# ANNA UNIVERSITY :: CHENNAI – 600 025

# DEGREE OF BACHELOR OF ENGINEERING

(8 SEMESTER PROGRAMME)

# BRANCH: COMPUTER SCIENCE AND ENGINEERING

# LIST OF ELECTIVE SUBJECTS

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</table>
1. **MULTIPROCESSOR OPERATING SYSTEMS**


2. **NETWORK OPERATING SYSTEMS (NOS)**

   Types of NOS – NOS to LANs – Choosing and NOS – Multiple NOS on a single Network – NOS and Network management – Future Trends.

3. **DISTRIBUTED OPERATING SYSTEMS**


4. **DATABASE OPERATING SYSTEMS**


5. **REAL TIME OPERATING SYSTEMS**


**TEXT BOOKS**


**REFERENCES**

1. ADVANCED ALGORITHMS

2. DIVIDE AND CONQUER
General methods – Typical problems – Finding the minimum and maximum – Strassen’s matrix multiplications – Convex Hull.

3. GREEDY METHOD

4. DYNAMIC PROGRAMMING
General method – 0/1 knapsack – Traveling salesman problem – Flow shop scheduling.

5. BACKTRACKING AND BRANCH AND BOUND TECHNIQUES
General method – 8 Queens problems – Graph coloring – Branch and bound method – 0/1 knapsack – Traveling Salesman.

TEXT BOOK

REFERENCES

CS036 PARALLEL COMPUTING

1. INTRODUCTION
Computational demands of parallel applications – Taxonomy – Performance metrics and measures – Speed up laws – Scaling and speed up – Evaluating a real machine.

2. PARALLEL COMPUTING PARADIGMS
Pipelining and superscalar processors, Vector processors, Array Processors, SIMD processors, Systolic architecture, Data flow.

3. MULTIPROCESSORS
4. CACHE COHERENCE IN SHARED MEMORY SYSTEMS

Snooping protocols – Synchronization – Memory consistency models – Hardware / Software support for implementation.

5. CACHE COHERENCE IN SCALABLE MULTIPROCESSORS


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TEXT BOOK


REFERENCES


CS038 NEURAL COMPUTING

1. BACK PROPAGATION


2. STATISTICAL METHODS


3. COUNTER PROPAGATION NETWORK AND SELF ORGANIZING MAPS

CPN building blocks – CPN data processing – An image classification example, SOM data processing – Applications of SOMs.

4. ADAPTIVE RESONANCE THEORY AND SPATIO TEMPORAL PATTERN CLASSIFICATION

ART network description – ART1 – ART2 – Applications. The formal avalanche – Architecture of Spatio temporal networks – The sequential competitive avalanche field – Applications of STNS.

5. NEO-COGNITRON

CS039 REAL TIME SYSTEMS
Prerequisite: CS238

1. INTRODUCTION 6

2. TASK ASSIGNMENT AND SCHEDULING 10

3. PROGRAMMING LANGUAGES AND TOOLS 6

4. REAL TIME DATABASES 12

5. FAULT TOLERANCE, RELIABILITY AND SYNCHRONIZATION 11

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REFERENCES

CS041 PATTERN RECOGNITION

1. INTRODUCTION

2. STATISTICAL PATTERN RECOGNITION

3. CLUSTER ANALYSIS
Unsupervised learning – Clustering for unsupervised learning and classification – C-means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions.

4. SYNTACTICS PATTERN RECOGNITION
Elements of formal grammar – String generation as pattern description – Recognition of syntactic description – Parsing – Stochastic grammar and applications – Graph based structural representation.

5. FEATURES EXTRACTION AND RECENT ADVANCES

TEXT BOOKS

REFERENCES
CS042   PARALLEL ALGORITHMS
Prerequisites: CS231, CS238

1. **INTRODUCTION**


2. **SORTING AND SEARCHING**

Parallel sorting algorithms – Dictionary operations – Combinatorial search – Generating permutations and combinations in parallel.

3. **MATRIX AND NUMERICAL ALGORITHMS**


4. **FFT AND GRAPH ALGORITHMS**


5. **COMPUTATIONAL GEOMETRY**


**TEXT BOOK**


**REFERENCES**


CS043   ATM NETWORKS
Prerequisite: CS339

1. **INTRODUCTION**


2. **ATM PROTOCOL**

Connection setup – Routing Switching, Signaling, ATM Service categories – QOS parameters – Adaptation Layer.
3. ROUTING ISSUES

4. HIGH SPEED LANS
Fast Ethernet – ATM LAN’s – LANE

5. PROTOCOLS OVER ATM
Multiple protocols over ATM, IP over ATM, TCP over ATM – Real time transport protocol – Wireless ATM – Current trends.

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TEXT BOOK

REFERENCES

CS045 SOFTWARE TESTING
Prerequisite: CS338

1. INTRODUCTION
Software testing – Role of software testing – A structural approach to testing – Test strategy – methods for developing test strategy Testing methodologies.

2. LIFE CYCLE TESTING APPROACH

3. INSTALLATION

4. TESTING METHODS
Tools and techniques – Cost estimate – For testing – Testing phase of life cycle – Point accumulation tracking system – Performance analysis of testing – Inspection plan and test plan documents.
5. TESTING STRATEGY


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TEXT BOOK


CS046 ADVANCED DATABASES

Prerequisite: CS234

1. INTRODUCTION


2. DISTRIBUTED DATABASES


3. OBJECT ORIENTED DATABASES


4. SPECIAL PURPOSE DATABASES

Temporal databases – Active databases – Spatial and multimedia databases – Deductive databases – Mobile databases.

5. CURRENT TRENDS


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TEXT BOOKS


REFERENCES

CS047 HIGH PERFORMANCE MICROPROCESSORS
Prerequisite: CS334

1. CISC PRINCIPLES
   5

2. CISC MICROPROCESSOR
   10

3. RISC PRINCIPLES
   10
   RISC processors – Principles – Architectural features of DEC Alpha / Power PC / Sun sparc / MIPS RX100 family.

4. RISC MICROPROCESSOR
   10
   Study of a current RISC microprocessor architecture – Performance related features – Supporting devices – Bus system support.

5. CASE STUDIES
   10
   Case studies and comparison.

Total: 45

Text Book

References
1. **INTRODUCTION TO WINDOWS PROGRAMMING**  
   Different paradigms of programming – Comparison – Event driven programming – Windows programming fundamentals – Applications.

2. **VISUAL BASIC PROGRAMMING**  

3. **VISUAL C++ PROGRAMMING**  
   Visual C++ components – Developing simple applications – Microsoft Foundation classes – Controls – Message handling - Document-view architecture – Dialog based applications – Mouse and keyboard events.

4. **VISUAL JAVA – INTRODUCTION**  

5. **JAVA APPLETS AND NETWORKING**  

**Text Books**


**References**

CS050  ADVANCED SOFTWARE ENGINEERING
Prerequisite: CS338

1. SOFTWARE PROJECT MANAGEMENT  9

2. REQUIREMENTS AND SPECIFICATION  9

3. OBJECT ORIENTED SOFTWARE ENGINEERING  9
Introduction to Object Oriented Development – Architecture – Object Oriented Testing, Object Oriented Metrics – Objects and Productivity – Object Documentation – MSG Case Study.

4. SOFTWARE REENGINEERING  9

5. PROCESS AND PRODUCT IMPROVEMENTS  9

Text Book

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CS051 NETWORK PROTOCOLS, MANAGEMENT & SECURITY
Prerequisite: CS339

1. NETWORK MANAGEMENT FUNDAMENTALS  6
   Network monitoring – Network Control – OSI, Internet and IEEE network management standards.

2. NETWORK MANAGEMENT PROTOCOLS  12
   SNMP – Concepts, MIBs – Implementation issues – SNMPv2, SNMPv3 – RMON – CMIP.

3. CRYPTOGRAPHY  9

4. SYSTEM SECURITY  9

5. OTHER PROTOCOLS  9

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References
CS052  GRAPH THEORY

1. FUNDAMENTAL CONCEPTS  
   Path – Circuit – Subgraph – Isomorphism – Operations on graphs – Euler tour – 
   Hamiltonian graphs – Trees – Equivalent conditions.

2. CUTSET, MATRICES AND VECTOR SPACES  
   Fundamental cutsets – Fundamental circuits – Adjacency matrix – Incidence matrix 
   Circuit matrix – Cutset matrix – Path matrix – Cutset space – Circuit space – 
   Properties and relationship among them.

3. CONNECTIVITY AND PLANARITY  
   Blocks – n connected graphs – Algorithm to find cutvertices, Blocks, Components 
   and maximum flow – Planarity – Geometric and combinational duals – Planarity 
   testing algorithm – kratowski graphs – Thickness and crossing number.

4. COLORING, COVERING AND MATCHING  
   Chromatic number – Independent sets – Chromatic partitioning – Chromatic 

5. DIRECTED GRAPH  
   Euler diagraphs – Spanning arborescence – Tournament – Complete tournament – 
   connectedness – Matrices and their relationships.

Text Book
1. Narsing Deo, “Graph Theory with applications to engineering and computer science” 
   PHI, Delhi, 1995.

References
2. West DB, “Introduction to Graph Theory”, PHI, 1996.
1. **INTRODUCTION** 4
   The reconfigurability paradigm – computing requirements – cost constraints – Introduction to FPGAs, FPGA design methodology – Custom computing machines.

2. **HARDWARE DESCRIPTION LANGUAGES** 5
   VHDL-programming concepts – structural and behavioral modeling – Simulation and synthesis – Design using FPGAs.

3. **CCM ARCHITECTURAL ISSUES** 7
   Reconfigurable data path – spatial computational styles interconnection – use of Partial / dynamic reconfigurations – timing constraints – Reusability and sharing of resources.

4. **PROGRAMMING FOR CCMS** 7
   Methodologies - styles – languages – JHDL – Compilers for CCMs – compilation techniques for CCMs.

5. **COMPARISON OF CCMS** 7

**References**

1. **INTRODUCTION**
   Objects – Distributed objects – Historical perspective Distributed objects and computing methodologies.

2. **CORBA**

3. **DEVELOPMENT OF A CORBA APPLICATION**

4. **DCOM**
   Model and Services – Objects and Object hierarchies – Location transparency – Configuration information – Interface Definition Language (MIDL) – Applications.

5. **CURRENT ISSUES**

   **Total: 45**

**Text Book**

**References**
CS058 ADVANCED JAVA PROGRAMMING
Prerequisite: CS237

1. JAVA BASICS-REVIEW 10
   Java Streaming – Components and events handling – Threading concepts – Networking features – Byte code interpretation – Media Techniques.

2. JAVA DATA STRUCTURES 9

3. ADVANCED NETWORKING AND BEANS 10

4. JAVA DATABASE PROGRAMMING 10

5. RELATED JAVA TECHNIQUES 10
   3D graphics – JAR file format and creation – Internationalization – Swing Programming – Advanced Java Scripting Techniques.

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Text Book

References
1. JAVA PROGRAMMING LANGUAGE
   Types, value, variables, conversions – Names and packages, classes, fields, method, static initializes, constructors, interfaces, nesting – Arrays – Exception – Execution – Threads.

2. JAVA VIRTUAL MACHINE (JVM) STRUCTURE
   Data types – Runtime data base areas and frames – Objects – Floating point arithmetic – Exceptions – Instruction set summary – Class libraries.

3. CLASS FILE FORMAT
   Class and interfaces names, descriptors – Constant pool – Fields, methods, attributes – Constraints – Verification.

4. RUNTIME ISSUES
   Runtime constant pool – Virtual machine start up – Creation, loading, linking, initialization – Binding - Instruction set – Threads and locks.

5. COMPILING FOR JVM
   Constants, local variables, control constructs – Arithmetic – Runtime constant pool – Arguments, method, class instances – Arrays - Compiling switches – Exceptions – Synchronization.

Text Book

References
CS060 COMPONENT WARE ARCHITECTURES
Prerequisite: CS237

1. **INTRODUCTION**
   Distributed applications – Two tier, three tier, n-tier architectures,

2. **COM / DCOM**
   Architecture – Lookup strategies – Interfaces – Location transparency and registration.

3. **DATABASE ISSUES**

4. **APPLICATION DEVELOPMENT**

5. **MISCELLANEOUS TOPICS**
   Security – Clustering – Message Queuing (MSMQ).

Text Books

References

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GE034 CREATIVITY, INNOVATION AND NEW PRODUCT DEVELOPMENT

1. INTRODUCTION

The process of technological innovation – factors contributing to successful technological innovation – the need for creativity and innovation – creativity and problem solving – brainstorming different techniques.

2. PROJECT SELECTION AND EVALUATION

Collection of ideas and purpose of project – Selection criteria – screening ideas for new products (evaluation techniques).

3. NEW PRODUCT DEVELOPMENT


4. NEW PRODUCT PLANNING


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1. LABORATORY

Creative design – Model Preparation – Testing – cost evaluation – Patent application

References

1. **SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**  

2. **INTERPOLATION**  
   Newton’s divided difference formula, Lagrange’s and Hermite’s polynomials. Newton forward and backward difference formulae. Stirling’s and Bessel’s Central difference formulae.

3. **NUMERICAL DIFFERENTIATION AND INTEGRATION**  
   Numerical differentiation with interpolation polynomials, Numerical integration by Trapezoidal and Simpson’s (both 1/3rd and 3/8th) rules. Two and three point Gaussian quadrature formula. Double integrals using Trapezoidal and Simpson’s rules.

4. **INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS**  

5. **BOUNDARY VALUE PROBLEMS FOR ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**  
   Finite difference solution for the second order ordinary differential equations. Finite difference solution for one dimensional heat equation (both implicit and explicit), one dimensional wave equation and two dimensional laplace and poisson equations.

**TEXT BOOKS**


**REFERENCES**

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V
Case Studies on – Patents (Basmati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOK

REFERENCES
UNIT I

UNIT II
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III

UNIT IV
Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V
Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TEXT BOOKS

REFERENCES
UNIT I
MOS transistor and CMOS logic design – Transistor layout in CMOS and related issues –
algorithmic paradigms - Partitioning – types of problems – Kernighan – Lin partitioning
algorithm.

UNIT II
Types of placement problems - Placement algorithms constructive placement – iterative
improvement - Floor planning concepts – Terminology – Optimization problems in floor
planning

UNIT III
Area routing, Channel routing and global routing – Algorithms – Routing in FPGA – Array
and row based FPGA’s.

UNIT IV
Delay minimization – Via minimization.

UNIT V
Power minimization - Introduction – VHDL, Verilog-gate level and switch level simulation –
Algorithms.

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TEXT BOOK:

REFERENCE:
UNIT I  

UNIT II  
Speech synthesizer – Linear predictive synthesizer – Different methods of speech recognition and speech encoding.

UNIT III  

UNIT IV  

UNIT V  
Morphology – Automated Image Analysis – Semantic Networks – Production (expert system)

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UNIT III

UNIT IV

UNIT V

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Text Book

References
CS 048 ROBOTICS

UNIT I 9

UNIT II 9
Robot Programming – Methods – Interlocks textual languages – Characteristics of Robot level languages, characteristics of task level languages.

UNIT III 9

UNIT IV 9

UNIT V 9

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UNIT III

Structure – Context – Address Space – Creation – Termination – Scheduling – Threads implementation of System Calls.

UNIT IV


UNIT V

Drivers – Streams – Implementation of IPC mechanisms.

TEXTBOOK

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REFERENCE:

UNIT I  

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UNIT III  
Cutting plane algorithm, Branch and Bound method, Multistage (dynamic) programming – Solution of LP by dynamic programming.

UNIT IV  

UNIT V  

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REFERENCES:

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UNIT II

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UNIT IV
Core Gateway system – Autonomous systems and Considerations – Interior gateway Protocols, Transparent Gateways, DNS.

UNIT V

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TEXT BOOK

REFERENCE:
CS 062 C# AND .NET FRAME WORK

UNIT I 9
Introduction to .NET frame work-.NET objects- ASP .NET- .NET web services – Windows Forms

UNIT II 9
Introduction to C#, Understanding C# in .NET, overview of C#, Literals, Variables, Data types.

UNIT III 9
Operators, Expressions, Branching and looping operations- Methods, Arrays, Strings.

UNIT IV 9
Structures and Enumerations – Classes and Objects - Inheritance and Polymorphism, Multiple Inheritance.

UNIT V 9
Operator overloading, Events, console I/O operations and Exception.

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TEXT BOOKS

REFERENCES
COMMUNICATION SKILLS FOR ENGINEERS

UNIT 1:  

Introducing oneself and others, narrating events – Making telephonic conversation – Making requests, Asking questions, Making recommendations using modal verbs, Expressing causal relations with suitable discourse markers, Giving instructions using imperatives, Expressing purposes and functions, obligation and preferences, Accepting offers and Counseling, Interpreting advertisements, Describing processes using sequential expressions.

UNIT 2:  
Presenting one’s ideas at meetings and conferences, Making extempore talks, Public speaking, Body language, Strategic competence, Use of audio – visual aids and multimedia presentations.

UNIT 3:  
Technical Writing – the structure of organised writing – paragraph writing, coherence, cohesion (use of Discourse Markers) and punctuation, Use of titles, nonverbal devices – Layout – Revision strategies – Reading techniques.

Letter Writing: - Personal/Informal letters: Letters to family members and friends Business / Formal letters: Letters thanking the recipients, announcing functions, extending invitations, congratulating associates on important occasions, letters of application (Resumes), apology and complaint, letters to the editor.

UNIT 4:  
Report Writing: - persuasive, explanatory, argumentative and informative, Writing agenda, minutes, memos, project proposals and checklists.

UNIT 5  

Total 60 hrs.  L: 40  P: 20

Text Books:  
2.  Dr.V.Chellammal, Learning to Communicate – a resource book for Engineers and Technologists. Coimbatore: Kamakhya Publications 2002 (1 audio cassette)
References:


CS063 QUANTUM COMPUTING 3 0 0 100

1. INTRODUCTION


2. QUANTUM CIRCUITS


3. Quantum Fourier Transform

Quantum Fourier Transform – Phase estimation – order finding and factoring – General applications of the quantum fourier transform.

4. Quantum Search Algorithms


5. Physical Realization


Total = 45

TEXTBOOK
CS061 MAINFRAME COMPUTING

1. MVS CONCEPTS
   - MVS overview – System Initialization – Storage Management – Job Management –

2. TSO/ISPF
   - TSO Commands – General syntax of JCL statements.

3. JCL
   - Explanation of job statements – Explanation of EXEC statements – Explanation of
     DD statements – Additional parameters on JOB, EXEC, DD statements – Additional
     parameters on JOB, EXEC, DD statements – Classification – Instream and catalog
     procedures – Utilities – Abend codes.

4. VSAM
   - VSAM data set organization structure – IDCAMS comments – JCL for VSAM –

5. COBOL/370
   - Structured programming constructs – Fundamentals of COBOL – Data definition –
     Conditional statements – Perform statements – Compiler option – Table definition –
     COBOL call and parameter passing – File Handling.

6. DB2
     DB2 objects – Locks – Program preparation – Cursors – Null indicators – Optimier –
     Utilities.

7. CICS
   - CICS Introduction – Terminal control – Application House keeping – Exec, interface
     block – Supplied transactions – CESN, CESF, CEMT, CEDF – NMDS – BMS –
     Abend Codes – File control – Program control – TSQ – TDQ – Pseudo conversation –
     Recovery and rollback.

Total: 45

References

7. C.J. Data, “DB2”
Below is the list of Punjab University elective subjects for BA examinations. Also, no candidate shall take up Space Science except with A Course of Mathematics or Geography and that no candidate shall take up B Course of Mathematics unless he has taken up A Course of Mathematics. All those candidates who have passed B.A. with General Mathematics need only to qualify B -Course of Mathematics (Paper I & II) as an additional subject for eligibility of admission to M.Sc. Mathematics or for appearing in M.Sc. Mathematics Examination as an external/private candidates. Also that Mathematics Gen It will guide you about subjects selection for exam, list of subjects, format of exam and syllabus. Bachelor of arts (ba). Bachelor of Arts (BA) Part-I. Subject. Marks. 1. English (Compulsory) - I. The BSc students will select three elective subjects from the list of elective subjects given at the end of this page. BA & BSc. English paper and Islamic studies/Pak-studies are compulsory subjects. The paper of Islamic Studies/Pak-studies will be a combined paper of 100 marks. Islamiyat portion has 60 marks. Pak-studies portion has 40 marks. Each elective subject has two papers (paper-I and paper-II). Paper-I is attempted in part-I and Paper-II is attempted in part-II of the Bachelor program. ELECTIVE SUBJECTS.