beginning Java 2 SDK – Wrox
7. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – TMH

Course Outcomes:

On completion of the course students will be able to

1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.
4. Design applications with an event-driven graphical user interface.

Introduction to Industrial Management (Humanities III)
Code: HSMC-501
Contacts: 3L

Name of the Course:	**Introduction to Industrial Management (Humanities III)**	
Course Code: HSMC-501	Semester: V	
Duration:6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz : 10 marks
		Attendance: 5 marks
Practical: NIL		End Semester Exam:70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/Unit
1	**Introduction** System- concept, definition, types, parameters, variables and behavior. Management – definition and functions. Organization structure: i. Definition. ii. Goals. iii. Factors considered in formulating structure. iv. Types. v. Advantages and disadvantages. vi. Applications. Concept, meaning and importance of division of labor, scalar & functional processes, span of control, delegation of authority, centralization and decentralization in industrial management. Organizational culture and climate – meaning, differences and factors affecting them. Moral-factors affecting moral. Relationship between moral and productivity. Job satisfaction- factors influencing job satisfaction. Important provisions of factory act and labor laws.	6	
2	**Critical Path Method (CPM) and Programme Evaluation Review Technique (PERT):** 2.1 CPM & PERT-meaning, features, difference, applications. 2.2 Understand different terms used in network diagram. Draw network diagram for a real life project containing 10-15 activities, computation of LPO and EPO.(Take minimum three examples). Determination of critical path on network. Floats, its types and determination of floats. Crashing of network, updating and its applications.	8	

3	**Materials Management:** Material management-definition, functions, importance, relationship with other departments. Purchase - objectives, purchasing systems, purchase procedure, terms and forms used in purchase department. Storekeeping- functions, classification of stores as centralized and decentralized with their advantages, disadvantages and application in actual practice. Functions of store, types of records maintained by store, various types and applications of storage equipment, need and general methods for codification of stores. Inventory control: i. Definition. ii. Objectives. iii. Derivation for expression for Economic Order Quantity (EOQ) and numeric examples. iv. ABC analysis and other modern methods of analysis. v. Various types of inventory models such as Wilson's inventory model, replenishment model and two bin model. (Only sketch and understanding, no derivation.). 3.6 Material Requirement Planning (MRP)- concept, applications and brief details about software packages available in market.	6	
4	**Production planning and Control (PPC):** Types and examples of production. PPC : i. Need and importance. ii. Functions. iii. Forms used and their importance. iv. General approach for each type of production. Scheduling- meaning and need for productivity and utilisation. Gantt chart- Format and method to prepare. Critical ratio scheduling-method and numeric examples. Scheduling using Gantt Chart (for at least 5-7 components having 5-6	8	

	machining operations, with processes, setting and operation time for each component and process, resources available, quantity and other necessary data), At least two examples. 4.7 Bottlenecking- meaning, effect and ways to reduce.		
5	**Value Analysis (VA) and Cost Control:** 5.1 VA-definition, terms used, process and importance. 5.2 VA flow diagram. DARSIRI method of VA. Case study of VA-at least two. Waste-types, sources and ways to reduce them. Cost control-methods and important guide lines.	4	
6	**Recent Trends in IM:** ERP (Enterprise resource planning) - concept, features and applications. Important features of MS Project. Logistics- concept, need and benefits. Just in Time (JIT)-concept and benefits. Supply chain management-concept and benefits.	4	

Text book and Reference books:

1. L.S. Srinath– "CPM & PERT principles and Applications".
2. Buffa – "Modern Production Management".
3. N. Nair – "Materials Management".
4. O. P. Khanna – " Industrial Engineering & Management".
5. Mikes – "Value Analysis".
6. S.C. Sharma, "Engineering Management – Industrial Engineering & Management", Khanna Book Publishing Company, New Delhi

Course Outcomes:

On completion of the course students will be able to

1. Interpret given organization structure, culture, climate and major provisions of factory acts and laws.
2. Explain material requirement planning and store keeping procedure.
3. Plot and analyze inventory control models and techniques.
4. Prepare and analyze CPM and PERT for given activities.
5. List and explain PPC functions.

Theory of Computation
Code: PEC-IT501A
Contacts: 3L

Name of the Course:	**Theory of Computation**	
Course Code: **PEC-IT501A**	Semester: V	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/ Unit
1	Fundamentals: Basic definition of sequential circuit, block diagram, mathematical representation, concept of transition table and transition diagram (Relating of Automata concept to sequential circuit concept) Design of sequence detector, Introduction to finite state model [2L] Finite state machine: Definitions, capability & state equivalent, kth-equivalent concept [1L] Merger graph, Merger table, Compatibility graph [1L] Finite memory definiteness, testing table & testing graph. [1L] Deterministic finite automaton and non deterministic finite automaton. [1L] Transition diagrams and Language recognizers. [1L] Finite Automata: NFA with Î transitions - Significance, acceptance of languages. [1L] Conversions and Equivalence: Equivalence between NFA with and without Î transitions. NFA to DFA conversion. [2L] Minimization of FSM, Equivalence between two FSM's , Limitations of FSM [1L] Application of finite automata, Finite Automata with output- Moore & Melay machine. [2L]	13	
2	Regular Languages : Regular sets. [1L] Regular expressions, identity rules. Arden's theorem state and prove [1L] Constructing finite Automata for a given regular expressions, Regular string accepted by NFA/DFA [1L] Pumping lemma of regular sets. Closure properties of regular sets (proofs not required). [1L] Grammar Formalism: Regular grammars-right linear and left linear	8	

	9grammars. [1L] Equivalence between regular linear grammar and FA. [1L] Inter conversion, Context free grammar. [1L] Derivation trees, sentential forms. Right most and leftmost derivation of strings. (Concept only) [1L]		
3.	Context Free Grammars, Ambiguity in context free grammars. [1L] Minimization of Context Free Grammars. [1L] Chomsky normal form and Greibach normal form. [1L] Pumping Lemma for Context Free Languages. [1L] Enumeration of properties of CFL (proofs omitted). Closure property of CFL, Ogden's lemma & its applications [1L] Push Down Automata: Push down automata, definition. [1L] Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. [1L] Equivalence of CFL and PDA, interconversion. (Proofs not required). [1L] Introduction to DCFL and DPDA. [1L]	9	
4.	Turing Machine : Turing Machine, definition, model [1L] Design of TM, Computable functions [1L] Church's hypothesis, counter machine [1L] Types of Turing machines (proofs not required) [1 L] Universal Turing Machine, Halting problem [2L]	5	

Text book and Reference books:

1. "Introduction to Automata Theory Language and Computation", Hopcroft H.E. and Ullman J. D., Pearson education.
2. "Theory of Computation", R.B Patel, Khanna Publishing House, New Delhi
3. "Theory of Computer Science ", Automata Languages and computation", Mishra and Chandra shekaran, 2nd edition, PHI.
4. "Formal Languages and Automata Theory", C.K.Nagpal, Oxford
5. "Switching & Finite Automata", ZVI Kohavi, 2nd Edn., Tata McGraw Hill
6. "Introduction to Computer Theory", Daniel I.A. Cohen, John Wiley
7. "Introduction to languages and the Theory of Computation", John C Martin, TMH
8. "Elements of Theory of Computation", Lewis H.P. & Papadimitrou C.H. Pearson, PHI.

Course Outcomes:

On completion of the course students will be able to

1. Define a system and recognize the behavior of a system. They will be able to minimize a system
   and compare different systems

2. Convert Finite Automata to regular expression. Students will be able to check equivalence between regularlinear grammar and FA.
3. Minimize context free grammar. Student will be able to check equivalence of CFL and PDA. They
4. Will be able to design Turing Machine.
5. Design Turing machine.

Artificial Intelligence
Code: PEC-IT501B
Contacts: 3L

Name of the Course:	**Artificial Intelligence**	
Course Code**: PEC-IT501B**	Semester: V	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/ Unit
1	**Introduction [2]** Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem. **Intelligent Agents [2]** Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents. **Problem Solving [2]** Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, issues in the design of search programs.	6	
2.	**Search techniques [5]** Solving problems by searching :problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies. **Heuristic search strategies [5]** Greedy best-first search, A* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search,	13	

	genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems. **Adversarial search [3]** Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.		
3	**Knowledge & reasoning [3]** Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation.	**3**	
4	**Using predicate logic [2]** Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction. **Probabilistic reasoning [4]** Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets & fuzzy logics.	**6**	
5	**Natural Language processing [2]** Introduction, Syntactic processing, semantic analysis, discourse & pragmatic processing. **Learning [2]** Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning. **Expert Systems [2]** Representing and using domain knowledge, expert system shells, knowledge acquisition.	**6**	

Text book and Reference books:

1. Artificial Intelligence, Ritch & Knight, TMH
2. Artificial Intelligence A Modern Approach, Stuart Russel Peter Norvig Pearson
3. Introduction to Artificial Intelligence & Expert Systems, Patterson, PHI
4. Poole, Computational Intelligence, OUP
5. Logic & Prolog Programming, Saroj Kaushik, New Age International
6. Expert Systems, Giarranto, VIKAS
7. M.C. Trivedi, Artificial Intelligence, Khanna Publishing House, New Delhi (AICTE Recommended Textbook – 2018)

Advanced Computer Architecture
Code: PEC-IT501C
Contacts: 3L

Name of the Course:	**Advanced Computer Architecture**	
Course Code: PEC-IT501C	Semester: V	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/ Unit
1	Computer Architecture and Organization-Review, Fundamentals of Computer Design, Technology Trends Cost Performance Analysis (3L) Parallel Processing Architectures- Taxonomy- SISD, MISD, SIMD,MIMD, PRAM models (3L)	6	
2.	Data and Resource Dependencies, Program Partitioning and Scheduling, Control Flow vs. Data Flow (3L) Network topologies-Static, Dynamic, Types of Networks (3L) RISC vs. CISC, Memory Hierarchy, Virtual Memory (4L)	10	
3	Concepts of Pipelining, Instruction Pipelining, dynamic pipelining, arithmetic pipelines. (4L) Multiprocessors- Multistage Networks, Cache Coherence, Synchronization, Message- passing (4L) Vector Processing Principles- Instruction types, Compound, Vector Loops, Chaining (4L)	12	
4	Array Processors- Structure, Algorithms (3L) Data Flow Architecture- Graphs. Petri Nets, Static and Dynamic DFA, VLSI Computations (4L) Parallel Programming Models, Languages, Compilers (4L)	11	

Text book and Reference books:

1. Computer Architecture and Parallel Processing- Kai Hwang and A. .Brigggs International Edition, McGraw Hill
2. Advanced Computer Architecture: D. Sima, T. fountain, P. Kacsuk, Pearson
3. Parallel Computer Architecture: D. Culler, J.P.Singh, A.Gupta, Elsevier

Computer Graphics
Code: PEC-IT501D
Contacts: 3L

Name of the Course:	**Computer Graphics**	
Course Code: PEC-IT501D	Semester: V	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:3 hrs./week		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		End Semester Exam :70 Marks
Credit Points:	3	

Unit	Content	Hrs/Unit	Marks/ Unit
1	**Introduction to computer graphics & graphics systems [6L**]: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software. **Scan conversion [8L]:** Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.	14	
2	**2D transformation & viewing [15L]:** Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. Cohen and Sutherland line clipping, Sutherland-Hodgeman Polygon clipping, Cyrus-beck clipping method 3D transformation & viewing [5L]: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.	20	
	Curves [3L]: Curve representation, surfaces, designs, Bezier curves,		

3.	B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves. **Hidden surfaces [3L]:** Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry. **Color & shading models [2L]:** Light & color model; interpolative shading model; Texture. **Introduction to Ray-tracing: [3L]** Human vision and color, Lighting, Reflection and transmission models.	6	

Text book and Reference books:

1. Hearn, Baker – "Computer Graphics (C version 2nd Ed.)" – Pearson education
2. Z. Xiang, R. Plastock – " Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
3. D. F. Rogers, J. A. Adams – "Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH

Constitution of India
Code: MC-CS501
Contacts: 3L

Name of the Course:	**Constitution of India**	
Course Code: MC-CS501	Semester: V	
Duration: 6 months	Maximum Marks:100	
Teaching Scheme		**Examination Scheme**
Theory:		Mid Semester exam: 15
Tutorial: NIL		Assignment and Quiz: 10 marks
		Attendance : 5 marks
Practical: NIL		
Credit Points:	0	

Unit	Content	Hrs/Unit	Marks/ Unit
1	**Introduction:** Constitution' meaning of the term,, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy	3	
2	**Union Government and its Administration :** Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha	6	

3.	**State Government and its Administration Governor:** Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions	6	
4.	**Local Administration District's Administration head:** Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different 4.departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy	8	
5.	**Election Commission Election Commission:** Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women		

Text book and Reference books:

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avasti

PRACTICAL SYLLABUS

Software Engineering Lab
Code: ESC591
Contact: 4P

Name of the Course:	**Software Engineering Lab**
Course Code: **ESC591**	Semester:V
Duration:6 months	Maximum Marks:100
Teaching Scheme:	
Theory: hrs./week	Continuous Internal Assessment
Tutorial: NIL	External Assesement:60
Practical: 4 hrs./week	Distribution of marks:40
Credit Points:	2
Course Outcomes:	
1	To understand the software engineering methodologies involved in the phases for project development.
2	To gain knowledge about open source tools used for implementing software engineering methods.
3	To exercise developing product-startups implementing software engineering methods.
4	Learn simple optimization techniques
Pre-Requisite:	

Laboratory Experiments:
• Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope, Objectives and Infrastructure. • Software Requirement Analysis – Describe the individual Phases/modules of the project and Identify deliverables. Identify functional and non-functional requirements. • Data Modeling – Use work products – data dictionary. • Software Designing - Develop use case diagrams and activity diagrams, build and test class diagrams, sequence diagrams and add interface to class diagrams. • Prototype model – Develop the prototype of the product. The SRS and prototype model should be submitted for end semester examination.

Any experiment specially designed by the college
(Detailed instructions for Laboratory Manual to be followed for further guidance)

Operating System Lab
Code: PCC-CS592
Contacts: 4P

Name of the Course:	Operating System Lab
Course Code: PCC-CS592	Semester:V
Duration:6 months	Maximum Marks:100
Teaching Scheme:	
Theory: hrs./week	Continuous Internal Assessment
Tutorial: NIL	External Assesement:60
Practical: 4 hrs./week	Distribution of marks:40
Credit Points:	2

1 1. **Managing Unix/Linux Operating System [8P]:** Creating a bash shell script, making a script executable, shell syntax (variables, conditions, control structures, functions,

commands). Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and
methods Kernel loading, init and the inittab file, Run-levels, Run level scripts. Password file management, Password
security, Shadow file, Groups and the group file, Shells, restricted shells, user-management commands, homes and
permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users &user groups.
2. **Process [4P]**: starting new process, replacing a process image, duplicating a process image, waiting for a process,
zombie process.
3. **Signal [4P]**: signal handling, sending signals, signal interface, signal sets.
4. **Semaphore [6P]**: programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).
5. **POSIX Threads [6P]**: programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit,
pthread_attr_init, pthread_cancel)
6. **Inter-process communication [6P]**: pipes(use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO),
message passing & shared memory(IPC version V).

Any experiment specially designed by the college
(Detailed instructions for Laboratory Manual to be followed for further guidance)

Object Oriented Programming Lab
Code: PCC-CS593
Contacts: 4P

Name of the Course:	Object Oriented Programming Lab
Course Code: PCC-CS593	Semester:V
Duration:6 months	Maximum Marks:100
Teaching Scheme:	
Theory: hrs./week	Continuous Internal Assessment
Tutorial: NIL	External Assesement:60
Practical: 4 hrs./week	Distribution of marks:40
Credit Points:	2

Laboratory Experiments:
1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages

5. Assignments on multithreaded programming
6. Assignments on applet programming

Note: Use Java for programming

Any experiment specially designed by the college
(Detailed instructions for Laboratory Manual to be followed for further guidance)
