UNIVERSITY OF CALICUT

SCHEME OF STUDIES, EXAMINATION
AND DETAILED SYLLABUS
BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND ENGINEERING

FOR 2014 ADMISSION ONWARDS
2014 Scheme for B. Tech. Computer Science and Engineering (CS) Branch for 3rd to 8th Semesters

**SCHEME OF III SEMESTER B.Tech COURSE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Hours/Week</th>
<th>Marks</th>
<th>Duration of End Semester Examination</th>
<th>Credits</th>
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**Note:** For EN14 302 Computer Programming in C, the end semester examination will be held by the University as a theory paper.
## SCHEME OF IV SEMESTER B.Tech COURSE

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### SCHEME OF VI SEMESTER B.Tech COURSE

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Syllabus - B.Tech. Computer Science and Engineering
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Syllabus - B.Tech. Computer Science and Engineering
## SCHEME OF VIII SEMESTER B.Tech COURSE

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Total Credits = 210
### CS14 704 Elective I

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<td>CS14 704 (B)</td>
<td>Digital Image Processing</td>
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<td>CS14 704 (C)</td>
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<td>CS14 704 (D)</td>
<td>Queuing Theory</td>
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### CS14 705 Elective II

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<td>CS14 705(B)</td>
<td>E-Commerce</td>
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<td>CS14 705(C)</td>
<td>Software Architecture and Project Management</td>
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<td>CS14 705(D)</td>
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<td>Computer Based Numerical Methods (Global)</td>
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### CS14 804-Elective III

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<td>Advanced Topics in Operating Systems</td>
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<td>CS14 804 (B)</td>
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<td>CS14 804 (C)</td>
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<td>CS14 804 (D)</td>
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<td>CS14 805 (E)</td>
<td>Pattern Recognition (Global)</td>
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EN14 301: ENGINEERING MATHEMATICS III
(Common for all branches)

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objective

• To provide a quick overview of the concepts and results in complex analysis that may be useful in engineering.

• To introduce the concepts of linear algebra and Fourier transform which are wealth of ideas and results with wide area of application.

Module I: Functions of a Complex Variable (13 hours)

Functions of a Complex Variable - Limit - Continuity - Derivative of a Complex function - Analytic functions - Cauchy-Riemann Equations - Laplace equation - Harmonic Functions - Conformal Mapping - Examples: $e^z$, $\sin z$, $\cosh z$, $(z^{1/2})$ - Mobius Transformation.

Module II: Functions of a Complex Variable (13 hours)

Definition of Line integral in the complex plane - Cauchy’s integral theorem (Proof of existence of indefinite integral to be omitted) - Independence of path - Cauchy’s integral formula - Derivatives of analytic functions (Proof not required) - Taylor series (No proof) - Laurent series (No proof) - Singularities - Zeros - Poles - Residues - Evaluation of residues - Cauchy’s residue theorem - Evaluation of real definite integrals.

Module III: Linear Algebra (13 hours) - (Proofs not required)


Module IV: Fourier Transforms (13 hours)

Syllabus - B.Tech. Computer Science and Engineering

Text Books

Module I:
Sections: 12.3, 12.4, 12.5, 12.6, 12.7, 12.9

Module II:
Sections: 13.1, 13.2, 13.3, 13.4, 14.4, 15.1, 15.2, 15.3, 15.4

Module III:
Sections: 6.1, 6.2, 6.3, 6.4, 6.8, Appendix.B.1

Module IV:
Sections: 9.1, 9.3, 9.5

Reference books


Syllabus - B.Tech. Computer Science and Engineering


**Internal Continuous Assessment (Maximum Marks-50)**

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% - Attendance and Regularity in the class

**University Examination Pattern**

**PART A:** Analytical/problem solving **SHORT questions**  

\[ 8 \times 5 \text{ marks} = 40 \text{ marks} \]

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving **DESCRIPTIVE**  

\[ 4 \times 15 \text{ marks} = 60 \text{ marks} \]

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

Maximum

**Total Marks:** 100
EN14 302 COMPUTER PROGRAMMING IN C
(Common for all branches)

Teaching scheme

2 hours lectures and 2 hours lab per week

Credits: 4

Objectives

- To impart the basic concepts of computer and information technology
- To develop skill in problem solving concepts through learning C programming in practical approach.

Module I (13 hours)


Module II (13 hours)


Module III (14 hours)


Module IV (12 hours)


Syllabus - B.Tech. Computer Science and Engineering
Text Books

Reference Books

Internal Continuous Assessment *(Maximum Marks-50)*
50% - Lab Practical Tests
20% - Assignments
20% - Fair Record
10% - Regularity in the class

Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

PART A: Analytical/problem solving SHORT questions  8x 5 marks=40 marks
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE  4 x 15 marks=60 marks
Two questions from each module with choice to answer one question.

Maximum
Total Marks: 100
CS14 303: Computer Organization and Design

(Common with IT14 303)

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

• To lay the foundation for the study of hardware organization of digital computers. It brings out the interplay between various building blocks of computers, without being specific to any particular computer. At the end of the course, the student is expected to gain a fair idea about the functional aspects of each building block in computer design, in the general sense.

Module I (14 hours)


Module II (12 hours)

Computer arithmetic - Signed and unsigned numbers - Addition and subtraction - Logical operations - Constructing an ALU - Multiplication and division - faster versions of multiplication- floating point representation and arithmetic

Module III (12 hours)

The processor: Building a data path - Simple and multi-cycle implementations - Microprogramming - Exceptions, Introduction to pipelining-pipeline Hazards

Module IV (14 hours)

Memory hierarchy - Caches - Cache performance - Virtual memory - Common framework for memory hierarchies Input/output - I/O performance measures - I/O techniques - interrupts, polling, DMA; Synchronous vs. Asynchronous I/O; Controllers. Types and characteristics of I/O devices - Buses - Interfaces in I/O devices - Design of an I/O system

Syllabus - B.Tech. Computer Science and Engineering
**Text Books**

**Reference Books**

**Internal Continuous Assessment (Maximum Marks-50)**
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% - Attendance and Regularity in the class
# University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks = 40 marks  
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE**  
4 x 15 marks = 60 marks  
Two questions from each module with choice to answer one question.

*Maximum  
Total Marks: 100*
CS14 304 : Discrete Computational Structures
(Common with IT14 304)

Teaching scheme
3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives
• To provide the mathematical foundations required in any stream of study in Computing.
• To provide a sound understanding of the various algorithms and methods
• To get familiar with the essential proof techniques, logic and useful mathematical objects.

Module I (13 hours)

Module II (13 hours)
Relational Structures - Cartesian products - Relations - Relation matrices - Properties of relations - Composition of relations - Equivalence relations and partitions - Functions – One-to-one, onto functions - Composition of functions and inverse functions - Partial orders - Hasse diagrams.

Module III (13 hours)
Group Theory - Definition and elementary properties - Cyclic groups - Homomorphisms and Isomorphisms - Subgroups - Cosets and Lagrange’s theorem - Elements of coding theory- Hamming metric - Generator matrices - Group codes - Hamming matrices.

Module IV (13 hours)
Recurrence Relations - Introduction, Linear recurrence relations with constant coefficients – Homogeneous solutions - Particular solutions - Total solutions Generating Function - solutions of recurrence relations by the method of generating functions.
Text Books

References

Internal Continuous Assessment *(Maximum Marks-50)*

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% - Attendance and Regularity in the class

University Examination Pattern

PART A: Analytical/problem solving SHORT questions  8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE  4 x 15 marks=60 marks questions

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

Maximum

Total Marks: 100

Syllabus - B.Tech. Computer Science and Engineering
CS14 305 : Electronic Circuits
(Common with IT14 305)

Teaching scheme  Credits: 4
3 hours lectures and 1 hour Tutorial per week

Objectives
1. To introduce the concepts and working principles of electronic circuits essential for the computing field.

Module I (14 hours)
Diode switch, clipping and clamping circuits – Types of Diodes - light emitting diodes - photo diode – opto coupler - laser diode - the schottky diode - varactor diodes - varistors - current-regulator diodes – step recovery diodes - back diodes - tunnel diodes - pin diodes - Transistors - Transistor switch and amplifier circuits – Bistable multivibrator - Schmitt trigger - Monostable and astable multivibrator

Module II (15 hours)

Module III (10 hours)
Logic levels - Concepts of SSI, MSI, LSI and VLSI - Logic families: NOT gate, TTL, ECL, CMOS logic - Interfacing - Comparison of logic families - TTL and, MOS flip-flops.

Module IV (13 hours)
Memories: Basic concepts - Read only memories - Programmable ROMs - Static and dynamic random access memories - Memory expansion - Magnetic bubble memories - Magnetic surface storage devices - CD-ROMs - Special memories -1 Sample and hold circuit - D/A converters - A/D converters – Timing

Syllabus - B.Tech. Computer Science and Engineering
**Text Books**

**References**
2. Floyd T.L., *Digital Fundamentals*, Universal Book Stall

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**Internal Continuous Assessment** *(Maximum Marks-50)*

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:** Analytical/problem solving SHORT questions  
8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE  
4 x 15 marks=60 marks questions

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

Maximum

**Total Marks: 100**
CS14 306 Switching Theory and Logic Design
(Common with IT14 306)

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

1. To introduce the principles, features and properties of digital devices and circuits.

2. To provide the basic concepts of computations and logic designs of ALU of a Computer

Module I(14 hours)

Number Systems and Codes - Binary-Coded Decimals -Weighted Codes-Gray Code-
Alphanumeric Codes- Boolean algebra - Postulates and theorems -Boolean functions and logical operations- Switching Expressions- Minterms, Maxterms, Generalization of De Morgan’s Laws -Normal and canonical forms - Self-dual functions -Incompletely Specified Functions- Karnaugh map - prime cubes – Quine-McClusky algorithm.

Module II(14 hours)

Combinational Logic-Implementation of Logic Expressions - Universal property of the NAND and NOR gates -Analysis and design of combinational logic circuits - Adders - Parallel adders and look-ahead adders - Comparators - Decoders and encoders - Code conversion - Multiplexers and demultiplexers - Parity generators and checkers – ROMs, PLAs.

Module III(14 hours)


Module IV(10 hours)

Fault diagnosis and tolerance - Fault classes and models - Fault diagnosis and testing – Test generation - Fault table method - Path sensitization method -Boolean difference method - Fault tolerance techniques.

Syllabus - B.Tech. Computer Science and Engineering
**University Examination Pattern**

**PART A: Analytical/problem solving SHORT questions**  \[8 \times 5 \text{ marks} = 40 \text{ marks}\]

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  \[4 \times 15 \text{ marks} = 60 \text{ marks}\]

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

**Maximum**

**Total Marks:** 100

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**Text Books**

- Floyd T.L., *Digital Fundamentals*, Universal Book Stall (Module III).

**Reference Books**

**Internal Continuous Assessment** *(Maximum Marks-50)*

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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Syllabus - B.Tech. Computer Science and Engineering
CS14 307(P) : Programming Lab

Objectives

- To give a strong foundation for developing the art of programming to the students of computing streams. For adequacy this has to be complemented by exercises appearing in the references.

Set 1 (3 lab sessions)

HCF (Euclid's algorithm) and LCM of given numbers - Find mean, median and mode of a given set of numbers - Conversion of numbers from binary to decimal, hexadecimal, octal and back - Evaluation of functions like ex, sin(x) and cos(x) for a given numerical precision using Taylor's series - Testing whether a given number is prime.

Set 2 (2 lab sessions)

String manipulation programs: sub-string search, deletion - Lexicographic sorting of a given set of strings - Generation of all permutations of the letters of a given string using recursion.

Set 3 (2 lab sessions)

Matrix operations: Programs to find the product of two matrices - Inverse and determinant (using recursion) of a given matrix - Solution to simultaneous linear equations using Jordan elimination

Set 4 (3 lab sessions)

Files: Use of files for storing records with provision for insertion - Deletion, search, sort and update of a record

Reference Books

<table>
<thead>
<tr>
<th>Internal Continuous Assessment (Maximum Marks-50)</th>
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<tbody>
<tr>
<td>60% - Laboratory practical and record</td>
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<tr>
<td>30% - Test/s</td>
</tr>
<tr>
<td>10% - Regularity in the class</td>
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<table>
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<tr>
<th>University Examination Pattern (Maximum Marks-100)</th>
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<tbody>
<tr>
<td>70% - Procedure, conducting experiment, results, tabulation, and inference</td>
</tr>
<tr>
<td>20% - Viva voce</td>
</tr>
<tr>
<td>10% - Fair record</td>
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</tbody>
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CS14 308(P) : Electronics Circuits Lab

Objectives

- To give a hands on experience to students in the static and dynamic characteristics of the electronics components and systems.

1. Silicon, germanium and zener diode characteristics
2. Characteristics of UJT and UJT relaxation oscillator
3. Static transistor characteristics in CE and CB configurations
4. Clipping, clamping, differentiating and integrating circuits
5. Series voltage regulator
6. Frequency response of CE amplifier with and without feedback
7. Emitter follower: measurement of input and output impedance
8. RC phase shift oscillator
9. Op amp: inverting and non-inverting amplifier, voltage follower

Reference Books

2. Bhargava etal., Basic Electronic Circuits and Linear Circuits, Tata McGraw Hill

Internal Continuous Assessment (Maximum Marks-50)

60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class
University Examination Pattern (Maximum Marks-100)

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

EN14 401B: Engineering Mathematics IV
(Common for IC, EC, EE, AI, BM, CS, and IT)

Teaching scheme  Credits: 4

Syllabus - B.Tech. Computer Science and Engineering
3 hours lectures and 1 hour Tutorial per week

Objective

• To inculcate the students an adequate understanding of the basic concepts of probability theory.
• To make them develop an interest in the area which may find useful to pursue their studies
• To stimulate the students understanding of the z-transform
• To make the student get acquainted with the basics of PDE

Module I: Probability Distributions (13 hours)


Module II: Z-Transforms (13 hours)


Module III: Series Solutions of Differential Equations (13 hours)


Module IV: Partial Differential Equations (13 hours)

Introduction – Solutions of equations of the form F(p,q) =0 ; F(x,p,q) =0 ; F(y,p,q) =0 ; F(z,p,q) =0 ; F_1(x,q) = F_2(y,q) ; Clairaut’s form, z = px + qv + F(p,q) ; Legrange’s form, Pp + Qq = R – Classification of Linear PDE’s – Derivation of one dimensional wave equation and one dimensional heat equation – Solution of these equation by the method of separation of variables.

Syllabus - B.Tech. Computer Science and Engineering
### Text Books

**Module I:**

Richard A Johnson, CB Gupta, *Miller and Freund’s Probability and statistics for Engineers, 7e*, Pearson Education - Sections: 4.1, 4.2, 4.3, 4.4, 4.6, 4.8, 5.1, 5.2, 5.5, 5.7

**Module II:**


Sections: 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7.

**Module III:**


Sections: 4.1, 4.4, 4.5

**Module IV:**


Sections: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9


Sections: 11.2, 11.3, 9.8 Ex.3, 11.5

### Reference books


Internal Continuous Assessment (Maximum Marks-50)

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% - Attendance and Regularity in the class

University Examination Pattern

**PART A:** Analytical/problem solving 8x 5 marks=40 marks
SHORT questions

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving 4 x 15 marks=60 marks
DESCRIPTIVE questions

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

*Maximum Total Marks: 100*
EN14 402      ENVIRONMENT SCIENCE
(Common for all branches)

Teaching scheme                  Credits: 4
3 hours lecture and 1 hour tutorial per week

Objectives

• To understand the problems of pollution, loss of forest, solid waste disposal, degradation of environment, loss of biodiversity and other environmental issues
• To create awareness among the students to address these issues and conserve the environment in a better way.

Module I (13 hours)

The Multidisciplinary nature of environmental science. Definition-scope and importance-need for public awareness. Natural resources. Renewable and non-renewable resources: Natural resources and associated problems-forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their defects on forests and tribal people- water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.- Food resources: World food problems, changes caused by agriculture over grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.-Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Module II (13 hours)

Ecosystems-Concept of an ecosystem-structure and function of an ecosystem - producers, consumers, decomposers-energy flow in the ecosystem-Ecological succession- Food chains, food webs and Ecological pyramids-Introduction, types, characteristics features, structure and function of the following ecosystem-Forest ecosystem- Grassland ecosystem -Desert ecosystem-Aquatic ecosystem(ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its consideration Introduction- Definition: genetic, species and ecosystem diversity-Bio-geographical; classification of India -value of biodiversity: consumptive use, productive use, social ethical, aesthetic and option values Biodiversity at Global, national, and local level-India at mega -diversity nation- Hot spot of biodiversity-Threats to biodiversity: habitat loss, poaching of wild life, man,
wild life conflicts – Endangered and endemic species of India-Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Module III (13 hours)

Environmental pollution Definition-Causes, effects and control measures of Air pollution- Water pollution -soil pollution-Marine pollution-Noise pollution-Thermal pollution-Nuclear hazards-Solid waste management: Causes, effects and control measures of urban and industrial wastes-Role of an individual in prevention of pollution. Pollution case studies-Disaster management: floods , earth quake, cyclone and landslides-Environmental impact assessment

Module IV (13 hours)

Environment and sustainable development-Sustainable use of natural resources- Conversion of renewable energy resources into other forms-case studies-Problems related to energy and Energy auditing-Water conservation, rain water harvesting, water shed management-case studies-Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust-Waste land reclamation Consumerism and waste products-Reduce, reuse and recycling of products-Value education.
Text Books:

1. Daniels & Krishnaswamy, Environmental studies, Wiley India pvt ltd, 2009

References:

2. S.P Misra, S.N Pandey, Essential Environmental studies, Ane books, Pvt Ltd, 2009

Internal Continuous Assessment (Maximum Marks-50)

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

Note: Field work can be Visit to a local area to document environmental assets-river/forest/grass land/mountain or Visit to local polluted site-urban/rural/industrial/agricultural etc. or Study of common plants, insects, birds etc. or Study of simple ecosystems-pond, river, hill slopes etc. or mini project work on renewable energy and other natural
resources, management of wastes etc.

University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks=60 marks

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

*Maximum*

*Total Marks: 100*
CS14 403: Data Structures and Algorithms

(Common with IT14 403)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To impart the basic concepts of continuous data structures
- To develop understanding about fundamental searching and sorting techniques.

Module I (10 hours)


Module II (14 hours)


Module III (14 hours)

Non Linear Structures - Graphs - Trees - Graph & Tree implementation using array & Linked List - Binary trees - Binary tree traversals - pre-order, in-order & postorder - Threaded binary trees - Binary Search trees - AVL trees - B trees and B+ trees - Graph traversals - DFS, BFS - shortest path - Dijkstra’s algorithm, Minimum spanning tree - Kruskal Algorithm, prims algorithm

Module IV (14 hours)


Syllabus - B.Tech. Computer Science and Engineering
Text Books

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Fundamentals of Data Structure in C, University Press

Reference Books

3. Yedidyah Langsam, Moshe J Augenstein, Tanenbaum -Data Structures using C and C++, PHI Learning

Internal Continuous Assessment (Maximum Marks-50)

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% - Attendance and Regularity in the class

Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A:** Analytical/problem solving SHORT questions 8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE 4 x 15 marks = 60 marks

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

*Maximum

Total Marks: 100
CS14 404 : Object Oriented Programming In Java
(Common with IT14 404)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
- To familiarize the student with the Object Oriented Programming Concepts
- Also to give a fair idea about Programming In Java and its use as an Application development tool.

Module I (12 hours)

Module II (12 hours)

Module III (13 hours)
Streams and Files - Use of Streams, Object Streams, File Management. Multi-threaded programming - Thread properties - Creating a thread - Interrupting threads - Thread priority - thread synchronization - Synchronized method - Interthread communication

Module IV (15 hours)

Syllabus - B.Tech. Computer Science and Engineering
Text Books


References


2. Timothy Budd, “Understanding Object-oriented programming with Java”, Pearson Education.

3. Doug Lea, Concurrent programming in Java Design Principles and Patterns, Pearson Education.

4. George Reese, " Database programming, with JDBC and Java", O'Reilly.


7. Dr.G.T.Thampi, Object Oriented Programming in Java,Dream-tech press

8. Hari Mohan Pandey, Java Programming, Pearson Education

9. Deitel & Deitel, Java : How to Program, PHI

Internal Continuous Assessment (Maximum Marks-50)

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% - Attendance and Regularity in the class

Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A:** Analytical/problem solving SHORT questions  \[ 8 \times 5 \text{ marks}=40 \text{ marks} \]

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE \[ 4 \times 15 \text{ marks}=60 \text{ marks} \]

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

Maximum

Total Marks: 100
CS14 405: Systems Programming

(Common with IT14 405)

**Teaching scheme**
3 hours lecture and 1 hour tutorial per week

**Credits:** 4

**Objectives**

- To familiarize the students with the essentials of system software design. System software consists of programs necessary to make the hardware function properly.
- To equip the student with the right kind of tools for computer systems design and development.

**Module I (16 hours)**

Background - system software machine architecture - the simplified instructional computer - traditional machines - RISC machines - assemblers - basic assembler functions - machine dependent and machine independent - assembler features - assembler design - assembler design options - implementation examples - AIX Assembler.

**Module II (10 hours)**

Loaders and linkers - basic loader functions - machine dependent and machine independent loader features - loader design options and implementation examples

**Module III (10 hours)**

Macro processors - basic macro processor functions - machine-independent macro processor features - macro processor design options and implementation examples.

**Module IV (16 hours)**

Introduction to operating systems - basic principles - batch processing - multi-programming - timesharing systems and real-time systems - parallel and distributed systems - computer system structure - computer system operation - I/O structure - structure - storage hierarchy - hardware protection - general system architecture - operating system structure - system components - OS services -system calls - system structure - virtual machines.

Syllabus - B.Tech. Computer Science and Engineering
Text Books

References
2. Timothy Budd, “Understanding Object-oriented programming with Java”, Pearson Education.
3. Doug Lea, Concurrent programming in Java Design Principles and Patterns, Pearson Education.
6. Dr.G.T.Thampi, Object Oriented Programming in Java, Dream-tech press
7. Hari Mohan Pandey, Java Programming, Pearson Education
8. Deitel & Deitel, Java : How to Program, PHI

Internal Continuous Assessment (Maximum Marks-50)
60% - Tests (minimum 2)
30% - Assignments (minimum 2) such as home work, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, field work etc.
10% - Attendance and Regularity in the class

Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks = 60 marks

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

*Maximum*

*Total Marks: 100*
CS14 406: Microprocessor Based Design

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To familiarize the student with the internals of a microprocessor with a wide range of processing capabilities.
- Also to give a fair idea of various interfacing methods and devices, along with a detailed treatment of important design issues.

Module I (11 hours)


Module II (12 hours)

Programming model-The Assembly Process, Assemblers for x86 , Memory Models- Approaches to Programming, Data Transfer Instructions , Branch Instructions, Arithmetic Instructions, Logical Instructions, Shift and Rotate Instructions, String Instructions , Procedures ,Macros, Input / Output Programming, I/O Instructions, Modular Programming .

Module III (14 hours)

The Hardware Structure of 8086 -, Clock, , Instruction Cycle. Memory and I/O Decoding -Memory Device Pins, Memory Address Decoding, I/O Address Decoding .The Interrupt Structure of 8086 -Dedicated Interrupt , Software Interrupts ,Hardware Interrupts, Priority of Interrupts ,Dos 21 H and BIOS 10H Functions , Keyboard Interfacing.

Module IV (15 hours)

Peripheral Interfacing -Programmable Peripheral Interface (PPI)-8255A, Modes of Operation, Centronics Printer Interface ,Interfacing an Analog-to-Digital Converter, Interfacing to a Digital-to-Analog Converter. Interfacing a Stepper Motor to the 8086 , Hex Keyboard Interfacing ,The Programmable Interval Timer 8253/8254 ,The

Syllabus - B.Tech. Computer Science and Engineering
Programmable Keyboard Display Interface - 8279 , The Programmable Interrupt Controller (PIC) 8259 , Direct Memory Access - The DMA Controller - 8237.

**Text Books**


2. Lyla B Das., *The X86 Microprocessors Architecture, Programming and Interfacing (8086 to Pentium)*, Pearson-2010

**Reference Books**


**Internal Continuous Assessment (Maximum Marks-50)**

60% - Tests (minimum 2)

30% - Assignments (minimum 2) such as homework, problem solving, group discussions, quiz, literature survey, seminar, term-project, software exercises, field work etc.

10% - Attendance and Regularity in the class

Syllabus - B.Tech. Computer Science and Engineering
### University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks = 60 marks

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

*Maximum*  
*Total Marks: 100*
CS14 407(P) : Data Structures Lab

Teaching scheme

3 hours practical per week

Credits: 2

Objectives

• To give hands on experience in viewing data as the central resource in computing process and to visualize the importance of structuring data.
• To demonstrate the impact of organizing data on the efficiency of algorithms that process the data, including static and dynamic data structures as well as linear and nonlinear data structures.

1. Stack and Queue: Implementation using arrays and Linked lists
2. Searching Methods: Binary search and Hashing
3. Sorting: Recursive implementation of Quick Sort and Merge Sort
4. Binary Search Tree. Implementation with insertion, deletion and traversal
5. Infix Expression Evaluation: Using expression tree
6. Graph Search Algorithms: DFS and BFS on A connected directed graph
7. Minimal Spanning Tree. Implementation of Kruskal's and Prim's Algorithms
8. Shortest Path Algorithm. Dijkstra and Floyd Warshall Algorithm
9. Disjoint Set operations: Union and Find using rank and path compression
10. Applications of Heap: Priority Queue and Heap Sort.

Reference Books

• Sahni S., Data structures, Algorithms & Applications in C++, McGraw Hill.
• G.S Baluja.,Data Structures through C,Dhanpat Rai & Co.
• Parag Himanshu Dave,Himanshu Bhalchandra Dave, Design and Analysis of Algorithm, Pearson.

Syllabus - B.Tech. Computer Science and Engineering
Internal Continuous Assessment (Maximum Marks-50)
60%-Laboratory practical and record
30%- Test/s
10%- Regularity in the class

University Examination Pattern (Maximum Marks-100)
70% - Procedure, conducting experiment, results, tabulation, and inference
20% - Viva voce
10% - Fair record

CS14 408(P) : Digital Systems Lab
Teaching scheme

3 hours practical per week

Credits: 2

Objectives

• To give a hands on experience on digital electronics components and systems; which are fundamental building blocks of the Computer systems.

• To deal extensively with the characteristic and features of indispensable digital electronic circuits and systems through structured experiments.

1. Verification of truth tables of AND, OR, NOT, NAND, NOR and XOR gates, used for gating digital signals.

2. TTL characteristics

3. Verification of the postulates of Boolean algebra and DeMorgan’s theorem using logic gates.

4. Half and full adders, half and full subtractors.

5. Digital comparator, parity generator and checker, and code converter

6. Characteristics and operations of RS, gated RS, D, T, and JK master slave flipflops

7. Multiplexer and demultiplexer using gates

8. Shift register, ring counter, and twisted ring counter.

9. Decade counter and variable modulo asynchronous counter

10. Astable multivibrator and schmitt trigger using gates, astable and monostable multivibrator and frequency divider using 555.

Reference Books

1. C Nagarath J., Electronics Analog & Digital, Prentice Hall India


Syllabus - B.Tech. Computer Science and Engineering
### Internal Continuous Assessment *(Maximum Marks-50)*

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

### University Examination Pattern *(Maximum Marks-100)*

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

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**CS14 501 ENGINEERING ECONOMICS AND PRINCIPLES OF MANAGEMENT**

Syllabus - B.Tech. Computer Science and Engineering
Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Section 1: Engineering Economics

Objective
The prime objective of the Engineering Economics course is to make students familiar with the economic way of thinking. This course provides the students with the foundations of economic theory, tools and techniques for use in the process of efficient economic decision-making in their engineering and managerial profession.

Module I (13 Hrs)

Introduction to Engineering Economics - Technical efficiency, Economic efficiency - Cost concepts: Elements of costs, Opportunity cost, Sunk cost, Private and Social cost, Marginal cost, Marginal revenue, Profit maximisation, Break-even analysis.


Module II (13 Hrs)

Text Books

Reference Books

Internal Continuous Assessment (Maximum Marks-25)
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% - Attendance and Regularity in the class
University Examination Pattern for Section 1

PART A: Analytical/problem solving SHORT questions 4x 5 marks = 20 marks

Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

PART B: Analytical/Problem solving DESCRIPTIVE 2 x 15 marks = 30 marks

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

Maximum

Total Marks: 50

University Examination Pattern - for Section 1

Note: Section 1 and Section 2 are to be answered in separate answer books

Maximum 50 marks each for Section 1 and Section 2

Syllabus - B.Tech. Computer Science and Engineering
Section 2: Principles of Management

Objective

- To provide knowledge on principles of management, decision making techniques, accounting principles and basic management streams

Module I (13 hours)

Principles of management – Evolution of management theory and functions of management Organizational structure – Principle and types. Decision making – Strategic, tactical & operational decisions, decision making under certainty, risk & uncertainty and multistage decisions & decision tree Human resource management – Basic concepts of job analysis, job evaluation, merit rating, wages, incentives, recruitment, training and industrial relations

Module II (13 hours)


Reference Books

8. Weist and Levy, *A Management guide to PERT and CPM*, Prantice Hall of India
Internal Continuous Assessment *(Maximum Marks-25)*

- **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%** - Attendance and Regularity in the class

University Examination Pattern for Section 1

**PART A:** Analytical/problem solving SHORT questions  \(4 \times 5\) marks = 20 marks

Candidates have to answer FOUR questions out of FIVE. There shall be minimum of TWO and maximum of THREE questions from each module with total FIVE questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE questions  \(2 \times 15\) marks = 30 marks

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

**Maximum**

**Total Marks:** 50

University Examination Pattern - for Section 2

**Note:** Section 1 and Section 2 are to be answered in separate answer books

Maximum 50 marks each for Section 1 and Section 2
CS14 502 :Software Engineering
(Common with IT14 502)

Teaching scheme
Credits:4
3 hours lecture and 1 hour tutorial per week

Objectives
• To introduce the software engineering techniques and background information to the students of computing science stream.
• For adequacy this has to be complemented by exercises appearing in texts and references.

Module I(13 Hours)
Introduction to Software Engineering - Reasons for software project failure - Similarities and differences between software and other engineering products. Software Life Cycle - Water fall model - Prototyping - Spiral model -incremental model- pros and cons of each model- feasibility study- Requirements gathering and analysis- SRS- formal specification methods.

Module II(13 Hours)

Module III(13 Hours)

Syllabus - B.Tech. Computer Science and Engineering
Module IV (13 Hours)

Software Project Management - Brief study of various phases of Project Management - Planning - Organizing - Staffing - Directing and Controlling.
Methods of software licensing and introduction to Free Software.

Text Books


References


Internal Continuous Assessment *(Maximum Marks-50)*

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

Note: One suggestion is to consider techniques learned here while doing mini project & assignments can be given to prepare Software Engineering documents in IEEE format for a sample project.
University Examination Pattern
CS14 503 : Operating Systems
(Common with IT14 503)

Teaching scheme
3hours lecture and 1 hour tutorial per week)

Credits:4

Objectives

- To impart the knowledge on the need and requirement of an interface between Man and Machine.
- To teach the features of operating systems and the fundamental theory associated with process, memory and file management components of operating systems.

Module 1(13 Hours)

Syllabus - B.Tech. Computer Science and Engineering
Introduction-Definition- Operating System Structure- Operating System Operations-
Process Management- Memory Management- Storage Management- Protection and Security-
Distributed Systems- Special-Purpose Systems- Computing Environments- Open Source Operating Systems- Operating-System Services- User Operating-System Interface- System Calls- Types of System Calls- System Programs- Operating-System Design and Implementation- Virtual Machines- System Boot-
System Debugging

Module II(14 Hours)
Process Management- Process Concept- Operations on Processes-Threading-

Module III(13 Hours)
Memory Management-Swapping- Contiguous Memory Allocation- Paging-

Module IV(12 Hours)
Mass Storage Structure- Disk Scheduling- Disk Management- RAID Structure-

Text Books
1. Silberschatz, Galvin, & Gagne, Operating System Concepts, 8th Ed., Wiley

References
**University Examination Pattern**

**PART A:** Analytical/problem solving SHORT questions

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPITIVE

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

Maximum

Total Marks: 100

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**Internal Continuous Assessment (Maximum Marks-50)**

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
CS14 504: Database Management Systems
(Deer with IT14 504)

Teaching scheme
3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

To introduce the fundamental concepts necessary for designing, using, and implementing database systems and applications. The syllabus includes the fundamentals of database modeling and design, the languages and facilities provided by the database management systems, and system implementation techniques.

Module I (13 hours)

Introduction: Characteristics of database approach - Database Users - Advantages of using DBMS - Categories of Data Models - schemas, instances and Database State - Three Schema Architecture and Data Independence - database languages and interfaces - Database modeling using entity-relationship (ER) - entity sets, attributes and keys Relationship Types, Relationship Sets, Roles and structural constraints - weak entity types - enhanced entity-relationship (EER) and object modeling - subclasses - super classes and inheritance - specialization and generalization - modeling of union types.

Module II (13 hours)

Relational model concepts - Relational model constraints and Relational Database Schema - Relational algebra - Tuple Relational Calculus - Domain Relational Calculus - Relational Database Design using ER - ER-to - Relational mapping - queries in SQL - DDL and DML-SQL views.

Module III (13 hours)

Database design: functional dependencies - Inference Rules for Functional Dependencies - Closure - Minimal Cover - Normal forms - First-second and third normal forms - Boyce-Codd normal form - Properties of Relational Decompositions - Algorithms for Relational database design - Multi valued dependencies and fourth normal form (general definitions) - join dependencies and fifth normal form (general definitions) - inclusion - Dependencies (general definitions).

Syllabus - B.Tech. Computer Science and Engineering
Module IV (13 hours)
Transaction processing: desirable properties of transactions, Characterizing Schedules Based on Recoverability and Serializability - concurrency control Techniques - Two-Phase Locking - Time stamp ordering- Multi version concurrency control - Validation (Optimistic) concurrency control- Granularity of Data Items and Multiple Granularity Locking - Database recovery techniques -based on deferred update and immediate update - shadow paging - ARIES recovery algorithm - Introduction to Database security - issues- access control based on granting/revoking of privileges

Text Book

Reference Books

Internal Continuous Assessment (Maximum Marks-50)
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

Syllabus - B.Tech. Computer Science and Engineering
<table>
<thead>
<tr>
<th>University Examination Pattern</th>
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<tbody>
<tr>
<td><strong>PART A:</strong> Analytical/problem solving SHORT questions  8x 5 marks=40 marks</td>
</tr>
<tr>
<td>Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.</td>
</tr>
<tr>
<td><strong>PART B:</strong> Analytical/Problem solving DESCRIPTIVE  4 x 15 marks=60 marks questions</td>
</tr>
<tr>
<td>Two questions from each module with choice to answer one question.</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Total Marks: 100</td>
</tr>
</tbody>
</table>
CS14 505: Digital Data Communication

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

1. To introduce the basic concepts of communication of digital data by looking at the various aspects of generation, transmission and reception.

2. To introduce the various protocols involved in communication of digital data.

Module I (13 hours)


Module II (13 hours)


Module III (13 hours)


Module IV (13 hours)

Syllabus - B.Tech. Computer Science and Engineering

**Text Books**


**Reference Books**


3. Fred Halsall, *Data Communication, Computer Networks and Open Systems*, Pearson Education.

**Internal Continuous Assessment (Maximum Marks-50)**

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: Analytical/problem solving SHORT questions**  \(8 \times 5 \text{ marks}=40 \text{ marks}\)

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE**  \(4 \times 15 \text{ marks}=60 \text{ marks}\)

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

*Maximum*

*Total Marks: 100*
CS14 506: Theory Of Computation
(Common with IT14 506)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
1. To teach the fundamentals on computational models and computability.
2. To introduce the introductory concepts of languages and their classification
3. To familiarize the students on recognizers and automata.
4. To impart knowledge on classifying algorithms into the various computability classes and proofs of some standard algorithms.

Module I (13 hours) Introduction to formal proof - Inductive proofs - Concepts of automata theory - Deterministic finite automata - Nondeterministic finite Automata - equivalence of deterministic and nondeterministic finite automata - Nondeterministic Finite automata with ε transitions - Regular expressions - Finite automata and regular expressions - Algebraic laws for Regular expressions - Pumping lemma for regular languages - closure properties of regular languages - Decision properties of regular languages - Equivalence and minimization of automata.

Module II (13 hours) Context free Grammars - Derivations - sentential forms - The language of grammar - Parse trees – Ambiguity in grammar and languages - Inherently ambiguous languages – Context Sensitive Language-Linear Bounded Automata- Chomsky Hierarchy-Pushdown automata - Formal definition - Graphical notation - The language of a PDA - Acceptance by PDA - Empty stack - Final state - PDAs to grammars - Deterministic PDAs and CFLs - Non deterministic PDAs - Chomsky Normal Form - Greibach Normal Form - Pumping lemma for CFLs - Closure properties of CFLs - Decision properties of CFLs - CYK algorithm.

Module III (14 hours) Turing Machines - Notation - Instantaneous Description - Transition Diagram - The language of a Turing Machine - Halting of TMs - Programming techniques for Turing Machines - Extension to basic TMs - Nondeterministic TMs - Restricted TMs -Universal Turing Machine- Recursive and Recursively Enumerable Languages -Properties of Recursively Enumerable Languages

Module IV (12 hours) Halting problem of TMs - Undecidable problem about TMs - Rice's Theorem - Post Correspondence problem - Undecidability of Post Correspondence Problem - Undecidable problems on Languages. Intractable problems - The classes P and NP - Polynomial time reducibility -NP-Complete problems

Syllabus - B.Tech. Computer Science and Engineering
Text Books
1. Raymond Greenlaw & H. James Hoover, Fundamentals of the Theory of Computation:
   Principles and Practice, Morgan Kaufmann Publishers.

Reference Books
1. Hopcroft J.E, Motwani R & Ullman J. D., Introduction to Automata Theory, Languages and
   Computation, Pearson Education.
2. Misra & Chandrasekhar, PHI
4. Martin I C, Introduction to Languages and the Theory of Computation, Tata
   McGraw Hill

Internal Continuous Assessment (Maximum Marks-50)
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: Analytical/problem solving SHORT questions   8x 5 marks=40 marks

Candidates have to answer EIGHT questions
out of TEN. There shall be minimum of TWO
and maximum of THREE questions from
each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE     4 x 15 marks=60 marks
questions

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

Maximum
Total Marks: 100

Syllabus - B.Tech. Computer Science and Engineering
CS14 507(P) : Object Oriented Programming Lab

Objectives

- To impart the working experience on object oriented concept of programming
- To teach the student to write programs in popular object oriented programming languages (C++/Java)

Lab1: Familiarization with classes, objects and constructors- Implementation of Stack/Queue

Lab 2: Implementation of abstract data type -Binary tree

Lab 3: Concept of abstract class and Inheritance-Define an abstract class “shape” and derive classes for rectangle, square, ellipse, circle with proper class hierarchy.

Lab 4: Polymorphism - Define base class for vectors and use inheritance to define complex and real vector with standard operations and use base class object to display different type objects.

Lab 5: Concurrent programming using Threads - program for the readers and writers problem

Lab 6: Applets: Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result

Lab 7: GUI programming : Define Point class and an Arc class. Define a Graph class which represents graph as a collection of Point objects and Arc objects. Write a method to find a minimum cost spanning tree in a graph and display it.

Lab 8 : Random Access Files : Create student database. Design a GUI with provision for insertion Deletion and search of a record and create reports.

Lab 9 : Java Packages : Define a Scanner package to read different data types and use the Scanner to compute the average of a list of comma separated values.

Lab 10 : Java Collections : Use Java collection frame work to perform set operations.

Reference Books

3. T.V. Suresh Kumar, B.Eswara Reddy, P.Raghavan, Programming with Java, Pearson Education
### Internal Continuous Assessment *(Maximum Marks-50)*

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

### University Examination Pattern *(Maximum marks: 100)*

- 70% - Algorithm, Program, output
- 20% - Viva voce
- 10% - Fair record
CS14 508(P): HARDWARE LAB
Objectives

- To teach the relevance and characteristics of hardware components of a digital computer system through various laboratory experiments.
- To enable the students to develop the ability to interface devices to computer systems through various interfacing techniques.

Lab 1: Identification of components/cards and PC assembling from components
Lab 2,3: Assembly language program for implementing arithmetic and string operations
Lab 4: Assembly Language programs for display /video manipulation
Lab 5: Implementation of a file manager using DOS/BIOS interrupts
Lab 6: TSR (Terminate and Stay Resident) Programming
Lab 7: Stepper Motor interface
Lab 8, 9: Parallel Interface: Printer and Hex keyboard
Lab 10: LED Matrix Board Display

Reference Books

2. Douglas V. Hall, Microprocessors and Interfacing, 2/e, Tata McGraw Hill, 1988

Internal Continuous Assessment (Maximum Marks-50)

60% - Laboratory Practical and record
30% - Tests.
10% - Regularity in the class
20% - Viva Voce
10% - Fair Record

Syllabus - B.Tech. Computer Science and Engineering
CS14 601 : Embedded System

Teaching scheme
3 hours lectures and 1 hour Tutorial per week

Credits: 4

Syllabus - B.Tech. Computer Science and Engineering
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 (13 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 (12 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
8. 

Internal Continuous Assessment (*Maximum Marks-50*)
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
University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE**  
4 x 15 marks=60 marks

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

Maximum

Total Marks: 100
CS14 602 : Computer Graphics & Multimedia

(Common with IT14 602)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objective:

• This course is to introduce fundamental principles of computer graphics and different media formats. The subject is very relevant in view of the continuing trend of convergence of media and communication engineering. For adequacy this has to be complemented by exercises appearing in texts and references

Module I (13 hours)

Introduction to computer graphics - programming in the simple raster graphics package - basic raster graphics algorithms for drawing 2D primitives - scan converting lines - circles - generating characters - geometrical transformations - 2D transformations - homogeneous coordinates and matrix representation of transformations - window-to-view-port transformation

Module II (13 hours)

Viewing in 3D projections - 3D transformations - basics of solid modelling - Input devices and interactive techniques - interaction hardware - basic interaction tasks – computer graphics programming in C/C++.

Module III (14 hours)

Introduction to multimedia - media and data streams - properties of a multimedia system - data stream characteristics - information units Multimedia building blocks - audio - basic sound concepts - music - speech - MIDI versus digital audio - audio file formats - sound for the web - images and graphics - basic concepts - computer image processing - video and animation - basic concepts - animation techniques - animation for the web

Module IV (12 hours)

Data compression - storage space and coding requirements - classification of coding/compression techniques - basic compression techniques like JPEG, H.261, MPEG and DVI

Syllabus - B.Tech. Computer Science and Engineering
Text books

Reference books

Internal Continuous Assessment (Maximum Marks-50)
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:** Analytical/problem solving SHORT questions 8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE 4 x 15 marks = 60 marks

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

*Maximum

Total Marks: 100

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**CS14 603: Compiler Design**

Syllabus - B.Tech. Computer Science and Engineering
Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

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 (13 hours)


Module II (13 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 (13 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 - run-time environments - source language issues - storage organization - storage allocation strategies - access to non-local names - parameter passing - symbol tables.

Module IV (13 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-50)
- 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:** Analytical/problem solving SHORT questions  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE  
4 x 15 marks = 60 marks

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

*Maximum*

*Total Marks: 100*
CS14 604: Computer Networks
(Common with IT14 604)

Teaching scheme
3 hours lectures 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)

Module III (13 hours)

Module IV (13 hours)
The Application Layer- DNS-The Domain Name System, Electronic Mail, The World Wide Web, Multimedia

Syllabus - B.Tech. Computer Science and Engineering
### Text Book

### Reference Books
2. Halsall F., Data Communication, *Computer Networks and Open Systems*, Pearson Education

### Internal Continuous Assessment (Maximum Marks-50)
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

Syllabus - B.Tech. Computer Science and Engineering
## University Examination Pattern

**PART A:** Analytical/problem solving SHORT questions  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE questions  
4 x 15 marks = 60 marks

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

*Maximum*  
*Total Marks: 100*
CS14 605 : GRAPH THEORY & COMBINATORICS

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

- This course introduces the basics of graph theory as a modeling and analysis tool in computer science and engineering. It introduces the structures such as graphs and trees and several combinatorial techniques, which are needed in number theory based computing and network security studies in Computer Science.

Module I (13 hours)

Introduction to graphs - definitions - subgraphs - paths and cycles - matrix representation of graphs - Euler tours - Chinese postman problem - planar graphs - Euler's formula - platonic bodies - applications of Kuratowski's theorem - Hamiltonian graphs - graph colouring and chromatic polynomials - map colouring

Module II (14 hours)

Trees - definitions and properties - rooted trees - trees and sorting - weighted trees and prefix codes - biconnected components and articulation points - the max-flow min-cut theorem - maximum bipartite matching - Matchings - matchings and augmenting paths - the personal assignment problem - Networks - flows and cuts - ford and Fulkerson algorithm - separating sets

Module III (11 hours)

Fundamental principles of counting - permutations and combinations - binomial theorem - combinations with repetition - combinatorial numbers - principle of inclusion and exclusion - derangements - arrangements with forbidden positions

Module IV (14 hours)

Generating functions - partitions of integers - the exponential generating function - the summation operator - recurrence relations - first order and second order - non-homogeneous recurrence relations - method of generating functions

Text books


Syllabus - B.Tech. Computer Science and Engineering
Introduction, Pearson Education
2. Clark J. & Holton D.A., A First Look at Graph Theory, Allied Publishers (World Scientific)

Reference books
5. S Pirzada, An Introduction Graph Theory, Universities Press

Internal Continuous Assessment (Maximum Marks-50)
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: Analytical/problem solving SHORT questions \[8 \times 5 \text{ marks}=40 \text{ marks}\]

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE \[4 \times 15 \text{ marks}=60 \text{ marks}\]

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

Maximum

Total Marks: 100

Syllabus - B.Tech. Computer Science and Engineering
CS14 606: Management Information Systems

Teaching scheme

Credits: 4

3 hours lectures and 1 hour Tutorial per week

Objectives

• To introduce the methods and the influence of the information systems in management milieu
• To enable the students to use MIS as an effective tool in management and decision making

Module I (14 hours)

Information Systems-functions of management-levels of management-framework for information systems-systems approach-systems concepts-systems and their environment- effects of systems approach in information systems design- using systems approach in problem solving - strategic uses of information technology.

Module II (14 hours)

Computer System Resources- Computer Hardware- Computer Software- File and Database Management Systems- Communications systems- office communications- Applications of Operational Information Systems to Business

Module III (10 hours)

Kinds of Information Systems - Transaction Processing System (TPS) - Office Automation System (OAS) - Management Information System (MIS) - Decision Support System (DSS) and Group Decision Support System (GDSS) - Expert System (ES) - Executive Support System (EIS or ESS).

Module IV (14 hours)

Information systems planning - critical success factor - business system planning - ends/means analysis - organizing the information systems plan - system analysis and design - alternative application development approaches - organization of data processing - security and ethical issues of information systems.
**Reference Books**


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**Internal Continuous Assessment** *(Maximum Marks-50)*

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**
CS14 607(P) : Systems Lab

Objectives

- 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 banker's algorithm
3. Inter-process communication using mailboxes and pipes
4. Simulation of any two CPU Scheduling Algorithms. (FCFS, RR, SJF, SPN, SRTF, Priority, Multilevel Queuing)
5. Program for FIFO, LRU, and OPTIMAL page replacement algorithm

Database management systems

1. Implementation of a database stored in an RDBMS accessible through a web browser.
2. Implementation of optimistic concurrency control algorithm
3. Familiarization of any one RDBMS software and writing SQL queries to retrieve information from the stored database

Reference Books

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University Examination Pattern *(Maximum Marks-100)*

Syllabus - B.Tech. Computer Science and Engineering
70% - Algorithm, Program, Output  
20% - Viva voce  
10% - Fair record

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>60% - Laboratory Practical and record</td>
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<tr>
<td>30% - Tests.</td>
</tr>
<tr>
<td>10% - Regularity in the class</td>
</tr>
</tbody>
</table>
CS14 608(P): Mini Project

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 specialized in Information Technology or 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.

<table>
<thead>
<tr>
<th>Internal Continuous Assessment (50 marks)</th>
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<tbody>
<tr>
<td>40% - Design and development</td>
</tr>
<tr>
<td>30% - Final result and Demonstration</td>
</tr>
<tr>
<td>20% - Report</td>
</tr>
<tr>
<td>10% - Regularity in the class</td>
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</table>

<table>
<thead>
<tr>
<th>End Semester Examination (Maximum Marks-100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% - Demonstration of mini project</td>
</tr>
<tr>
<td>50% - Practical test connected with mini project</td>
</tr>
<tr>
<td>25% - Viva voce</td>
</tr>
</tbody>
</table>

Syllabus - B.Tech. Computer Science and Engineering
CS14 701: Design and Analysis of Algorithms

(Common with IT14 701)

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

- To provide a sound basis of algorithm design and analysis techniques.
- To introduce the various computing models and their capabilities with respect to computing.

Module I (12 hours)


Module II (14 hours)


Module III (13 hours)

Complexity: Complexity classes - P, NP, Co-NP, NP Hard and NP Complete problems - Cook’s theorem(Proof not expected) - NP- Completeness reductions for clique - Vertex Cover - Subset Sum-Hamiltonian Cycle - TSP - approximation algorithms - Vertex Cover - TSP-Set covering and subset sum - Graph coloring.
Module IV (13 hours)


Text Books

Reference Books
1. Basse S., Computer Algorithms: Introduction to Design And Analysis, Addison Wesley

Internal Continuous Assessment (Maximum Marks-50)
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:** Analytical/problem solving SHORT questions \( \text{8x 5 marks=40 marks} \)

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE \( \text{4 x 15 marks=60 marks} \)

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

*Maximum

**Total Marks: 100*
CS14 702: Cryptography and Network Security

(Common with IT14 702)

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

• To introduce the principles and practices of cryptography and network security
• To discuss algorithms and schemes to handle the security issues
• To introduce web security

Module I (16 hours)


Module II (10 hours)

Public key cryptosystems – The RSA Algorithm – Diffie Hellman key exchange – comparison of RSA & DES – Elliptic Curve Cryptography

Module III (14 hours)


Module IV (12 hours)

**Text Books**

**Reference Books**

**Internal Continuous Assessment (Maximum Marks-50)**
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: Analytical/problem solving SHORT questions**

8 x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**

4 x 15 marks = 60 marks

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

*Maximum*

*Total Marks: 100*

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**CS14 703: Artificial Intelligence**

Syllabus - B.Tech. Computer Science and Engineering
Teaching scheme
Credits: 4
3 hours lecture and 1 hour tutorial per week

Objectives
• AI is the study of how to make computers do things which, at the moment people do better.
• This course introduces AI problems and Search techniques, Knowledge Representations, Neural networks, LISP, Prolog and various approaches of AI problems solving.
• This leads the students to design their own systems of artificial Intelligence and expert systems.

Module I (13 hours)

Module II (15 hours)
Knowledge representation - the propositional calculus - using constraints on feature values - the language - rules of inference - definition of proof - semantics - soundness and completeness - the PSAT problem - meta-theorems - associative and distributive laws - resolution in propositional calculus - soundness of resolution - converting arbitrary wffs to conjunctions of clauses - resolution refutations - horn clauses - the predicate calculus - motivation - the language and its syntax - semantics - quantification - semantics of quantifiers - resolution in predicate calculus - unification - converting arbitrary wffs to clause form - using resolution to prove theorems - answer

Module III (12 hours)
Neural networks - introduction - motivation - notation - the back propagation method - generalization and accuracy - communication and integration - interacting agents - a modal logic of knowledge - communication among agents - speech acts - understanding language strings - efficient communication - natural language processing

Module IV (12 hours)
Programming in LISP - basic LISP primitives - Predicates - conditionals and Binding - association lists - lambda expressions - macros - I/O in LISP - Introduction to Prolog - Representing facts - Recursive Search - Abstract Data types - Meta Predicates, Matching and Evaluation, Meta Interpreters - Semantic nets & frames in prolog
### Text book

### Reference books

### Internal Continuous Assessment *(Maximum Marks-50)*
- **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: Analytical/problem solving SHORT questions**  
8x 5 marks=40 marks  
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks=60 marks  
Two questions from each module with choice to answer one question.

Maximum

*Total Marks: 100*
CS14 706(P) : Compiler Lab

Teaching scheme

3 hours practical per week

Credits: 2

Objectives

- To familiarize the design of all phases of compilers up to a stage of intermediate code generation.
- To enable the students to design and implement modern compilers for any environment.

Lab 1,2 : Generation of lexical analyzer using tools such as LEX.

Lab 3,4 : Generation of parser using tools such as YACC.

Lab 5,6 : Creation of Symbol tables.

Lab 7,8 : Creation of type checker.

Lab 9,10 : Generation of intermediate code.

References

2. Holub A.I., Compiler Design in C, Prentice Hall India

Internal Continuous Assessment (Maximum Marks-50)
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<th>Percentage</th>
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<tbody>
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**University Examination Pattern** *(Maximum Marks-100)*

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<td>70%</td>
<td>Algorithm, Program, Output</td>
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<td>20%</td>
<td>Viva Voce</td>
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<tr>
<td>10%</td>
<td>Fair Record</td>
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</table>
CS14 707(P) : Network Programming Lab

Teaching scheme
Credits: 2

3 hours practical per week

Objectives

- To teach the working of various networking protocols

Lab 1: Implementation of PC to PC file transfer using serial port and MODEM.

Lab 2,3: Software Simulation of IEEE 802.3, 802.4 and 802.5 protocols.

Lab 4,5: Software Simulation of Medium Access Control protocols
- 1) GoBackN,
- 2) Selective Repeat
- 3) Sliding Window.

Lab 6: Implementation of a subset of Simple Mail Transfer Protocol using UDP.

Lab 7,8: Implementation of a subset of File Transfer Protocol using TCP/IP

Lab 9: Implementation of "finger" utility using Remote Procedure Call (RPC)

Lab 10: Generation and processing of HTML forms using CGI.
References

1. S Richard S.W., *Unix Network Programming*, Prentice Hall India

Internal Continuous Assessment (Maximum Marks-50)

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

University Examination Pattern (Maximum Marks-100)

70%-Algorithm, Program, Output
20%- Viva Voce
10%-Fair Record
**CS14 708(P) : Project**

**Teaching scheme**

3 hours Practicals per week

**Credits**: 4

**Objectives**

- *To judge the capacity of the students in converting the theoretical knowledge into practical systems/investigative analysis.*

Project work is for duration of two semesters and is expected to be completed in the eighth semester. Each student group consisting of not more than five members is expected to design and develop a complete system or make an investigative analysis of a technical problem in the relevant area. The project may be implemented using software, hardware, or a combination of both. The project work may be undertaken in computer science engineering or allied areas like -

OS platforms: relevant to the current state of the art with support for networked environment, distributed computing and development of multi-platform applications, Internet technologies: Architectural concepts, XML, Scripting languages, Middle-ware (Component) technologies, Front end / GUI: Code development or development based on tools, RDBMS/Back End: Relevant to current state with database connectivity to different platforms, Languages: Qt, Glade or any similar 4GLs, Scripting languages and C & C-Linux (under GNU gcc) etc, Universal network applications development platforms such as JAVA, OS internals: Device drivers, RPC, Threads, Socket programming etc., Networking: Mechanisms, protocols, security etc., Embedded systems: RTOS, Embedded hardware with software for an application, Code optimization, security etc.

Project evaluation committee consisting of the guide and three/four faculty members specialised in computer science & engg. will perform the screening and evaluation of the projects.

Each project group should submit project synopsis within three weeks from start of seventh semester. Project evaluation committee shall study the feasibility of each project work before giving consent. Design is to be completed in the seventh semester.

Students should execute the project work using the facilities of the institute. However, external projects can be taken up in reputed industries, if that work solves a technical problem of the external firm. Prior sanction should be obtained from the head of department before taking up external project work and there must be an internal guide for such projects.

Each student has to submit an interim report of the project at the end of the 7th semester. Members of the group will present the project details and progress of the project before the committee at the end of the 7th semester.
50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

CS14 704(A) : Object Oriented Modelling and Design

Teaching scheme

3 hours lectures and 1 hour Tutorial per week

Credits: 4

Objectives

• To impart ideas on building systems through the object oriented modelling approach using the Unified Modelling Language.

Module I (13 hours)

Introduction to UML and Unified Process - Use case modeling: Actors and Use cases, Use case specification, Actor generalization, Use case generalization - Objects and classes, Relationships, Inheritance and Polymorphism, Packages.

Module II (14 hours)


Module III (13 hours)

Design: Design workflow, well-formed design classes, Refining analysis relationships. Interfaces and components - State machine diagrams, Composite states, submachine states

Module IV (12 hours)

Implementation workflow, Deployment, Introduction to OCL: Why OCL? OCL expression syntax, Types of OCL expressions. Introduction to Software Architecture, Architecture description language (ADL)
**Text Books**


**Reference Books**


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**Internal Continuous Assessment** *(Maximum Marks-50)*

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:** Analytical/problem solving **SHORT questions** 8 x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving **DESCRIPTIVE** questions 4 x 15 marks = 60 marks

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

*Maximum*

*Total Marks: 100*
CS14 704 (B) : Digital Image Processing
(Common with IT14 704 B)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

• To impart the introductory concepts of image processing.
• To understand all the elements of image processing beginning from formation and digitization to enhancement, restoration, edge detection, segmentation, and compression.

Module 1 (15 Hours)


Module II (12 Hours)


Module III (12 hours)

Image restoration - model of Image degradation/restoration process - noise models - inverse filtering - least mean square filtering - constrained least mean square filtering. Edge detection - thresholding - region based segmentation - Boundary representation.

Module IV (13 hours)

Syllabus - B.Tech. Computer Science and Engineering

**Text Book**


**References**


**Internal Continuous Assessment** *(Maximum Marks-50)*

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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CS14 704 (C) : Grid Computing
(Common with IT14 704 C)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

• To understand the genesis of grid computing and tool kits for facilitating grid computing
• To know the application of grid computing

Module 1 (14)


Module 2 (12)


Module 3 (12)


Module 4 (14)

Resource management and scheduling, Setting up Grid, deployment of Grid software

Syllabus - B.Tech. Computer Science and Engineering
tools, and application execution. Grids in Life Sciences - Grids in the Telecommunications Sector - Hive Computing for Transaction Processing Grids

Case Studies: GLOBUS GT3 Toolkit: - Architecture, Programming model, High level services

Text Books

Reference Books
3. Dan C Marinescu; Gabriel A Marinescu; Approaching Quantum Computing ;Pearson-2009

Internal Continuous Assessment (Maximum Marks-50)
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

Syllabus - B.Tech. Computer Science and Engineering
## University Examination Pattern

### PART A: Analytical/problem solving SHORT questions

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

### PART B: Analytical/Problem solving DESCRIPTIVE questions

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

Maximum

Total Marks: 100
CS14 704 (D) : Queuing Theory

Teaching scheme 
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To teach the fundamental queuing models and the various parameters involved with performance

Module 1(13 Hours)

Module II(14 Hours)
Steady-state solution for the M/M/1 Model - Methods of Solving Steady-state Difference Equations - Queues with parallel channels (M/M/c) - Queues with Parallel Channels and Truncation (M/M/c/K) - Erlang’s Formula (M/M/c/c) - Queues with Unlimited Service - Queues with Impatience - Transient Behaviour - Busy-Period analyses for M/M/1 and M/M/c - Bulk input (M[x]/M/1) - Bulk Service (M/M[Y]/1) - Erlang’s Models (M/Ek/1, Ek/M/1, Ej/Ek/1) - Priority Queue disciplines

Module III(12 Hours)
Series Queues - Open Jackson Networks - Closed Jackson Networks - Cyclic Queues - Extensions of Jackson Networks - Non-Jackson Networks - Single-server Queues with Poisson Input and General Service (M/G/1) - Multi server Queues with Poisson input and General Service - General Input and Exponential service

Module IV(13 Hours)
G/Ek/1, G(k)/M/1 and G/PHk/1 - General Input, General Service (G/G/1) - Multichannel Queues with Poisson input and Constant Service (M/D/c) - Semi-Markov and Markov Renewal Processes in Queueing - Other Queueing Disciplines - Design and Control of Queues - Statistical Inference in Queueing - Bounds,

Syllabus - B.Tech. Computer Science and Engineering

Text Books

References

Syllabus - B.Tech. Computer Science and Engineering
**Internal Continuous Assessment (Maximum Marks-50)**

60% - Tests (minimum 2)
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10% - Regularity in the class

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**University Examination Pattern**

**PART A: Analytical/problem solving SHORT questions**

8 x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**

4 x 15 marks = 60 marks

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

*Maximum

*Total Marks: 100*
CS14 704 (E): Simulation and Modeling (Global)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To teach the students how to reproduce real-world events or process under controlled laboratory conditions, using mainly mathematical models.

Module I (13 hours)

Introduction - systems and models - computer simulation and its applications - continuous system simulation - modeling continuous systems - simulation of continuous systems - discrete system simulation - methodology - event scheduling and process interaction approaches - random number generation - testing of randomness - generation of stochastic variates - uniform distribution - exponential distribution - Erlang distribution - gamma distribution - normal distribution - beta distribution - random samples from discrete distributions - Bernoulli - discrete uniform - binomial - geometric and poisson

Module II (13 hours)

Evaluation of simulation experiments - verification and validation of simulation experiments - statistical reliability in evaluating simulation experiments - confidence intervals for terminating simulation runs - simulation languages - programming considerations - general features of GPSS - SIM SCRIPT and SIMULA.

Module III (12 hours)


Module IV (14 hours)


Syllabus - B.Tech. Computer Science and Engineering
Reference Books

Internal Continuous Assessment *(Maximum Marks-50)*
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:** Analytical/problem solving SHORT questions \( 8 \times 5 \text{ marks}=40 \text{ marks} \)

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE \( 4 \times 15 \text{ marks}=60 \text{ marks} \)

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

*Maximum Total

Marks: 100
CS14 705 (A) : Soft Computing
(Common with IT14 705 A)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

• To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.

• To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems.

• To provide the mathematical background for carrying out the optimization associated with neural network learning.

• To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.

• To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

Module I (13 hours)

Module II (13 hours)
Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Backpropagation, Associative Learning, Competitive Networks, Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Module III (13 hours)
Introduction to Fuzzy Sets, Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

Syllabus - B.Tech. Computer Science and Engineering
Module IV (13 hours)

Advanced Topics: Support Vector Machines, Evolutionary computation (EC)-Evolutionary algorithms, Harmony search, Swarm intelligence

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Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE**  
4 x 15 marks = 60 marks

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

*Maximum*

*Total Marks: 100*
CS14 705 (B) : E-Commerce
(Common with IT14 705 B)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

• To learn the basic concepts of e commerce
• To introduces the techniques and methods of E-Commerce.

Module1(13hours)

ModuleII(13hours)

ModuleIII(13 hours)

ModuleIV(13 hours)
Security needs in E commerce environment. E commerce marketing communications- Understanding the costs and benefits of online marketing communications. Ethical, Social & Political issues in E-commerce. Online content

Syllabus - B.Tech. Computer Science and Engineering

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<tr>
<td>1. Kamlesh K Bajaj &amp; Debjani Nag, <em>E-Commerce The cutting edge of Business</em>, TMH</td>
</tr>
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Internal Continuous Assessment (Maximum Marks-50)

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: Analytical/problem solving SHORT questions 8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks = 60 marks

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

Maximum

Total Marks: 100

CS14 705(C): Software Architecture and Project Management

Teaching scheme

Credits: 4

Syllabus - B.Tech. Computer Science and Engineering
3 hours lectures and 1 hour Tutorial per week

Objectives

- To impart the basic concepts of software architecture and design patterns.
- To develop an understanding about development of complex software systems in a methodical manner.

Module I (13 hours)

Module II (13 hours)
Archetypes and Archetype Patterns, Model Driven Architecture with Archetype Patterns. Literate Modeling, Archetype Pattern. , Customer Relationship Management (CRM) Archetype Pattern, Product Archetype Pattern, Quantity Archetype Pattern, Rule Archetype Pattern. Design Patterns, Creational Patterns, Patterns for Organization of Work, Access Control Patterns, Service Variation Patterns, Service Extension Patterns

Module III (13 hours)
Object Management Patterns Adaptation Patterns, Communication Patterns, Architectural Patterns, Structural Patterns, Patterns for Distribution, Patterns for Interactive Systems Adaptable Systems, Frameworks and Patterns, Analysis Patterns Patterns for Concurrent and Networked Objects, Patterns for Resource Management, Pattern Languages, Patterns for Distributed Computing.

Module IV (13 hours)
Defining EAI, Data-Level EAI, Application Interface-Level EAI., Method- Level EAI., User Interface-Level EAI, The EAI Process - An Introduction to EAI and Middleware, Transactional Middleware and EAI, RPCs, Messaging, and EAI, Distributed Objects and EAI, Database- Oriented Middleware and EAI, Java Middleware and EAI,
Implementing and Integrating Packaged Applications—The General Idea, XML and EAI, Message Brokers—The Preferred EAI Engine, Process Automation and EAI. Layering, Organizing Domain Logic, Mapping to Relational Databases, Web Presentation, Domain Logic Patterns, Data Source Architectural Patterns, Object-Relational Behavioral Patterns, Object-Relational Structural Patterns, Object-Relational Metadata Mapping Patterns, Web Presentation Patterns, Distribution Patterns, Offline Concurrency Patterns.

Reference Books

1. Mary Shaw, David Garlan, "Software Architecture", Prentice Hall
5. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *Design Patterns: Elements of Reusable Object-Oriented Software*, Addison-Wesley Professional; 1st edition.
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<td>10% - Regularity in the class</td>
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**University Examination Pattern**

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks=40 marks  
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE**  
4 x 15 marks=60 marks questions  
Two questions from each module with choice to answer one question.  

*Maximum*  
*Total Marks: 100*
CS14 705 (D) Advanced Data Structures
(Common with IT14 705 D)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objective

- To impart the advanced concepts of data structures
- To develop understanding about advanced searching and sorting techniques.

Pre-requisite: CS14 403 Data Structures

Module I (12 Hours)

Module II (13 Hours)

Module III (14 Hours)
Graph Algorithms: DFS- BFS- Topological Sort- Bi-connected components- Cut vertices- Matching-Network flow- Advanced Structures for Priority Queues and Their Extensions- Binomial heaps- Leftist heaps -Skewed heaps- Fibonacci heaps and its amortized analysis - Applications to minimum spanning tree algorithms

Module IV (13 Hours)
External and internal sorting algorithms - Insertion Sort-Shell sort- Heap Sort- Merge Sort- Quick Sort- Radix Sort- Algorithm Analysis-Sorting Large Structures -

**Text Books**


**Reference Books**

1. Robert L. Kruse, *Data Structures and Program Design*, PHI
2. Robert Kruse, C L Tondo, Bruce Leung, Shashi Mogalla, *Data Structures And Program Design In C*, Pearson Education
3. Debasis Samanta, *Classic Data Structures*, PHI

**Internal Continuous Assessment (Maximum Marks-50)**

- **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

Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A: Analytical/problem solving SHORT questions** 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE 4 x 15 marks=60 marks questions**

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

Maximum

Total Marks: 100
CS14 705(E) : Computer Based Numerical Methods (Global)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

• To impart the basic concepts of mathematical modelling of problems in science and engineering and to know procedures for solving different kinds of problems.

• To understand the various numerical techniques which provide solutions to non linear equations, partial differential equations etc that describe the mathematical models of problems.

Module I (13 hours)


Module II (13 hours)


Module III (13 hours)


Module IV (13 hours)

Syllabus - B.Tech. Computer Science and Engineering
Statistical Computations - frequency Chart - method of least square curve fitting procedures - fitting a straight line - curve fitting by sum of exponential - data fitting with cubic splines - approximation of functions. Regression Analysis - linear and nonlinear regression - multiple regression - statistical quality control methods.

**Text Books**


**Reference Books**


**Internal Continuous Assessment** *(Maximum Marks-50)*

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: Analytical/problem solving SHORT questions 8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE 4 x 15 marks = 60 marks questions

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

Maximum

Total Marks: 100
CS14 801 : Computer Architecture and Parallel Processing

(Common with IT14 801)

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

• To teach ideas on parallel computing based computer architectures with a quantitative approach.
• To impart concepts in new design paradigms to achieve parallelism, memory hierarchy design and inter-connection networks.

Module I (13 hours)

Fundamentals - task of a computer designer - trends in technology usage and cost - performance measurement - quantitative principles of computer design - instruction set architectures - classification - addressing and operations - encoding an instruction set - role of compilers - case study - the DLX architecture - pipelining - pipeline for DLX - pipeline hazards - data and control hazards - implementation difficulties - pipelining with multicycle operations.

Module II (12 hours)

Instruction level parallelism - concepts and challenges - dynamic scheduling - dynamic hardware prediction - multiple issue of instructions - compiler and hardware support for ILP - vector processing - vector architecture - vector length and stride - compiler vectorization - enhancing vector performance

Module III (14 hours)


Module IV (13 hours)

Interconnection networks - simple networks - connecting more than two computers - practical issues - multiprocessors - introduction - application domains -
centralised-shared memory and distributed-shared memory architectures - synchronisation - models of memory consistency

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Syllabus - B.Tech. Computer Science and Engineering
Internal Continuous Assessment *(Maximum Marks-50)*

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: Analytical/problem solving SHORT questions**  
8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE**  
4 x 15 marks=60 marks

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

*Maximum*  
*Total Marks: 100*
CS14 802 Distributed Systems

**Teaching scheme**

**Credits:** 4

3 hours lecture and 1 hour tutorial per week

**Objectives**

- To impart basic knowledge of the issues concerning distributed systems, from both software and hardware viewpoints.

**Module I (12 hours)**


**Module II (13 hours)**


Naming – Names, Identifiers, and addresses – Flat Naming - Structured Naming – Attribute based Naming.

**Module III (13 hours)**


**Module IV (14 hours)**

Text Book

Reference Books
4. Hagit Attiya & Jennifer Welch, Distributed Computing, Wiley India

Internal Continuous Assessment (Maximum Marks-50)
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: Analytical/problem solving SHORT questions 8x 5 marks=40 marks
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE 4 x 15 marks=60 marks questions
Two questions from each module with choice to answer one question.

Maximum
Total Marks: 100
CS14 803 : Data Mining and warehousing

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

To give only a broad, yet in-depth overview of the field of data mining and warehousing, a multi-disciplinary field of study.

Module I (14 hours)

Fundamentals of data mining -Basic data mining tasks, Issues, DM versus KDD, Data preprocessing: data cleaning, data integration and transformation, data reduction, discretization and concept - hierarchy generation. Introduction to Data warehouse and OLAP Technology, Multidimensional data model, Star and Snowflake schema, Data warehouse architecture and implementation.

Module II (12 hours)

Classification- decision tree-performance evaluation of the classifier, comparison of different classifiers, Rule based classifier, Nearest-neighbor classifiers-Bayesian classifiers-support vector machines, Class imbalance problem

Module III (14 hours)

Association analysis -frequent item generation rule generation, evaluation of association patterns Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases-mining multidimensional Association rules -association mining to correlation analysis-constraint based association mining.

Module IV (12 hours)

Cluster analysis,-types of clusters, K means algorithm, cluster evaluation, application of data mining to web mining and Bio-informatics
### Text Books

1. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques*, Morgan Kaufmann Publishers

### Reference Books

7. Pieter Adriaans, Dolf Zantinge, *Data Mining*, Pearson Education
**Internal Continuous Assessment** *(Maximum Marks-50)*

- 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

**Note:** One of the assignments shall be simulation of continuous systems using any technical computing software

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**University Examination Pattern**

**PART A:** Analytical/problem solving **SHORT questions**  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving **DESCRIPTIVE** questions  
4 x 15 marks = 60 marks

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

*Maximum*

Total Marks: 100
CS14 806 (P): Seminar

Teaching scheme
Credits: 2

3 hours practical per week

Objectives

• To assess the ability of the student to study and present a seminar on a topic of current relevance in computer science engineering or allied areas

It enables the students to gain knowledge in any of the technically relevant current topics and acquire the confidence in presenting the topic. The student will undertake a detailed study on the chosen topic under the supervision of a faculty member, by referring to papers that are related to the topic and those which are published in reputed journals and conferences. Each student has to submit a seminar report, based on these papers without plagiarizing any parts. A committee consisting of three/four faculty members will evaluate the seminar.

Internal Continuous Assessment:

20%- Relevance of the topic and Literature Survey
50%- Presentation & Discussion
20%- Report
10%- Regularity in the class and participation in the seminar
CS14 807 (P) : Project

Teaching scheme
Credits: 4

7 hours practical per week

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.

This project work is the continuation of the project initiated in seventh semester. The performance of the students in the project work shall be assessed on a continuous basis by the project evaluation committee through progress seminars and demonstrations conducted during the semester. Each project group should maintain a log book of activities of the project. It should have entries related to the work done, problems faced, solution evolved etc.

There shall be at least an Interim Evaluation and a final evaluation of the project in the 8th semester. Each project group has to submit an interim report in the prescribed format for the interim evaluation.

Each project group should complete the project work in the 8th semester. Each student is expected to prepare a report in the prescribed format, based on the project work. Members of the group will present the relevance, design, implementation, and results of the project before the project evaluation committee comprising of the guide, and three/four faculty members specialized in computer science and engineering.

50% of the marks is to be awarded by the guide and 50% by the evaluation committee.

Internal Continuous Assessment:

40%- Development/ Simulation and Analysis
30%- Presentation & Demonstration of results
20%- Report
10%- Regularity in the class
CS14 808 (P) : Viva Voce

Objectives
To examine the knowledge acquired by the student during the B.Tech. course, through an oral examination

The students shall prepare for the oral examination based on the theory and laboratory subjects studied in the B.Tech. Course, mini project, seminar, and project. There is only university examination for viva-voce. University will appoint two external examiners and an internal examiner for viva-voce. These examiners shall be senior faculty members having minimum five years teaching experience at engineering degree level. For final viva-voce, candidates should produce certified reports of mini project, seminar, and main project. If he/she has undergone industrial training/industrial visit/educational tour or presented a paper in any conference, the certified report/technical paper shall also be brought for the viva-voce.

Allotment of marks for viva-voce shall be as given below.

40% - Subject Knowledge
30% - Project and Mini Project
20% - Seminar
10% - Industrial Training/Industrial Visit/ Educational Tour/ Paper presented
CS14 804(A): Advanced Topics in Operating Systems

(Common with IT14 804 A)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Objectives

• To teach advanced concepts related to operating systems including various categories and the complex algorithms in their management functions.

Module I (13 hours)


Module II (13 hours)


Module III (13 hours)

Shared memory – Scheduling – Failure recovery – Fault tolerance.

Module IV (13 hours)

**Text Books**

**Reference Books**

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**Internal Continuous Assessment (Maximum Marks-50)**

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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Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**  
8x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  
4 x 15 marks = 60 marks

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

*Maximum*

*Total Marks: 100*
CS14 804(B) : Information Retrieval
(Common with IT14 804 B)

Teaching scheme
3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives
• To familiarize the students with tools and techniques for deriving the right information at the right time, in the current scenario of information explosion
• To present the techniques for storage of many forms of information, such as text, image, audio and video formats, and to present several issues related to different IR tasks.

Module I (11 hours)

Module II (13 hours)
Retrieval evaluation: Performance evaluation of IR: Recall and Precision, other measures, Reference Collections, such as TREC, CACM, and ISI data sets. Query Languages: Keyword based queries, single word queries, context queries, Boolean Queries, Query protocols, query operations.

Module III (13 hours)
Text and Multimedia Languages and properties, Metadata, Text formats, Markup languages, Multimedia data formats, Text Operations. Indexing and searching: Inverted files, Suffix trees, Suffix arrays, signature files, sequential searching, Pattern matching.

Module IV (15 hours)

Syllabus - B.Tech. Computer Science and Engineering
Multimedia IR: Spatial access methods, Generic multimedia Indexing approach, Distance functions, feature extraction, Image features and distance functions. Searching the Web: Characterizing and measuring the Web. Search Engines: Centralized and Distributed architectures, user Interfaces, Ranking, Crawling the Web, Web directories, Dynamic search and Software Agents.

**Text Book**


**Reference Books**


**Internal Continuous Assessment** *(Maximum Marks-50)*

Syllabus - B.Tech. Computer Science and Engineering
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:** Analytical/problem solving SHORT questions
8x 5 marks = 40 marks
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE
4 x 15 marks = 60 marks
Two questions from each module with choice to answer one question.

*Maximum*

*Total Marks: 100*
CS14 804C: Cyber Security

Teaching scheme
Credits: 4
3 hours lecture and 1 hour tutorial per week

Objectives

- To build a comprehensive understanding of the theory behind cyber security.
- Develop an awareness of the challenges that sophisticated hackers and criminal organizations currently and potentially pose to the world’s computer systems.
- To Gain knowledge in the theory and techniques of providing IP and Web security, e-mail security and system security.

Module I (13 Hours)


Module II (13 Hours)


Module III (13 Hours)


Module IV (13 Hours)

REFERENCES:

Internal Continuous Assessment (Maximum Marks-50)
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

Syllabus - B.Tech. Computer Science and Engineering
University Examination Pattern

**PART A: Analytical/problem solving SHORT questions**

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

8x 5 marks = 40 marks

**PART B: Analytical/Problem solving DESCRIPTIVE questions**

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

4 x 15 marks = 60 marks

Maximum

Total Marks: 100

Syllabus - B.Tech. Computer Science and Engineering
CS14 804(D) : MOBILE COMPUTING

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Objectives

- To teach advanced concepts related to mobile communication including various technologies and protocols.

Module I (13 hours)


Module II (13 hours)


Module III (13 hours)


Module IV (13 hours)

Wireless security-WLAN security-cellular wireless network security-Mobile ad-hoc network security-Internet security protocols: VPNs and IPSec-Wireless middleware security-SSL for wireless web security-WAP security and WTLS. Client programming tools-using XML and UML for mobile computing -J2ME.

Syllabus - B.Tech. Computer Science and Engineering
Text Book

Reference Books
1. Amjad Umar, Mobile Computing and Wireless Communications, NGE Solutions, 2004
Internal Continuous Assessment (Maximum Marks-50)

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: Analytical/problem solving SHORT questions 8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE questions 4 x 15 marks=60 marks

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

Maximum

Total Marks: 100
CS14 804(E) : Speech and Language Processing (Global)

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

• To teach the fundamental concepts in speech processing and natural language
  processing through which human-computer dialog systems may be developed.

Module I (13 hours)

Introduction: Words, Regular Expressions and Automata, Words and Transducers, N-
grams, Part-of-Speech Tagging, Hidden Markov and maximum Entropy Models

Module II (13 hours)

Speech: Phonetics, Speech Synthesis, Automatic Speech, Recognition, Speech
Recognition : Advanced Topics, Computational Phonology

Module III (13 hours)

Syntax: Formal Grammars of English, Syntactic Parsing, Statistical Parsing, Features
and Unification, Language and Complexity

Module IV (13 hours)

Semantics and Pragmatics: The Representation of Meaning, Computational
Semantics, Lexical Semantics, Computational Lexical Semantics, Computational
Discourse Applications : Information Extraction, Question Answering and
Summarization, Dialog and Conversational Agents, Machine Translation

Text Books

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing : An
   Introduction to Natural Language Processing, Computational Linguistics,
   and Speech Recognition (Second Edition), Pearson Education, 2009

Reference Books

1. C.D.Manning and H. Schutze, Foundations of Statistical Natural Language
2. James Allen, Natural Language Understanding, 2nd Edn, Pearson Education

Syllabus - B.Tech. Computer Science and Engineering
**Internal Continuous Assessment** *(Maximum Marks-50)*

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:** Analytical/problem solving SHORT questions \[8 \times 5 \text{ marks}=40 \text{ marks}\]

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE \[4 \times 15 \text{ marks}=60 \text{ marks}\]

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

Maximum

Total Marks: 100
CS14 805 (A) : Advanced Database Design

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

- To impart knowledge on the advancements in database management systems. This covers ideas on the latest methodologies such as object oriented, distributed and deductive database systems along with comparisons and some case studies.

- to enable the student to analyze, design and implement modern database systems, especially for a distributed environment.
Module I (11 hours)
Overview of relational database concept - object oriented database - overview of object oriented concepts - object definition language - object query languages - object database conceptional design - Object relational and extended relational systems.

Module II (13 hours)
Distributed database concepts - data fragmentation replication and allocation - types of distributed database system - query process - concurrency control for distributed database - overview of client - server architecture and its relationship to distributed database

Module III (13 hours)

Module IV (15 hours)
Oracle and microsoft access - basic structure of the oracle system - database structures and its manipulation in oracle - storage organization programming oracle applications - oracle tools - an overview of Microsoft access features and functionality of access - distributed databases in oracle
Text Books

Reference Books
2. O'neil P. & O'neil E., *Database Principles, Programming, And Performance*, Harcourt Asia (Morgan Kaufman)
4. Theory T.J., *Database Modelling And Design*, Harcourt Asia (Morgan Kaufman)
Internal Continuous Assessment *(Maximum Marks-50)*

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:** Analytical/problem solving SHORT questions \(8 \times 5 \text{ marks}=40 \text{ marks}\)

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE \(4 \times 15 \text{ marks}=60 \text{ marks}\) questions

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

*Maximum

Total Marks: 100*
CS14 805 (B) Cloud Computing

Teaching scheme
Credits: 4

3 hours lecture and 1 hour tutorial per week

Objectives

• To understand the new way of computing obtaining services in information technology.

• To familiarize of the Concepts of virtualisation and tools used in cloud space.

Module I (13 hours)


Module II (13 hours)


Module III (13 hours)


Module IV (13 hours)

Cloud Offerings-Information Storage, Retrieval, Archive and Protection-Information Security-Virtual Desktop Infrastructure-Storage Cloud-Cloud Management-
Provisioning-Service-Based Model-Provisioning-Asset Management-Cloud Governance-High Availability and Disaster Recovery-Charging Models, Usage Reporting, Billing and Metering -Cloud Performance Monitoring Commands-Case studies using Google web services, Amazon web services.

**Text Books**
1. Kumar Saurabh, *Cloud Computing*, Wiley India

**Reference Books**
3. Sosinsky, *Cloud Computing*, Wiley India

**Internal Continuous Assessment (Maximum Marks-50)**
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: Analytical/problem solving SHORT questions**

8x 5 marks=40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**

4 x 15 marks=60 marks

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

Maximum

Total Marks: 100
CS14 805 (C) : Machine Learning

Teaching scheme
Credits: 4
3 hours lecture and 1 hour tutorial per week

Objectives

- To teach the fundamental concepts of Machine Learning,
- To equip the learners with techniques and methods using which machines mimic the human learning process.

Module I (10 hours)

Preliminaries - Introduction - Learning Input-Output Functions - Learning and Bias - Sample applications - Boolean Functions - Representation - Classes of Boolean Functions - Introduction to Neural Networks

Module II (14 hours)


Module III (14 hours)


Module IV (14 hours)

Syllabus - B.Tech. Computer Science and Engineering

**Text Books**

1. Ethem Alpayd


**Reference Books**


**Internal Continuous Assessment (Maximum Marks-50)**

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:** Analytical/problem solving SHORT questions  
8x 5 marks = 40 marks  
Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B:** Analytical/Problem solving DESCRIPTIVE  
4 x 15 marks = 60 marks  
Two questions from each module with choice to answer one question.

*Maximum*  
*Total Marks: 100*
CS14 805(D) : Web Programming
(Common with IT14 805 D)

Teaching scheme
Credits: 4
3 hours lecture and 1 hour tutorial per week

Objectives

- To teach the various technologies available for programming the web applications.

Module I (13 hours)

Module II (13 hours)
CGI/Perl: Creating link to a CGI Script – Using a link to send data to a CGI Script – parsing data sent to a Perl CGI script – Using CGI script to process form data – Using scalar variables in Perl – Using variables in Perl – Using arithmetic operators in Perl – Associating a form with a script.

Module III (13 hours)

Module IV (13 hours)

Syllabus - B.Tech. Computer Science and Engineering
University of Calicut


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<td>9. Floyd Marinescu, <em>EJB Design Patterns</em>,</td>
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Internal Continuous Assessment (Maximum Marks-50)

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: Analytical/problem solving SHORT questions  8 x 5 marks = 40 marks

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

PART B: Analytical/Problem solving DESCRIPTIVE  4 x 15 marks = 60 marks questions

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

Maximum

Total Marks: 100

Syllabus - B.Tech. Computer Science and Engineering
CS14 805(E) : Pattern Recognition (Global)

Teaching scheme

3 hours lecture and 1 hour tutorial per week

Credits: 4

Objectives

- To impart a basic knowledge on pattern recognition and to give a sound idea on the topics of parameter estimation and supervised learning, linear discriminant functions and syntactic approach to PR.
- To provide a strong foundation to students to understand and design pattern recognition systems.

Module I (12 hours)

Introduction - introduction to statistical - syntactic and descriptive approaches - features and feature extraction - learning - Bayes Decision theory - introduction - continuous case - 2-category classification - minimum error rate classification - classifiers - discriminant functions - and decision surfaces - error probabilities and integrals - normal density - discriminant functions for normal density

Module II (12 hours)

Parameter estimation and supervised learning - maximum likelihood estimation - the Bayes classifier - learning the mean of a normal density - general Bayesian learning - nonparametric technic - density estimation - parzen windows - k-nearest neighbour estimation - estimation of posterior probabilities - nearest-neighbour rule - k-nearest neighbour rule

Module III (13 hours)

Linear discriminant functions - linear discriminant functions and decision surfaces - generalised linear discriminant functions - 2-category linearly separable case - non-separable behaviour - linear programming procedures - clustering - data description and clustering - similarity measures - criterion functions for clustering

Module IV (15 hours)

Syntactic approach to PR - introduction to pattern grammars and languages - higher dimensional grammars - tree, graph, web, plex, and shape grammars - stochastic grammars - attribute grammars - parsing techniques - grammatical inference
Text Books

1. Duda & Hart P.E, *Pattern Classification And Scene Analysis*, John Wiley

Reference Books

1. Fu K.S., *Syntactic Pattern Recognition And Applications*, Prentice Hall, Eaglewood cliffs

Internal Continuous Assessment *(Maximum Marks-50)*

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: Analytical/problem solving SHORT questions**  \( 8 \times 5 \text{ marks}=40 \text{ marks} \)

Candidates have to answer EIGHT questions out of TEN. There shall be minimum of TWO and maximum of THREE questions from each module with total TEN questions.

**PART B: Analytical/Problem solving DESCRIPTIVE questions**  \( 4 \times 15 \text{ marks}=60 \text{ marks} \)

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

*Maximum

Total Marks: 100*