SCHEME AND SYLLABI FOR

SIXTH SEMESTER

OF

BACHELOR OF

TECHNOLOGY IN

COMPUTER SCIENCE AND

ENGINEERING

FROM 2009 ADMISSION ONWARDS

CALICUT UNIVERSITY (P.O), THENHIPALAM
<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours / Week</th>
<th>Marks</th>
<th>Semester-end duration-hours</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CS09 601</td>
<td>Embedded Systems</td>
<td>L 3 T 1 D/P 30</td>
<td>Internal S Semester-end 70</td>
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<tr>
<td>CS09 602</td>
<td>Compiler Design</td>
<td>L 4 T 1 D/P 30</td>
<td>Internal S Semester-end 70</td>
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<tr>
<td>CS09 603</td>
<td>Computer Networks</td>
<td>L 3 T 1 D/P 30</td>
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<td>CS09 604</td>
<td>Database Management Systems</td>
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<td>Computer Graphics</td>
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<td>CS09 606</td>
<td>Elective I</td>
<td>L 3 T 1 D/P 30</td>
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<td>CS09 607(P)</td>
<td>Systems Lab</td>
<td>L 3 T 1 D/P 30</td>
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<td>CS09 608(P)</td>
<td>Mini Project</td>
<td>L 3 T 1 D/P 30</td>
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<th>Code</th>
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<td>CS09 701</td>
<td>Wireless Networks and Mobile Communication Systems</td>
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<td>CS09 702</td>
<td>Design and Analysis of Algorithms</td>
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<td>CS09 704</td>
<td>Cryptography and Network Security</td>
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<td><strong>Credits</strong></td>
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Total Marks
CS09 601: Embedded Systems

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To teach students about architecture, hardware and software elements, programming models and practices and tools for embedded system design and implementation.
- To focus on the hardware and real time operating systems used for the embedded systems design.

Pre-requisites: Knowledge of digital design, computer organization

Module I (14 hours)
Embedded systems: Overview, Design challenges-Optimising design metrics, Common design metrics-Processor technology-General purpose processors, Single purpose processors and Application specific processors.
IC technology: Full-custom/VLSI, Semi-custom ASIC, Compilation/Synthesis, libraries/IP, Test/Verification, Custom Single-purpose processors: Hardware-Combinational Logic, Transistors and logic gates, Basic combinational and Sequential logic design, Custom single purpose processor design and optimisation.
Application-specific instruction-set processors, Microcontrollers, Digital signal processors.
Standard single-purpose processors: Peripherals-some examples such as Timers, counters, Analog-digital converters, etc.

Module II (14 hours)
Memory: Write-ability and storage permanence. Common memory types, Composing memories, memory hierarchy and cache - Cache mapping techniques: replacement, write techniques, Cache impact on system performance, Advanced RAM, the basic DRAM, types of DRAMS, DRAM integration problem, Memory management unit (MMU)
Interfacing: Basic protocol concepts, Microprocessor interfacing: I/O addressing, interrupts, DMA, Arbitration methods, Multi-level bus architectures, Advanced communication principles, Parallel, Serial and Wireless communication, Error detection and correction, Bus standards and protocols.

Module III (13 hours)
State machine and concurrent process models: Models vs. languages, text vs. graphics, A basic state machine model: finite-state machines, FSM with datapath model FSMD, Hierarchical/Concurrent state machine model (HCFSM) and the State charts language, Program-state machine model (PSM),The role of an appropriate model and language
Concurrent process model: Concurrent processes, create, terminate suspend, resume and join, Interprocess Communication and synchronization methods and their implementation
Case studies: Windows CE, QNX

Module IV (11 hours)
Design technology: Automation-The parallel evolution of compilation and synthesis, Synthesis levels, Logic synthesis, Two-level and, Multi-level logic minimization, FSM synthesis, Technology mapping, Integration logic synthesis and physical design, Register-transfer synthesis, Behavioural synthesis, System synthesis and
hardware/software codesign, Intellectual property cores, New challenges posed by cores to processor providers and users.

### Text Books


### Reference Books


### Internal Continuous Assessment (Maximum Marks-30)

- 60% - Tests (minimum 2)
- 30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
- 10% - Regularity in the class

### University Examination Pattern

**PART A:** Short answer questions (one/two sentences)  
5 x 2 marks = 10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**PART B:** Analytical/Problem solving questions  
4 x 5 marks = 20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

**PART C:** Descriptive/Analytical/Problem solving questions  
4 x 10 marks = 40 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
Objectives

- To introduce the various techniques involved in the translation of source programs into object programs by a compiler.
- To understand the inner working of a compiler using the various data structures used in the translation process.

Module I (15 hours)

Module II (16 hours)
Syntax analysis : role of the parser - context-free grammars - top-down parsing - bottom-up parsing - operator precedence parsing - LR parsers (SLR, canonical LR, LALR) - parser generators.

Module III (16 hours)
Syntax-directed translation - syntax-directed definitions - S-attributed definitions - L-attributed definitions - bottom-up and top-down translation - type checking - type systems - specification of a type checker - runtime environments - source language issues - storage organization - storage allocation strategies - access to non-local names - parameter passing - symbol tables.

Module IV (18 hours)
Intermediate code generation - intermediate languages - declarations - assignment statements - Boolean expressions - procedure calls - introduction to code optimization - sources of optimization - introduction to data-flow analysis - introduction to code generation - issues in the design of a code generator - the target machine - a simple code generator

Text Books


Reference Books

1. Aho A. V., Ullman J.D. *Principles of Compiler Design*, Narosa
3. Holub A.I., *Compiler Design in C*, Prentice Hall India
**Internal Continuous Assessment (Maximum Marks-30)**

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
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**PART B:** Analytical/Problem solving questions  
4 x 5 marks=20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

**PART C:** Descriptive/Analytical/Problem solving questions  
4 x 10 marks=40 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
CS09 603: Computer Networks

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To teach the mode of operation of different types of computer networks that are used to interconnect a distributed community of computers and various interfacing standards and protocols.

Module I (13 hours)

Module II (13 hours)
Internetworking - Networking devices - Bridges, Routers, Gateways, Routing- Network as a graph, distance vector (RIP), link state (OSPF), Metrics, Routing for mobile hosts, Global Internet - Subnetting, CIDR, BGP, Routing areas.

Module III (13 hours)
Internetworking - IPv4 and IPv6, Multicast addresses, Multicast routing, DVMRP, PIM, MSDP, Multiprotocol label switching- Destination based forwarding, Explicit routing, virtual private networks and tunnels.

Module IV (13 hours)

Text Books
1. L. Peterson & Bruce S. Davie, *Computer Networks- A systems approach*, 4/e Morgan Kaufmann publishers an imprint of Elsevier

Reference Books
4. Andrew S. Tanenbaum, *Computer Networks*, PHI.
**Internal Continuous Assessment (Maximum Marks-30)**

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

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**University Examination Pattern**

**PART A:** Short answer questions (one/two sentences)  
5 x 2 marks = 10 marks  
All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**PART B:** Analytical/Problem solving questions  
4 x 5 marks = 20 marks  
Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

**PART C:** Descriptive/Analytical/Problem solving questions  
4 x 10 marks = 40 marks  
Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
Objectives

• To introduce the basic concepts of data bases connected with software engineering techniques and background information useful for the management of data bases. The syllabus includes the file organization, database design and transaction processing techniques.

Module I (14 hours)
Introduction: characteristics of database approach - advantages of using DBMS - database concept and architecture - data models - schemes - instances - data independence - database languages and interfaces - database modeling using entity-relationship (ER) - entity sets attributes and keys - relationships - type role and structural constraints - weak entity types - enhanced entity-relationship (EER) and object modeling - sub classes - super classes and inheritance - specialization and generalization - modeling of union types.

Module II (12 hours)
File organization and storage: secondary storage devices - RAID technology - operations in files - heap files and sorted files - hashing techniques - types of single level ordered index, multi-level indexes - B-trees and B+ trees - indexes on multiple keys - other types of indexes.

Module III (13 hours)
Database design: functional dependencies - normal forms - general definition of second and third normal forms - Boyce-Codd normal form - multi valued dependencies and fourth normal form - join dependencies and fifth normal form - inclusion dependencies - practical database design tuning - database design process relational model concepts - relational algebra operations - queries in SQL – insert, delete and update statements in SQL views in SQL.

Module IV (13 hours)
Transaction processing: desirable properties of transactions, schedules and recoverability - serializability of schedules - concurrency control - locking techniques - time stamp ordering multi version concurrency control - granularity of data items - database recovery techniques based on deferred up data and immediate updating - shadow pages - ARIES recovery algorithm - database security and authorization - security issue access control based on granting/revoking of privileges introduction to statistical database security.

Text Books

Reference Books
5. Date C.J., An Introduction to Database Systems, Addison Wesley
**Internal Continuous Assessment** *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

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**University Examination Pattern**

**PART A:**  *Short answer questions (one/two sentences)*  
5 x 2 marks = 10 marks

All questions are compulsory. There should be at least one question from each module and not more than two questions from any module.

**PART B:**  *Analytical/Problem solving questions*  
4 x 5 marks = 20 marks

Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

**PART C:**  *Descriptive/Analytical/Problem solving questions*  
4 x 10 marks = 40 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
Objectives

To teach the fundamentals of computer graphics including algorithms for drawing 2D and 3D primitives, object transformations and the like.

Module I (10 hours)

Module II (8 hours)
Graphic Operations - Windowport and viewport - Elimination of totally visible and totally invisible lines with respect to a rectangular window using line and point codes - Explicit line clipping algorithm - Sutherland Cohen Algorithm - Mid-point subdivision algorithm - Filling - Stack based and queue based seed fill algorithms - Scan line seed fill algorithm - Generation of Bar Charts - Pie Charts - Character Generation

Module III (9 hours)

Module IV (12 hours)
3D Graphics - Transformations - Right handed coordinate system - transformation matrices for translation - Scaling and Rotation around axes - parallel projection - Multiviews - front, top and side views - Oblique view - Projection on xy plane with Rays along a given direction - Perspective projection - Transformation matrix to yield one vanishing point - Perspective view with viewpoint lying on z-axis - effect of Translating the object - Computing the vanishing point - Numerical Examples - Hidden surface removal - Back Face removal - Depth Buffer Method

Text Books

Reference Books
Internal Continuous Assessment *(Maximum Marks-30)*

60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, etc.
10% - Regularity in the class

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University Examination Pattern

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Candidates have to answer four questions out of six. There should be at least one question from each module and not more than two questions from any module.

**PART C:** Descriptive/Analytical/Problem solving questions  
4 x 10 marks = 40 marks

Two questions from each module with choice to answer one question.

*Maximum Total Marks: 70*
Objective

- To make the learners understand the operating system structures and the implementation aspects of various OS functions and schedulers.
- To teach database technology and familiarize them with issues related to database design through hands-on practice.

Operating Systems

1. Implementation of dining philosophers problem by multiprogramming using threads, semaphores and shared memory.

2. Implementation of ls/dir command of Unix/Dos to display contents of a given floppy disk.

3. Program to generate disk usage status report for a given Unix/Dos formatted floppy disk giving details like free space availability etc.

4. Implementation of banker's algorithm.

5. Inter-process communication using mailboxes and pipes.

6. Program to find the least common ancestor of two given nodes in a binary tree (Concurrent Programming).

7. Program for the readers and writers problem (Concurrent Programming).

Database Management Systems

1. Conversion of a given relational scheme to 3NF and BCNF.

2. Implementation of B tree and B+ tree.

3. Implementation of a database stored in an RDBMS accessible through a web browser.

4. Program to convert SQL subset into relational algebra (tools like YACC may be used.)

5. Implementation of optimistic concurrency control algorithm.

Reference Books


2. Bach M.J., The Design of the Unix Operating System, Prentice Hall India


Internal Continuous Assessment (Maximum Marks-50)

- 60% - Laboratory practical and record
- 30% - Test/s
- 10% - Regularity in the class

Semester End Examination (Maximum Marks-50)

- 70% - Procedure, conducting experiment, results, tabulation, and inference
- 20% - Viva voce
10% - Fair record
Objectives

- To estimate the ability of the student in transforming the theoretical knowledge studied so far into a working model of a computer / information system.
- For enabling the students to gain experience in organisation and implementation of a small project and thus acquire the necessary confidence to carry out main project in the final year.

In this practical course, each group consisting of three/four members is expected to design and develop a moderately complex computer / information system with practical applications; this should be a working model. The basic concepts of product design may be taken into consideration while designing the project. A committee consisting of minimum three faculty members specialised in computer science and engineering will perform assessment of the mini project. Students have to submit a report on the mini project and demonstrate the mini project before the evaluation committee.

The division of the total marks is into two namely, 60% of the total marks to be awarded by the guide / Co-ordinator and the remaining 40% by the evaluation committee.

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<th>Internal Continuous Assessment (50 marks)</th>
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<tr>
<td>40% - Design and development</td>
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<td>30% - Final result and Demonstration</td>
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<td>20% - Report</td>
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<td>10% - Regularity in the class</td>
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<th>Semester End Examination (Maximum Marks-50)</th>
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<tr>
<td>20% - Demonstration of mini project</td>
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<tr>
<td>50% - Practical test connected with mini project</td>
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<tr>
<td>20% - Viva voce</td>
</tr>
<tr>
<td>10% - Fair record</td>
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